General Characteristics of Classes of New Food Products cont...

Types of New Product	General Characteristics
Creative products	Generally heavy, need for extensive research and development; therefore a costly venture. Extensive development time may be required. May require entirely new plant and equipment. Degree of creativity may require development de novo or unique equipment. Will require total revision of marketing and sales force. Creation of a new company or brand may be required. Risk of failure is high.

Fuller 2005

General Characteristics of Classes of New Food Products cont...

Types of New Product	General Characteristics
New form or size of existing product	Highly variable impact on research and development. Highly variable impact on physical plant and manufacturing capabilities. Major equipment purchases may be required if manufacturing to be done in-house. Marketing and sales resources require extensive programming.
Reformulation of existing product	Moderate research and development required with reformulation goal. Generally little impact on physical facilities. Generally little impact on marketing and sales resources unless reformulation leads to repositioning of product.

Cont'...

Causes of New Product Failures

9-3

- Overestimation of Market Size
- Product Design Problems
- Product Incorrectly Positioned, Priced or Advertised
- Costs of Product Development
- Competitive Actions

- To create successful new products, the company must:
  - understand its customers, markets and competitors,
  - develop products that deliver superior value to customers.

Type	Description	Example
Nanofiltration	Concentration of organic substances by removal of ions such as sodium; which is a new process.	To remove contaminants from a water source (such as desalination)
Reverse Osmosis	Removal of water for concentration of solution; it uses pressure to force a solution through a membrane that keeps the solids from the liquid.	Bottled water: lacks fluoride ions that are sometimes found in ground water
Ultrafiltration	Concentration of large and macromolecules; pressure forces liquid through a semi-permeable membrane so large molecules are retained while water and smaller molecules pass through the membrane.	Concentration of milk before making cheese Clarification of fruit juice
Microfiltration	Removal of bacteria and separation of macromolecules; it does not need to use pressure (as in reverse osmosis and nanofiltration)	Clarification of cranberry juice and wine filtration

NEW PRODUCT DEVELOPMENT

In business and engineering, **new product development** (NPD) covers the complete process of bringing a new product to market. A central aspect of NPD is product design, along with various business considerations. New product development is described broadly as the transformation of a market opportunity into a product available for sale.

The product can be tangible (something physical which one can touch) or intangible (like a service, experience, or belief), though sometimes services and other processes are distinguished from "products." NPD requires an understanding of customer needs and wants, the competitive environment, and the nature of the market.

Cost, time and quality are the main variables that drive customer needs. Aiming at these three variables, innovative companies develop continuous practices and strategies to better satisfy customer requirements and to increase their own market share by a regular development of new products.

Develop new products and services:

New products and services are the lifeblood of all businesses. Investing in their development isn't an optional extra - it is crucial to business growth and profitability. But embarking on the development process is risky. It needs considerable planning and organisation.

This guide will outline the key stages in the lifecycle of products and services so you know when the time is right for your business to start the development process.

It will explain how a planned and phased development process will help you make the wisest investment and budgeting decisions. It will also advise you on how best to create a development team and manage a project.

The lifecycle of products and services:

Development - at this point your product or service is only an idea. You're investing heavily in research and development.

Introduction - you launch your product or service. You're spending heavily on marketing.

Growth - your product or service is establishing itself. You have few competitors, sales are growing and profit margins are good. Now's the time to work out how you can reduce the costs of delivering the new product.

Maturity - sales growth is slowing or has even stopped. You've been able to reduce production and marketing costs, but increased competition has driven down prices. Now is likely to be the best time to invest in a new product.

Decline - new and improved products or services are on the market and competition is high. Sales fall and profit margins decline. Increased marketing will have little impact on sales and won't be cost-effective unless new markets are identified.

The project development process

- **Idea generation** - to capture new ideas.
- **Idea distillation** - to screen out those ideas not worth taking forward.
- **Concept definition** - to consider specifications such as technical feasibility and market potential. If you're planning a new product, you should consider the design process now.
- **Strategic analysis** - to ensure your ideas fit into your business' strategic plans.
- **Concept development** - to create a prototype product or pilot service.
- **Test marketing and finalising the concept** - to ensure your product or service can be modified according to customer, manufacturer and support organisations' feedback. This means deciding the best timing and process for piloting your new product or service.
- **Product launch** - the trickiest stage. Before setting a date you must determine how to sell, promote and support your product or service. Getting it right first time is essential. But any decisions to delay your launch should be balanced against the danger that your competitors will beat you to market.

Phasing new product development:

One way to minimise your risks is to phase investments in projects. By reviewing a project at the end of each phase or stage of development, you can identify products or services that are unlikely to be successful before resources are wasted. If the product or service fails to meet established criteria, the project is ditched. If it meets them, resources sufficient to enable it to reach a next, predetermined, stage are allocated.

Manage a development project:

Project managers are essential to ensure the successful development of new products or services. They'll be responsible for:

- controlling costs and allocating resources - for further information, see the page in this guide on investment and cost control
- drawing up the key parameters for the product or service's specification
- co-ordinating the product development team - for further information, see the page in this guide on creating a project team
- timetabling the development process
- troubleshooting

Timetabling the development process

Your project manager should draw up a critical path for the completion of key tasks. SMART (specific, measurable, agreed, realistic and time-limited) objectives can help to control and co-ordinate the development team's advance along this path and stages can be used to monitor progress.

However, **flexibility** must be built into your plans. Any number of unknowns can come into play and result in, for example, a change in the project's specifications or expected completion date.

IMPLEMENTING NEW TECHNOLOGY:

For all the dollars spent by American companies on R&D, there often remains a persistent and troubling gap between the inherent value of the technology they develop and their ability to put it to work effectively. At a time of

fierce global competition, the distance between technical promise and genuine achievement is a matter of especially grave concern. Drawing on their long study of the difficulties managers have had in closing this gap, the authors identify half a dozen key challenges that managers responsible for implementing new technology must surmount: their inescapably dual role, the variety of internal markets to be served, legitimate resistance to change, the right degree of promotion, the choice of implementation site, and the need for one person to take overall responsibility.

Introducing technological change into an organization presents a different set of challenges to management than does the work of competent project administration. Frequently, however, the managers responsible for shepherding a technical innovation into routine use are much better equipped by education and experience to guide that innovation's development than to manage its implementation.

A Dual Role:

Those who manage technological change must often serve as both technical developers and implementers. As a rule, one organization develops the technology and then hands it off to users, who are less technically skilled but quite knowledgeable about their own areas of application. In practice, however, the user organization is often not willing—or able—to take on responsibility for the technology at the point in its evolution at which the development group wants to hand it over.

Adoption of a marketing perspective encourages implementation managers to seek user involvement in the: (1) early identification and enhancement of the fit between a product and user needs, (2) preparation of the user organization to

receive the innovation, and (3) shifting of "ownership" of the innovation to users. We discuss the first two of these issues in this section of the article; the third we cover later.

Marketing Perspective:

That involving users in a new technology's design phase boosts user satisfaction is quite well known, but the proper extent, timing, and type of user involvement will vary greatly from company to company. For example, software developers in an electronic office equipment company established a user design group to work with developers on a strategically important piece of applications software when the program was still in the prototype stage.

Prospective users could try out the software on the same computer employed by the program's developers. The extremely tight communication loop that resulted allowed daily feedback from users to designers on their preferences and problems. This degree of immediacy may be u nusual, but managers can almost always get some information from potential users that will improve product design.

Framework for Information

Just as marketing managers carefully plan the research through which they will gather critical product information, so implementation managers must develop an iterative, almost accordion-like framework to guide decisions about when and how to collect needed information from all groups affected by an innovation. We say "accordion-like" because the process necessarily involves a search for information, a pause to digest it, and then another active period of search—cycle after cycle. What information is important—and who has it—may vary at different

stages of the implementation process, but someone must coordinate the iterative work of gathering it—and that someone is the implementation manager.

Multiple Internal Markets:

The higher the organizational level at which managers define a problem or a need, the greater the probability of successful implementation. At the same time, however, the closer the definition and solution of problems or needs are to end-users, the greater the probability of success. Implementation managers must draw up their internal marketing plans in light of this apparent paradox.

As these managers identify the individuals or groups whose acceptance is essential to an innovation's success, they must also determine whom to approach, when, and with which arguments. Top management and ultimate users have to buy into the innovation to make it succeed, but marketing an idea to these two groups requires very different approaches. How, then, can an implementation manager foster general acceptance of an innovation from such a range of constituencies? We believe this executive must view the new technology from the perspective of each group and plan an approach to each accordingly.

References :

1. ^ *A dictionary of business and management (5th ed.). Oxford [England]: Oxford University Press. 2009. ISBN 9780199234899. OCLC 277068142.*

NEW PRODUCT DEVELOPMENT

Introduction

New product development is a task taken by the company to introduce newer products in the market. Regularly there will arise a need in the business for new product development.

There are 7 stages of new product development and they are as follows:

- Idea generation.
- Idea Screening.
- Concept Development and Testing.
- Marketing Strategy Development.
- Product Development.
- Test Marketing.
- Commercialization.

1. Idea generation

A company has to generate many ideas in order to find one that is worth pursuing. The Major sources of new product ideas include internal sources, customers, competitors, distributors and suppliers.

Almost 28% of new product ideas come from watching and listening to customers. Customers: even create new products on their own, and companies can benefit by finding these products and putting them on the market.

Example – Pillsbury gets promising new products from its annual Bake-off. One of Pillsbury's four cake mix lines and several variations of another came directly from Bake-Off winners' recipes.

2. Idea screening

The second step in New product development is Idea screening. The purpose of idea generation is to create a large pool of ideas. The purpose of this stage is to pare these down to those that are genuinely worth pursuing. Companies have different methods for doing this from product review committees to formal market research.

Against these, management can assess how well the idea fits with the company's marketing skills and experience and other capabilities. Finally, the management can obtain an overall rating of the company's ability to launch the product successfully.

3. Concept development and testing

The third step in New product development is Concept Development and Testing. An attractive idea has to be developed into a Product concept. As opposed to a product idea that is an idea for a product that the company can see itself marketing to customers, a product concept is a detailed version of the idea stated in meaningful consumer terms.

4. Marketing strategy development

This is the next step in new product development. The strategy statement consists of three parts: the first part describes the target market, the planned product positioningand the sales, market share and profit goals for the first few years.

5. Product development

Here, R&D or engineering develops the product concept into a physical product. This step calls for a large investment. It will show whether the product idea can be developed into a full- fledged workable product.

6. Test marketing

If the product passes the functional tests, the next step is test marketing: the stage at which the product and the marketing program are introduced to a more realistic market settings. Test marketing gives the marketer an opportunity to tweak the marketing mix before the going into the expense of a product launch.

7. Commercialization

The final step in new product development is Commercialization. Introducing the product to the market – it will face high costs for manufacturing and advertising and promotion. The company will have to decide on the timing of the launch and the location. This depends a lot on the ability of the company to bear risk and the reach of its distribution network.

Idea sources

Six Great source of idea generation for new product development :

Two types of sources

- Internal sources
- External sources

Internal sources

❖ R & D (Research and Development):

It is the formal department of any organization to generate new ideas. R&D department research according to the company's future plan and then come up with the new ideas which complete its journey with the

commercialization of the idea. One recent survey showed that traditional R&D only contribute less than 15% of the ideas of the organization.

❖ Employees:

Companies can use the brain of their employees. If customers are the Oxygen of any company then employees are the heart of that company. All level of employees from executive to top management can be the great source of ideas. One recent research showed that almost 45% of the ideas come from the employees. Many companies now use web technology to get the ideas from their internal employees. In that web, form employees can share their ideas about a new product. However, picking up the great idea of it and rewarding the employees can encourage your employees to be more creative and contribute more in future.

External sources

❖ Customers:

Most probably customers are the most important sources to get new product development ideas. The customer knows best what they need and what they are looking for. It is the most important thing to deliver satisfaction by providing exactly what your customers want. For instances, when you know that your customer needs a specific product or a special feature on any particular product then it will be easier to make that exactly what your customer need and then you will get satisfied customers. This way you can build a long-term relationship.

❖ Distributors and Suppliers:

Distributors works very closely with the market and they know consumer problems and their need. Distributors can give the ideas for new product possibilities. Suppliers can also help with the information of the market like a new concept, technique or materials which can be used for developing new products.

❖ Competitors:

Competitors are another important source. One can analyze their competitors and can find many things which can be used for idea generation. Researching competitors can give you the idea that which thing you are missing or which thing they are missing, you can decide then what things you need to include in your new product. Remember your competitors are not your enemy, they are your strength.

❖ Others:

Other idea sources includes outside Consultancies, Design Firms and Online Communities, Trade Magazines, Shows and Seminars, Government agencies, Advertising agencies, Marketing research firms, Universities, Commercial laboratories, Inventories and so on.

Unit - V

MARKETING MANAGEMENT CONCEPT

The marketing concept is the strategy that firms implement to satisfy customers needs, increase sales, maximize profit and beat the competition.... Marketing is a department of management that tries to design strategies that will build profitable relationships with target consumers.

5 MARKETING CONCEPTS EXPLAINED WITH EXAMPLES

1. Production concept,
2. Product concept,
3. Selling concept,
4. Marketing concept,
5. Societal marketing concept.

PRODUCTION CONCEPT:

The idea of production concept – "consumers will favor products that are available and highly affordable". This concept is one of the oldest Marketing management orientations that guide sellers.

The production concept can lead to marketing myopia. Management focuses on improving production and distribution efficiency.

PRODUCT CONCEPT :

The product concept holds that the consumers will favor products that offer the most in quality, performances and innovative features.

Marketing strategies are focused on marking continuous product improvements.

Product quality and improvement are important parts of marketing strategies, sometimes the only part.

SELLING CONCEPT:

The selling concept holds th idea-"consumers will not buy enough of the firm's products unless it undertakes a large – scale selling and promotion effort".

Here the management focuses on creating sales transactions rather than on building long term, profitable customers relationships.

MARKETING CONCEPT:

The marketing concept holds-"achieving organizational goals depends on knowing the needs

and wants of target markets and delivering the desired satisfactions better than competitors do".

MARKETING AND FOUR FUNCTIONS OF MANAGEMENT:

- Planning Function
- Organizing Function
- Controlling Function
- Directing Function

SOCIETAL MARKETING CONCEPT:

The idea that the organization should determine the needs, wants, and interests of target markets and deliver the desired satisfactions more effectively and efficient than competitors in a way that maintains or well-being.

Rebar

USING EXISTING TECHNOLOGY

INTRODUCTION:

The term new product can mean different things. Six different categories of new products can be identified that are all quite different from each other. Still, they are all called new products. Let's investigate the different categories of new products and what the term new product may actually mean.

The six categories of new products range from new-to-the-world products (sometimes called *really new products*), as well as a range of minor repositionings and cost reductions.

The Six Categories of New Products:

As you see, we have to broaden our definition of new products to include the following six categories of new products.

1. New-to-the-world Products :

The alternative expression for new-to-the-world products (really new products) already indicates that this is what most people would define as a new product. These products are inventions that create a whole new market. Examples: cookies and cakes.

2. New-to-the-firm Products :

Products that take a firm into a category new to it. The products are not new to the world, but are new to the firm. The new product line raises the issue of the imitation product: a "me-too". Examples: coffee.

3. Additions to existing Product Lines:

These are simple line extensions, designed to flesh out the product line as offered to the firm's current markets. Examples: Liquid drinks, snack bars, and cereals.

4. Improvements and Revisions to existing Products:

Current products made better. Examples: Beverages,chips,crisps,corn snacks.

5.Repositioning:

A company may discover that one of its products already existing in the market has another good usage. To make sure that profit flows from this, they can release it again with such revelation. This would put the product in the category of repositioning.

6. Reduction in cost:

This category has to do with products that are expensive, but can be made affordable for both the company and consumers. Change in materials or outsourcing the jobs to developing countries is the strategy used for this. Such a turn can certainly bring in more consumers who before could not afford its price. But the main disadvantage is low quality. Cheap materials can force the product to expire quicker.

Development of New Products for an Existing Market:

Product development can occur at a variety of levels and it is helpful to distinguish between them. They include the addition

of product features, the expansion of the product line, the development of new-generation technologies, and the development of new products for the existing market.

New product development:

New product development is a term often used by the management and marketing department of firms. It describes the process of changing the form, components, materials, marketing or packaging of a product, and it differs from innovation in that it does not usually involve invention.

EXISTING TECHNOLOGY:

- Product R&D: A look at how platforms are democratizing R&D talent, the ways AI is helping materials science, and how the drafting board of tomorrow could be an AR or VR headset.
- Resource Planning & Sourcing: On-demand decentralized manufacturing and block chain projects are working on the complexities of integrating suppliers.
- Operations Technology Monitoring & Machine Data: A look at the IT stack and platforms powering future factories. First, factories will get basic digitization, and further along we'll see greater predictive power.
- Machining, Production & Assembly: Modular equipment and custom machines like 3D printers are enabling manufacturers to handle greater demand for variety.
- Quality Assurance (QA): A look at how computer vision will find imperfections, and how software and block chain tech will more quickly be able to identify problems (and implement recalls).

CONCEPT TESTING :

Concept testing (to be distinguished from **pre-test markets** and **test markets** which may be used at a later stage of product development research) is the process of using surveys (and sometimes qualitative methods) to evaluate consumer acceptance of a new product idea prior to the introduction of a product to the market. It is **important not to confuse** concept testing with advertising testing, brand testing and packaging testing; as is sometimes done. Concept testing focuses on the basic product idea, without the embellishments and puffery inherent in advertising.

It is important that the instruments (questionnaires) to test the product have a high quality themselves. Otherwise, results from data gathered surveys may be biased by measurement error. That makes the design of the testing procedure more complex. Empirical tests provide insight into the quality of the questionnaire. This can be done by:

- conducting cognitive interviewing. By asking a faction of potential-respondents about their interpretation of the questions and use of the questionnaire, a researcher can verify the viability of the cognitive interviewing.

- carrying out a small pretest of the questionnaire, using a small subset of target respondents. Results can inform a researcher of errors such as missing questions, or logical and procedural errors.
- estimating the measurement quality of the questions. This can be done for instance using test-retest,[3] quasi-simplex,[4] or mutlitrait-multimethod models.[5]
- predicting the measurement quality of the question. This can be done using the software Survey Quality Predictor (SQP).[6]

Concept testing in the new product development (NPD) process is the concept generation stage. The concept generation stage of concept testing can take on many forms. Sometimes concepts are generated incidentally, as the result of technological advances. At other times concept generation is deliberate: examples include brain-storming sessions, problem detection surveys and qualitative research. While qualitative research can provide insights into the range of reactions consumers may have, it cannot provide an indication of the likely success of the new concept; this is better left to quantitative concept-test surveys.

In the early stages of concept testing, a large field of alternative concepts might exist, requiring concept-screening surveys. Concept-screening surveys provide a quick means to narrow the field of options; however they provide little depth of insight and cannot be compared to a normative database due to interactions between concepts. For greater insight and to reach decisions on whether or not pursue further product development, monadic concept-testing surveys must be conducted.

Frequently concept testing surveys are described as either monadic, sequential monadic or comparative. The terms mainly refer to how the concepts are displayed:

1.) Monadic. The concept is evaluated in isolation. 2.) Sequential monadic. Multiple concepts are evaluated in sequence (often randomized order). 3.) Comparative. Concepts are shown next to each other. 4.) Proto-monadic. Concepts are first shown in sequence, and then next to each other.

"Monadic testing is the recommended method for most concept testing. Interaction effects and biases are avoided. Results from one test can be compared to results from previous monadic tests. A normative database can be constructed.[7] However, each has its specific uses and it depends on the research objectives. The decision as to which method to use is best left to experience research professionals to decide, as there are numerous implications in terms of how the results are interpreted.

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- 1 Evaluating concept-test scores
- 2 Determining the importance of concept attributes as purchase drivers
- 3 See also
- 4 References

Evaluating concept-test scores

Traditionally concept-test survey results are compared to 'norms databases'.[8] These are databases of previous new-product concept tests. These must be 'monadic' concept tests, to prevent interaction effects. To be fair, it is important that these databases contain 'new' concept test results, not ratings of old products that consumers are already familiar with; since once consumers become familiar with a product the ratings often drop. Comparing new concept ratings to the ratings for an existing product already on the market would result in an invalid comparison, unless special precautions are taken by researchers to reduce or adjust for this effect quantitatively. Additionally, the concept is usually only compared to norms from the same product category, and the same country.

Companies that specialize in this area, tend to have developed their own unique systems, each with its own standards. Keeping to these standards consistently is important to preventing contamination of the results.

Perhaps one of the famous concept-test systems is the Nielsen Bases system, which comes in different versions. Other well-known products include Decision Analyst's 'Concept Check', Acupoll's 'Concept Optimizer', Ipsos Innoquest and GFK. Examples of smaller players include Skuuber and Acentric Express Test.

Volumetric concept testing

Volumetric concept testing falls somewhere between traditional concept testing and pre-test market models (simulated test market models are similar but emphasize greater realism) in terms of the level of complexity. The aim is to provide 'approximate' sales volume forecasts for the new concept prior to launch. They incorporate other variables beyond just input from the concept test survey itself, such as the distribution strategy.

Examples of volumetric forecasting methodologies include 'Acupoll Foresight'[9] and Decision Analyst's 'Conceptor'.[10]

Some models (more properly referred to as 'pre-test market models' or 'simulated test markets')[11] gather additional data from a follow-up product testing survey (especially in the case of consumer packaged goods as repeat purchase rates need to be estimated). They may also include advertisement testing component that aims to assess advertising quality. Some such as Decision Analyst, include discrete choice models / conjoint analysis.

Prototype product

[1][5]A **prototype** is an early sample, model, or release of a product built to test a concept or process or to act as a thing to be replicated or learned from.[1] It is a term used in a variety of contexts, including semantics, design, electronics, and software programming. A prototype is generally used to evaluate a new design to enhance precision by system analysts and users.[2] Prototyping serves to provide specifications for a real, working system rather than a theoretical one.[3] In some design workflow models, creating a prototype (a process sometimes called **materialization**) is the step between the formalization and the evaluation of an idea.[4]

The word *prototype* derives from the Greek πρωτότυπον *prototypon*, "primitive form", neutral of πρωτότυπος *prototypos*, "original, primitive", from πρῶτος *protos*, "first" and τύπος *typos*, "impression".

Contents

- 1Basic prototype categories
- 2Differences in creating a prototype vs. a final product
- 3Characteristics and limitations of prototypes
- 4Engineering sciences
  - 4.1Mechanical and electrical engineering
  - 4.2Electronics prototyping
- 5Computer programming/computer science
  - 5.1Data prototyping
- 6Scale modeling
- 7Metrology
- 8Natural sciences
- 9See also
- 10References

Basic prototype :

- A **Proof-of-Principle Prototype** serves to verify some key functional aspects of the intended design, but usually does not have all the functionality of the final product.
- A **Working Prototype** represents all or nearly all of the functionality of the final product.
- A **Visual Prototype** represents the size and appearance, but not the functionality, of the intended design. A **Form Study Prototype** is a preliminary type of visual prototype in which the geometric features of a design are emphasized, with less concern for color, texture, or other aspects of the final appearance.
- A **User Experience Prototype** represents enough of the appearance and function of the product that it can be used for user research.
- A **Functional Prototype** captures both function and appearance of the intended design, though it may be created with different techniques and even different scale from final design.[6][7]
- A **Paper Prototype** is a printed or hand-drawn representation of the user interface of a software product. Such prototypes are commonly used for early testing of a software design, and can be part of a software walkthrough to confirm design decisions before more costly levels of design effort are expended.[8]

Differences in prototype in products

Material: The materials that will be used in a final product may be expensive or difficult to fabricate, so prototypes may be made from different materials than the final product. In some cases, the final production materials may still be undergoing development themselves and not yet available for use in a prototype.

Process: Mass-production processes are often unsuitable for making a small number of parts, so prototypes may be made using different fabrication processes than the final product. For example, a final product that will be made by plastic injection molding will require expensive custom tooling, so a prototype for this product may be fabricated by machining or stereolithography instead. Differences in fabrication process may lead to differences in the appearance of the prototype as compared to the final product.

Verification: The final product may be subject to a number of quality assurance tests to verify conformance with drawings or specifications. These tests may involve custom inspection fixtures,

statistical sampling methods, and other techniques appropriate for ongoing production of a large quantity of the final product. Prototypes are generally made with much closer individual inspection and the assumption that some adjustment or rework will be part of the fabrication process. Prototypes may also be exempted from some requirements that will apply to the final product.

Characteristics and Limitations of prototypes :

Engineers and prototyping specialists seek to understand the limitations of prototypes to exactly simulate the characteristics of their intended design.

It is important to realize that by their very definition, prototypes will represent some compromise from the final production design. Due to differences in materials, processes and design fidelity, it is possible that a prototype may fail to perform acceptably whereas the production design may have been sound. A counter-intuitive idea is that prototypes may actually perform acceptably whereas the production design may be flawed since prototyping materials and processes may occasionally outperform their production counterparts.

Data prototyping :

The objectives of *data prototyping* are to produce:

- A set of data cleansing and transformation rules which have been *seen* to produce data which is all fit for purpose.
- A dataset which is the result of those rules being applied to an instance of the relevant raw (source) data.

To achieve this, a data architect uses a graphical interface to interactively develop and execute transformation and cleansing rules using raw data. The resultant data is then evaluated and the rules refined. Beyond the obvious visual checking of the data *on-screen* by the data architect, the usual evaluation and validation approaches are to use Data profiling software and then to insert the resultant data into a test version of the target application and trial its use.

Naturnal sciences

In many sciences, from pathology to taxonomy, prototype refers to a disease, species, etc. which sets a good example for the whole category. In Biology, prototype is the ancestral or primitive form of a species or other group; an archetype.[18] For example, the Senegal bichir is regarded as the prototypes of its genus, *Polypterus*.

NEW PRODUCT PROCESS DEVELOPMENT:

New product development (NPD) covers the complete process of bringing a new product to market. A central aspect of NPD is product design, along with various business considerations. New product development is described broadly as the transformation of a market opportunity into a product available for sale. The product can be tangible (something physical which one can touch) or intangible (like a service, experience, or belief), though sometimes services and other processes are distinguished from "products".

NPD requires an understanding of customer needs and wants, the competitive environment, and the nature of the market. Cost, time and quality are the main variables that drive customer needs. Aiming at these three variables, innovative companies develop continuous practices and strategies to better satisfy customer requirements and to increase their own market share by a regular development of new products. There are many uncertainties and challenges which companies must face throughout the process. The use of best practices and the elimination of barriers to communication are the main concerns for the management of the NPD.

PROCESS STRUCTURE:

The product development process typically consists of several activities that firms employ in the complex process of delivering new products to the market. A process management approach is used to provide a structure. Product development often overlaps much with the engineering design process, particularly if the new product being developed involves application of math and/or science.

Every new product will pass through a series of stages/phases, including ideation among other aspects of design, as well as manufacturing and market introduction. In highly complex engineered products (e.g. aircraft, automotive, machinery), the NPD process can be likewise complex regarding management of personnel, milestones and deliverables. Such projects typically use an integrated product team approach. The process for managing large-scale complex engineering products is much slower (often 10-plus years) than that deployed for many types of consumer goods.

The product development process is articulated and broken down in many different ways, many of which often include the following phases/stages:

1. **Fuzzy front-end** (FFE) is the set of activities employed before the more formal and well defined requirements specification is completed. Requirements speak to what the product should do or have, at varying degrees of specificity, in order to meet the perceived market or business need.
2. **Product design** is the development of both the high-level and detailed-level design of the product: which turns the *what* of the requirements into a specific *how* this particular product will meet those requirements. This typically has the most overlap with the engineering design process, but can also include industrial design and even purely aesthetic aspects of design. On the marketing and planning side, this phase ends at pre-commercialization analysis stage.
3. **Product implementation** often refers to later stages of detailed engineering design (e.g. refining mechanical or electrical hardware, or software, or goods or other product forms), as well as test process that may be used to validate that the prototype actually meets all design specifications that were established.
4. **Fuzzy back-end** or commercialization phase represent the action steps where the production and market launch occur.

The front-end marketing phases have been very well researched, with valuable models proposed. Peter Koenetal. provides a five-step front-end activity called front-end innovation: opportunity identification, opportunity analysis, idea genesis, idea selection, and idea and technology development. He also includes an engine in the middle of the five front-end stages and the possible outside barriers that can influence the process outcome. The engine represents the management driving the activities described. The front end of the innovation is the greatest area of weakness in the NPD process. This is mainly because the FFE is often chaotic, unpredictable and unstructured.

Engineering design is the process whereby a technical solution is developed iteratively to solve a given problem. The design stage is very important because at this stage most of the product life cycle costs are engaged. Previous research shows that 70–80% of the final product quality and 70% of the product entire life-cycle cost are determined in the product design phase, therefore the design-manufacturing interface represent the greatest opportunity for cost

reduction Design projects last from a few weeks to three years with an average of one year.

Design and Commercialization phases usually start a very early collaboration. When the concept design is finished it will be sent to manufacturing plant for prototyping, developing a Concurrent Engineering approach by implementing practices such as QFD, DFM/DFA and more. The output of the design (engineering) is a set of product and process specifications – mostly in the form of drawings, and the output of manufacturing is the product ready for sale.

Basically, the design team will develop drawings with technical specifications representing the future product, and will send it to the manufacturing plant to be executed. Solving product/process fit problems is of high priority in information communication design because 90% of the development effort must be scrapped if any changes are made after the release to manufacturing.

NPD PROCESS:

1. **New Product Strategy** – Innovators have clearly defined their goals and objectives for the new product.
2. **Idea Generation** – Collective brainstorming through internal and external sources.
3. **Screening** – Condense the number of brainstormed ideas.
4. **Concept Testing** – Structure an idea into a detailed concept.
5. **Business Analysis** – Understand the cost and profits of the new product and determining if they meet company objectives.
6. **Product Development** – Developing the product.
7. **Market Testing** – Marketing mix is tested through a trial run of the product.
8. **Commercialization** – Introducing the product to the public.

PUBLIC HEALTH CLEARANCE:

Public health has been defined as "the science and art of preventing disease, prolonging life and promoting human health through organized efforts and informed choices of society, organizations, public and private, communities and individuals". Analyzing the health of a population and the threats it faces is the basis for public health. The *public* can be as small as a handful of people or as

large as a village or an entire city; in the case of a pandemic it may encompass several continents. The concept of *health* takes into account physical, psychological and social well-being. As such, according to the World Health Organization, it is not merely the absence of disease or infirmity. Public health is an interdisciplinary field.

For example, epidemiology, biostatistics and management of health services are all relevant. Other important subfields include environmental health, community health, behavioral health, health economics, public policy, mental health, occupational safety, gender issues in health, and sexual and reproductive health.

Public health aims to improve the quality of life through prevention and treatment of disease, including mental health. This is done through the surveillance of cases and health indicators, and through the promotion of healthy behaviors. Common public health initiatives include promotion of hand washing and breastfeeding, delivery of vaccinations, suicide prevention, and distribution of condoms to control the spread of sexually transmitted diseases.

Modern public health practice requires multidisciplinary teams of public health workers and professionals. Teams might includee pidemiologists, biostatisticians, medical assistants, public health nurses, midwives, medical microbiologists, economists, sociologists, geneticists, data managers, and physicians. Depending on the need, environmental health officers or public health inspectors, bioethicists, and even veterinarians, gender experts, or sexual and reproductive health specialists might be called on. Access to health care and public health initiatives are difficult challenges in developing countries. Public health infrastructures are still forming in those countries.

BACKGORUND:

The focus of a public health intervention is to prevent and mitigate diseases, injuries and other health conditions through surveillance of cases and the promotion of healthy behaviors, communities and environments. Many diseases are preventable through simple, nonmedical methods. For example, research has shown that the simple act ofhandwashing with soap can prevent the spread of many contagious diseases In other cases, treating a disease or controlling a pathogen can be vital to preventing its spread to others, either during an outbreak of infectious disease or through contamination of food or water supplies. Public health communications programs, vaccination programs and distribution of condoms are examples of common preventive public health measures. Measures

such as these have contributed greatly to the health of populations and increases in life expectancy.

Public health plays an important role in disease prevention efforts in both the developing world and in developed countries through local health systems and non-governmental organizations. The World Health Organization (WHO) is the international agency that coordinates and acts on global public health issues. Most countries have their own governmental public health agency, often called the ministry of health, with responsibility for domestic health issues.

In the United States, state and local health departments are on the front line of public health initiatives. In addition to their national duties, the United States Public Health Service(PHS), led by the Surgeon General of the United States, and the Centers for Disease Control and Prevention, headquartered in Atlanta, are also involved with international health activities.

In Canada, the Public Health Agency of Canada is the national agency responsible for public health, emergency preparedness and response and infectious and disease control and prevention. The Public health system in India is managed by the Ministry of Health & Family Welfare of the government of India with state-owned health care facilities.

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PACKAGED PRODUCT STORAGE STUDIES

INTRODUCTION:

Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the process of designing, evaluating, and producing packages. Packaging can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells. In many countries it is fully integrated into government, business, institutional, industrial, and personal use.

PACKAGED PRODUCT STORAGE STUDIES:

I. Compliance:

As a supplier to the rail industry, you are required to develop packaging systems and use packaging materials which are consistent with regulations established by Federal, State, Provincial or local governments wherever your package is discarded (i.e. recycled, reused, disposed of etc.). U. S. and Canadian regulations have been established for the packaging of materials determined to be hazardous. Included in this category are explosives, compressed gases, flammables, oxidizing materials, poisons, irritating materials, etiologic agents, blasting agents, radioactive materials, corrosives, and hazardous wastes. All suppliers shipping these types of material are required to adhere to the most restrictive of these regulations. The supplier has ultimate

responsibility for assuring that their packaging is in compliance with current regulations.

2.With RailCIS Packaging Standards and Guidelines:

Railroad industry suppliers will be requested by individual railroad industry customers to comply with these packaging standards and guidelines and therefore, it is expected that suppliers will adhere to them. Furthermore, the RailCIS Quality Systems Standards Subcommittee (QSSS) requires that supplier "Preservation and Packaging" be audited relative to the standards contained herein when evaluating quality products and processes. Packaging Standards have been developed for high volume usage parts or parts presenting initial packaging problems. These Standards take precedence over the Guidelines which have been developed for parts presenting common characteristics such as dimensions, weight, fragility and usage. It is recognized however that returnable containers represent the best environmental packaging solution and therefore, if a supplier obtains the agreement of a railroad industry customer to use returnable container(s), then those agreements, for the concerned customers, take precedence over the Guidelines and Standards contained in this Manual.

II. Environmental Packaging Considerations:

Implemented, proposed and/or impending Federal and State legislation prohibits wasteful and/or excessive packaging. The challenge then is to meet these requirements with the amount and degree of packaging required without excess. Overpackaging and wasteful "just in case" packaging is undesirable for both the supplier and the user.

Non-recyclable packaging is that which has no available or economical system in place to reprocess the material used. Wax-coated corrugated is a prime example of this type of packaging.

Wax or plastic coated paper is prohibited because it contaminates the recycling process.

3. Non-kraft corrugated has no recycle value and therefore is unacceptable. Recycling centers will not accept it, therefore, rail industry suppliers shall not use it.
4. The use of lead and cadmium in packaging and/or labeling material is strictly prohibited.
5. Plastic plugs, caps and protectors are extremely difficult to recycle due to oil and paint contamination, colors, uncertainty of resin type, and transportation costs. Every effort should be made to reduce the use of plastic. If it cannot be eliminated, other changes can be made to assist with the effectiveness of the packaging:

a. Mold the Society of the Plastics Industry (SPI) code into the part. When elimination is not possible these codes will allow for effective recycling.
b. Clear Linear Low Density PolyEthylene (LLDPE) plastics are preferred and can be effectively recycled.
c. Shipping plastics must not be contaminated with paints and lubricants.
d. When at all possible, replace plastic with a recyclable paper substitute.

III. General Packaging Requirements:

Essential Packaging Functions:

It is expected that the packaging perform a number of functions during transportation, storage and use, including:

- Containment of the product to ensure integrity and safety
- Protection of the product from physical damage
- Convenience of use and ease of handling by users
- Compliance to legal and regulatory requirements
- Communication of information
- Environmental acceptability and ease of disposal and/or recycling

Handling and Ergonomics:

All containers and packaging must be designed with consideration given to ergonomics and ease of part removal. Appropriate consideration must be given to unit load height restrictions, weight restrictions, carton disassembly and other requirements which may affect ergonomics and worker safety.

Manual Material Handling Guidelines The following standards have been adopted from research guidelines and principles designed to reduce the risk factors associated with causing back injuries:

1. Any package which may be manually handled should not exceed standard dimensions of 30″ length by 20″ width by 18″ depth. This includes packages unitized on pallets which are moved by forktruck but are manually placed onto the pallet.
2. Large boxes, bins, or waist carts which are used to hold more than one part should not be higher than 24 inches from the floor in order to allow easy accessibility to the center of the package when reaching for an item.

Acceptable Loads The guidelines below are based on manual material handling techniques which allow the package to be carried close to the body and which do not require excessive bending or squatting:

1. All containers designed to allow manual handling must not exceed 35 lbs. maximum weight, even if palletized. The exception to this requirement is packaging for fasteners.
2. The weight of the package should be clearly written on all four sides and the top of the container.
3. Packages which are greater than 35 lbs. in weight increase the risk of injury if they are manually handled. These packages should be designed in such a way that they will enhance mechanical movement and discourage any manual handling.

Handholds In order to reduce the mechanical stress placed on the hand while the carton is being carried, the handhold should have the minimum dimensions of 4½" length and 1" minimum curvature or width of edge.

1. The handholds should be located so that when the item is picked up the side walls do not come in contact with the legs. More specifically, the handholds should be located slightly above the package's center of gravity.
2. Any package which is too broad to be lifted by both hands can be lifted by one hand if the package is no greater than 5" deep and if it has cut-in handholds located no greater than 16" from the top of the package. This allows the package to be carried at the side under one arm.

Fastener Packaging All fasteners (nuts, bolts, washers, screws, etc.) must be packaged with a maximum gross weight of 50 lbs. and should be unitized according to the Unit Load Containment Guidelines. Use of the standard small parts returnable container is also recommended.

Unique Packaging Requirements Unique packaging requirements dictated by part characteristics such as rust prevention, weight, fragility and surface appearance which are not covered by these Guidelines or the packaging standards are the responsibility of the parts suppliers.

Minimum Packaging Requirements:

For each part, a realistic minimum level of packaging should be established which provides adequate functionality. Suppliers should continually review these minimum requirements and recognize that there are regulated minimum standards for some items such as hazardous materials.

Packaging Design Reviews:

Suppliers should conduct ongoing reviews of all packaging designs to ensure they are consistent with these Guidelines and reflect currently available technology and materials.

Packaging Reduction:

Consideration should be given to eliminating all unnecessary packaging materials wherever possible. A priority should be placed on reducing material by weight and volume. Unnecessary materials and packaging for overprotection are unacceptable.

Packaging Reusability:

Suppliers should identify those opportunities where packaging can be designed to promote reuse, for its originally intended function or other uses.

Packaging for Recyclability

Suppliers should determine how their packaging can be made more recyclable. To aid recycling efforts companies should design packaging to be easily separable when made of different materials. All packaging components should carry information (e.g. symbols) to identify material type.

Incorporation of Recycled Materials:

Suppliers are encouraged to determine where and how much recycled material can be incorporated into packaging designs while also providing adequate performance. Supplier purchasing practices should provide preference for recycled materials where economically and functionally justifiable.

IV. Bar Code Symbology & Label Requirements:

. Scope:

This section of the Guidelines defines the proper use of bar code symbols generated on labels which are used to identify material, containers, and documentation covering parts shipped from suppliers. Guidelines for the printing and application of bar coded labels are provided herein. These labels are designed to

improve productivity for both customers and suppliers by providing information in a machine readable form.

Label Concept:

The purpose of a bar code label is to facilitate the movement of goods and the exchange of data among all members within a channel of distribution (suppliers, carriers, customers and others). The amount of data (bar code as well as human readable text) needed on a label is a function of the needs of the trading partners involved. When a bar code label is used in conjunction with computerized data bases and Electronic Data Interchange (EDI) and Advanced Shipment Notification (ASN), the amount of data needed on a label may be reduced significantly.

DEVELOPMENT OF CONSUMER PACKAGE FOR FRESH VEGETABLES & FRUITS :

The following 5 types of fresh vegetables are selected to develop the consumer package

- Snow peas
- Snap Peas
- Asparagus
- Cherry Tomatoes
- Grapes

PSRD

RESEARCH TIMING AND QUALITY CONTROL

INTRODUCTION:

In a changing market, staying competitive often requires the development of new products. As consumer tastes and needs change, products must also change. Developing new products, however, is a risky and costly venture. Experts estimate that eight out of ten new products fail. With such formidable odds, it pays to be informed and prepared to meet the challenges of introducing a new product. Market research is an essential tool to help boost the chances for success.

The new product development process has at least six stages. In each stage, information about the market and consumers is needed to support critical decisions about the product. The list below outlines the stages of product development, information needed at each stage, and research techniques that may be helpful.

RESEARCH TIMING:

1. Opportunity identification. To start, you should seek holes in the market that might be opportunities. At this stage, the following information gathering techniques are useful: focus groups, consumer surveys, analysis of customer suggestions and complaints, brainstorming, industry research (size of market, consumption patterns), and analysis of competitors' products. From the beginning, remember that your customers are an important source of information. Make them a part of your product development team by listening to their suggestions and complaints.

2. Concept screening. Next, you will move from generating ideas to testing ideas. In concept screening, you describe the product idea to potential customers and consumers do not like the idea of your product, the physical product will probably not do well either. Concept screening allows for the evaluation of winners and losers early in product development before substantial resources are committed to a product's development. At this stage, focus groups and consumer surveys are useful research methods. Be sure to conduct research in the product's target market so that the results accurately reflect the potential consumers.

3. Marketing strategy development. Next, you will set a plan for your marketing mix (the four Ps):

- Product. Define your product in terms of varieties, quality, design, features, brand, packaging, sizes, service, and warranties.

- Price. Develop a pricing strategy. Consider how you will use list price, discounts, allowances, payment periods, and credit terms.

- Place Consider the best locations to reach your target market. Also consider transportation, inventory, and storage.

- Promotion

4. Product development. At this stage, using the information you have collected and the decisions you have made about the 4 Ps, you will design and create the physical product, as well as its packaging, name, logo, and advertising. Research at this stage usually involves repeated cycles of product improvement and testing. Product testing includes both physical performance (e.g., shelf stability) and consumer reactions. Some research techniques useful at this stage are surveys, tasting panels, and in-home placement testing.

5. Market testing. This stage is a last check on the product before it enters the market. At this point, product performance tests are complete. Market testing aims to evaluate advertising, awareness, and usage (AAU) of the product in test markets. The techniques used include simulated store testing and controlled test marketing. Some marketing research firms offer AAU studies.

6. Product introduction. As you introduce the product to the market, you should test the distribution of the product. Is the product getting on the shelves. Is it getting a favorable presentation on the shelves Again, evaluating advertising, awareness, and usage is important. For companies that do not have in-house research capabilities, market research consulting firms can provide needed services. However, whether in-house or out-sourced, market research can be expensive. Many companies do not invest in all of the techniques mentioned above. In deciding what kind of investment to make in marketing research, your company must balance the risk of product failure with the costs of marketing research. Marketing research is not only costly, but it also takes time. In selecting marketing research techniques, you must balance the needs of your schedule. If you want to enter a market quickly, you may not have time to complete all of the marketing research studies mentioned above. Again, balancing your resources and your risks is key in your decisions about marketing research.

QUALITY CONTROL:

The purpose of the testing is to determine any needs for corrective actions in the manufacturing process. Good quality control helps companies meet consumer demands for better products.

Quality control (QC) is a process through which a business seeks to ensure that product quality is maintained or improved with either reduced or zero errors. Quality control requires the business to create an environment in which both management and employees strive for perfection. This is done by training personnel, creating benchmarks for product quality and testing products to check for statistically significant variations.

A major aspect of quality control is the establishment of well-defined controls. These controls help standardize both production and reactions to quality issues. Limiting room for error by specifying which production activities are to be completed by which personnel reduces the chance that employees will be involved in tasks for which they do not have adequate training.

The Role of Quality Control GOVERNMENT:

Quality control inspectors protect the consumer from defective products and the company from damage to its reputation due to inferior manufacturing processes. If the testing process reveals issues with the product, the inspector has the option of fixing the problem himself, returning the product for repairs or tagging the product for rejection. When issues arise, the inspector notifies supervisors and works with them to correct the problem.

Governments have always played a leading role in economy and society ever since the dawn of civilizations several millennia ago.

This is a reality that no one can deny regardless of the scope of government activities from little to too the society. In fact, governments have been the most powerful institution on which almost all other actors and institutions of society have depended or relied for authoritative allocation of resources, space, rights, protection, and guidance. Historically, governments have been a force of both

promotion and hindrance in social action. Very often, governments have been constructive, guiding movements and marketplace activities, but at times not so infrequently govern1 An original version of this paper was presented at the International Conference on Total Quality Management (TQM), Tehran, Iran, December 18Y20, 2004.

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