Product Development

Product - A set of attributes offered to consumers to fulfill their needs or requirements

Product (Broad)

- Tangible (Electronics)
  - Something that can be physically felt
  - → Measurable Attributes
  - → Quantitative metrics to measure
- Non-Tangible (Services)
  - Something that is difficult to measure
  - → Non-measurable
  - → Qualitative metrics to measure

Product (User)

- Consumer
  - Produced / Bought by specific personnel
  - Priced more
  - Manf. cost is more due to involvement of logistics, marketing
- Industrial
  - Produced / Bought in Bulk
  - Priced less compared to consumer
  - Manf. cost is less

Product development is a set of activities beginning with the perception of market opp. and ending in production sales and delivery, services of a product

Research and Development

Basic Research : → Discovery Proces
① → Huge Cost center
→ No set Timing
↓ → Unpredictable Returns
→ Long Term

Technology Development → Loosely Structured
② → Difficult to plan
→ less predictable
↓ → Medium Term

Product Development → Only structured Method
③ → Planned Timing
→ Predictable Outcome
→ Short Term

→ If this structure isn't followed, the pdt. fails
→ Product Dev. starts in the market, ends in the market
→ Competitiveness today is more than ever based on pdt. development capability

Product (changing Dimensions of Competition)

Earlier : Manf.
(Cost, Quality)

Present : PD
(Feature, Fn.)
(Quality Embeded)

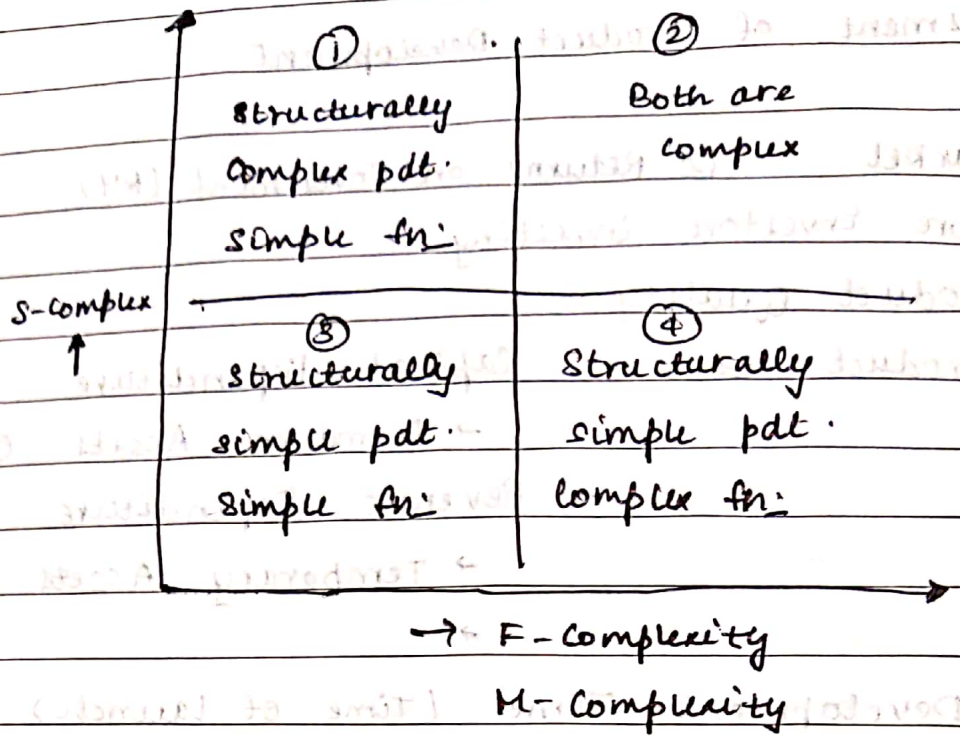
Assessment of Product Development

① Market ② Returns on Investment (RY)
③ More Investors investing
④ Product Quality
⑤ Product cost – Capital Expenditure
→ Permanent Assets (Machinery)
– Revenue Expenditure
→ Temporary Assets (Employee cost)
→

⑥ Development Time (Time of Launch)
→ First to the market matters, if comp. comes to the market before the client, the clients pdt. may fail
→ Nano was initially going to get released @ 1L but due to political issues, it had to be delayed by 8-9 months, now they're selling Nano @ 1.4L. Meanwhile, maruti developed alto with K-type engine (light wt.) @ 2.2L People preferred ~~Nathat~~ over Nano

⑦ Development cost
→ cost Based for Developing (Employee cost)

⑧ Development → Environment Factors
→ Safety Rules
→ Interest Rates



① Screw Driver - Sturturally complex (Manf. Difficult)
② Automobiles, Submarines
③ Light bulbs, Paper
④ Fashion items

Types of products from company's pdt

① New-to-the world product
→ New to the company as well as the world.
② New Product lines (Eg: ITC)
→ ITC was initially a tobacco chain, they started product lines in various other fields like food, hotels etc.
→ Opening into a new sector (Almost setting up a new company)
③ Addition to pdt. lines
→ Already having a pdt. line and adding to the pdt. line

④ Improvement and revision pdt.
→ Modifying current product (not many comp. changed)
→ Swift relaunched in 2020s with changes in engine

⑤ Repositioned Pdts.
→ Re introduced in another form (change in branding)
→ Mountain Dew was initially sold as a health drink, then changed the packaging and selling

⑥ Lower Priced / Low cost products
→ Products introduced at lower cost for poor people
→ Companies relaunching / re-introducing pdt. at a lower price

Why new product lines?
Consider company only selling ciggerates. Govt. will keep an eye on them & it'll slowly shrink. So the company needs to start producing products of a different line

Process - It is a sequence of steps that transforms a set of inputs to a set of outputs

PD Process - It is a sequence of steps which enterprise employs to conceive, design & commercialize a product

Marketing - ① Identification of pdt. opportunities
② Identification of consumer needs
③ Defn of market segments
④ Product promotion
⑤ Sets the target Price

Design :- ① Define the physical form of pdt. to best meet the customer needs
② Engineering Design (ME / EE / Software Design)
③ Industrial Design (Aesthetics, Ergonomics etc)

Manufacturing :- ① Product Design
② Operation
③ Co-ordination of production
④ Purchasing
⑤ Installation
⑥ ~~Distillation~~ Distn.

Challenges of PD

① Finding an investor
② Change in market trends
③ Customer Acquisation
④ Trade - offs
→ Choosing b/w quality & cost at each and every stage of PD
→ Eg:- Trade-off b/w steel and anti-rust metal
⑤ Dynamics
→ Economic Slowdown (Macroeconomic, env. shifts)
→ Customer pref. evolve
→ Competitors introduce new pdts.
→ Technological advancements.

⑥ Details
→ Design Details
→ Eg:- Earlier automobiles & computers were fixed through nuts & bolts, screws. Now everything is snap

⑦ Time Pressure
⑧ Economics
→ Getting money from an investor
⑨ Creation
⑩ Satisfaction of social & individual needs
⑪ Team diversity
⑫ Team Spirit
⑬ Conversion of ideas to pdt. realication

Phases of Product realization

Idea (Defn.) → Design → Prototype → Production
→ Final po

Some Crazy Ideas

① New search engine (Google vs Bing)
② email v/s To-do
↓ ↳ To-do list generated from email
Cluttered (Privacy issues)

Five Front end elements of new pdt. development process
["Fuzzy Front End"]

① Opportunity Identification
→ Large or Incremental Business and technological chances are identified in a more or less structured way. Using the guidelines of individual companies resources will eventually will be allocated to new ~~projects~~ pdt. development strategy

② Opportunity Analysis
→ Identified opportunities are translated into implications for the business and technology specific context of the company. Extensive efforts are made to align ideas to target customer groups and do market, research, technical trials.

③ Idea genesis
→ It is described as evolutionary / iterative and kinetic process progressing from start to maturation of opportunity into a tangible idea.

④ Idea Selection
→ Idea is selected by analysing its potential business value.

⑤ Business Case
→ Business case is developed based on estimates of total available market, customer needs, investment req. degree of uncertainty

SWOT Analysis → Threat (T) → External factor
Weakness (W) → Internal issue
Strength (S) → Both Ext & Int. factor
Oppur. (O) → External factor

Fuzzy Back End – ① Strategic Planning
② Concept Generation
③ Pre-Technical evaluation

These activities are often chaotic, unpredictable and unstructured.

Sources of Business Ideas
① Market and Consumer Trends
② Company's R&D Dept.
③ Competitors
④ Focus Groups
- They tell you what extra they're looking for in our pdt. line
⑤ Employees
⑥ Sales people
⑦ Corporate Spies - Suppliers telling companies what other companies are buying from them
⑧ Trade Shows -
⑨ Ethnographic (discovery methods (searching for user habits and patterns)

Idea Screening

→ To retain the potential ideas and eliminate the ideal which could be failures
→ The aim in successive screening is to build up the necessary information for decisions made in a quantitative, objective way.

Purpose of Idea Screening

→ To spot and drop poor ideas as early as possible to stop good money chase bad money
→ To evaluate whether a potential idea fits well the organization's mission, objectives, strategies, core competencies and resources.

Errors in Idea Screening

→ Drop Error: Dismissal of an otherwise good idea. Too many drop errors → company is conservative
→ Go Error: A company fails to catch a poor idea before moving into development stage

Factor for Idea screening

① Marketing Factors
→ Potential Market Size: Wether a viable market exists or not
② → Compatability of Market Image with company's product lines - Agarbatti company producing alchol is a problem
③ → Relation with competing products
④ → Compatability with existing/ specific market chan
⑤ → Access to suitable physical distn. systems
⑥ → Fits into acceptable pricing structure
⑦ → Marketing resources needed for succes
⑧ → Relation to

② Development Factors

→ Knowledge needed for development
→ Available knowledge & skills
→ Available time & human resources
→ Development Funds needed & available
→ Compatability with existing strengths
→ Development difficulties & risk factors

③ Production factors

→ compatibility with existing pdt. lines
→ Availability of processing equipment
→ Availability of raw materials
→ Availability of technical skills for product
→ Availability of production time
→ Agreement with legal req.
→ Cost & Availability of new resources req.

④ Financial factors

→ Compatability of dev. costs with resources
→ Capital investment resources needed
→ Finance needed for market launch
→ Profits & Returns on inv. req.

Product Idea Description

PID statement consits of:

① Clear description of product
② use of the product
③ Target Market of the product
④ Relationship of the new product to company's existing line of pdts.
⑤ Relationship of the product to the competitors products

Baskin Robins wants to launch a new line of liquor ice cream for IIT KGP

1 ✓ 2 ✗ 3 ✓ 4 ✓ 5 ✗

↓

A plain based ice cream with little jellies containing conc. liquors aimed as a gift to be taken to b'day parties sold through existing outlet at IIT KGP campus with no existing competitors

Prod. Dev. Process

Product Dev. Process
→ Quality Assurance
→ Co-ordination
→ Planning
→ Management - (Benchmarking)
→ Improvement (Documenting the process)
→ Morale & Satisfaction

Generic Product Development

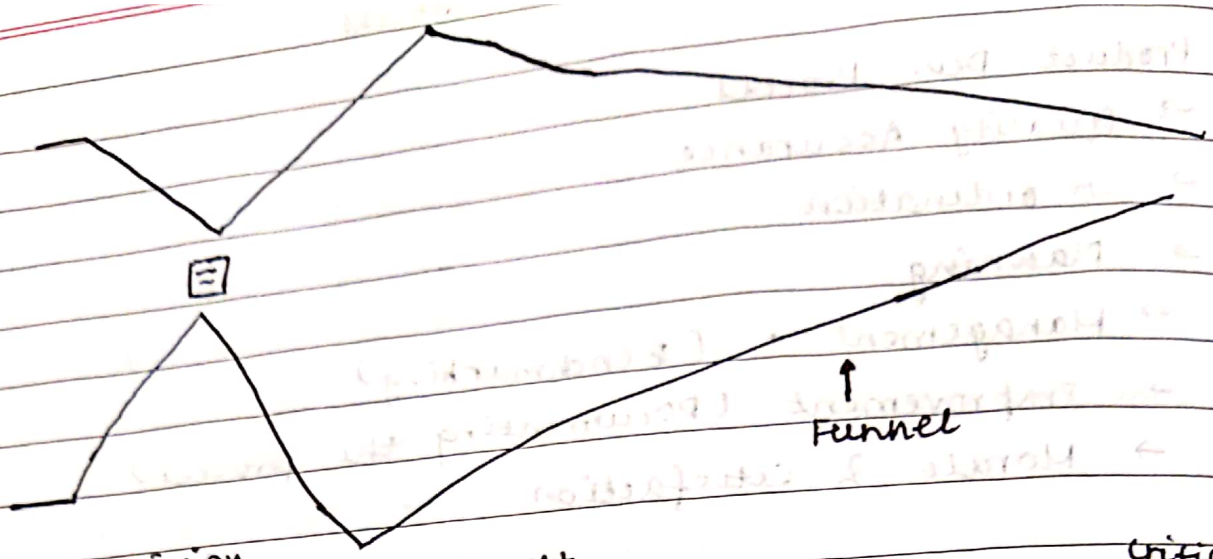
① Concept Development
- Develop concept and find which concepts work w
- Has economic justification as well

② System level Design
- A set of specifications that is reviewed again and again by design team

③ Detail Design
- Try to design the process of manufacturing

④ Testing and Refinment
- Prototypes are made

After production approval, the product goes to the market. A few of the product still fail. Then failure review is done and goes again to system level design



Planning → Concept Dev. → System Level Des. → Detail Design → Prod. Ramp

Mission Approval · Concept Rev. · System spec. Rev. · Critical Design Rev. · Test & Refine · Prod. Approval

→ Risks are identified at every stage and reduced.

Phase 0 (Planning)

① Marketing → Articulate market opp.
→ Define market segments

② Design → Consider pdt. platform & archi.
→ Assess new technologies

③ Manf. → Identify pdt. constraints
→ Set Supply Chain strategy

④ Other fn' → Research: Demonstrate available tech.
→ Finance: Provide planning goals
→ General Management: Allot resources

Phase 1 (Concept Development)

① Marketing → Collect customer needs
→ Identify lead users
→ Identify competitive pdts.

② Design → Investigate feasibility of pdt. concepts
→ Develop industrial design concepts
→ Build & Test experimental prototypes

③ Manf. → Estimate manf. costs
→ Assess production facility

④ Other fn: → Finance : Facilitate economic analysis
→ Legal : Investigate Patent issues
→ General Management : Supp & Review

Phase 2 (System level Design)

① Marketing → Develop plan for product options and extended pdt. family
→ Set target sales price points

② Design → Generate alt. product arch
→ Define major subsys. & interfaces
→ Refine industrial design

③ Manf. → Identify suppliers
→ Perform make-buy analysis
→ Define final assemby scheme
→ Set target costs.

④ Other fn: → Finance : Facilitate Make-Buy analys
→ Service: Identify service issue
→ General Management : Supp & Review

Service - Earier batteries in phone couldnt be changed. The service team will decide which part will be servicable and which wont

Phase 3 (Detail Design)

① Marketing → Developing Marketing plan

② Design → Define part geometry
→ Choose material
→ Assign tolerance
→ Control Ind. Design control documentation

Eg:- 1 container loaded with 20 tonnes of iron pillets.
The waiting time for the container is just 6hrs. After that the company is fined for making the consumer wait. In the 6hrs, the company needs to check quality before sending it ahead or back. Thus, a document needs to be prepared before hand to define what all testing needs to be done.

③ Manf. → Define piece part prod. process
→ Design tooling
→ Define QA process
→ Begin procurement of long lead tooling

④ Other fn: → QRM: Supp, review

Design Tooling - Procure toolings of desired specs.
QA process - Quality assurance process to

Phase 4 (Testing & Refinement)

① Marketing → Develop promotion & launch materials
→ Facilitate Field testing
② Design → Reliability Testing
→ Life Testing
→ Performance Testing
→ Obtain regulatory approvals
→ Implement Design changes
③ Manf. → Facilitate Supplier Ramp-up
→ Refine Fabrication & Assembly
→ Train Work Force
→ Refine QA process
④ Other fn: → Sales: Develop Sales Plan
→ General Management: Supp & Review

Phase 5 (Production Ramp Up)

① Marketing → Place Early production with key cust.
② Design → Evaluate early production output
③ Manf. → Begin operation of entire prod. sys.
④ Other sec → Supp & Review

Market Dependent Products

1. Generic (Market - Pull) Products
2. Technology Push Products - Pushing a pdt. into mar
3. Platform Products - Technology already exists but this type of product didn't exist on the platform
4. Process Intensive Products
5. Customised Products - High costs
6. High Risk Products
7. Quick Build Products - Easy to Build
8. Complex Systems

Product Planning

0th process of PD

Planning → Concept Development → System level Design → Detail Design

Mission statement

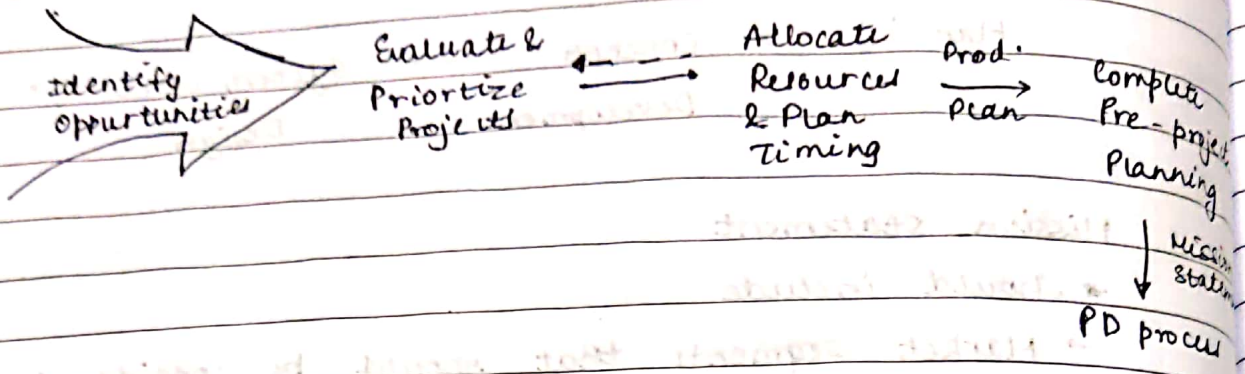
- Should include
  - → Market segments that should be considered in designing and developing a product
  - → New tech (if any) that should be incorporated into new product
  - → Manf., service goals and constraints
  - → Financial targets for project
  - → Budget & Time Frame

Mission Statement directs the output and this should be ready before product dev. stage begins. Highest innovation goes onto fundamentally new products.

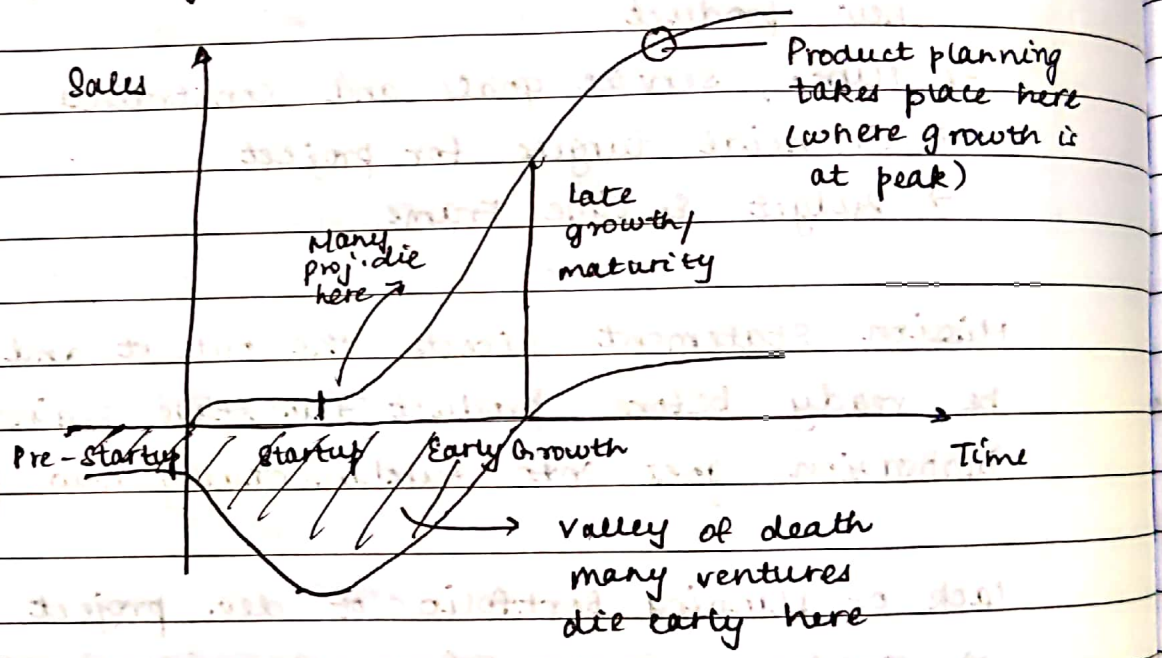
Lack of planning portfolio of dev. project results in,

- → Inadeq. coverage of target markets with competitive products
- → Poor timing of market introduction of products
- → Mismatches b/w aggregate development capacity & number of projects pursued.
- → Poor distn. of resources, with some projects overstaffed & other understaffed
- → Initiation & subsequent cancellation of ill-conceived projects.
- → Frequent changes in direction of projects

The Process



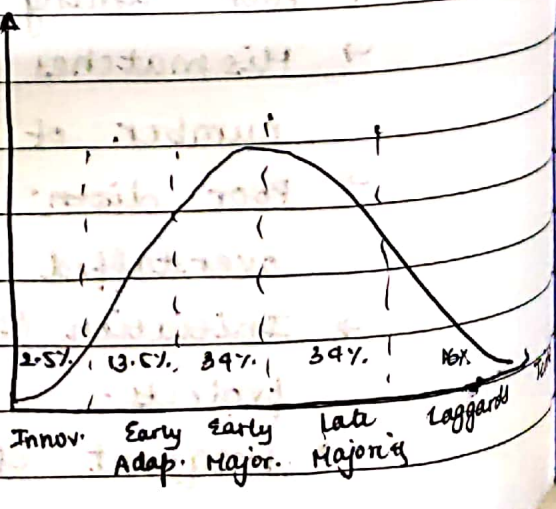
Product life cycle



Start up phase

→ People differ in their adoption of new ideas.

→ Only 16% of customers want to try out new ideas at some risk and rest adopt:



Five Step Process

① Identify Opportunities
② Evaluate and Prioritize Projects
→ After your ideas go through opp. tunnel, you are left with a set of ideas. We need to check if these ideas match our company's startegy and other projects
→ Eg:- EVs aren't a priority for Maruti India as India doesn't have enough infrastructure
→ Competitive Strategy:
① Technology leadership - Must have a strong R&D team to lead technologically
② Cost leadership -
→ Eg: ① Min labour cost, locating supply chain
② The best t-shirts sold in US & UK are made in Bangladesh. They have best tailors
③ All electronics are made in China
③ Customer Focus
④ Initiative
" At Xerox " -
Print & Then Distribute → (Transformed To) Distribut & Print

→ Product Design changes incure more cost than process change.

Startegies & Financial Strength
① low cost startegy - More of process change
② High product variety strategy - Large no. of derivative pdts.
③ Tech. based strategy - Breakthrough / New pdt. platfor

Both design change & manf. process changes

Criteria for evaluating fundamentally new pdt. opportunities:

→ Market size (units/year × Avg. price)
→ Market Growth (Y. per year)
→ Comp. Intensity (No comp & strengths)
→ Depth of firm's existing knowledge of market, tech.
→ Fit with firm's other pdts., capabilities

③ Allocate Resource & Plan Timing

→ Project Timing:

① Timing of pdt. intro.
② Technology readiness
③ Market readiness
④ Competition

④ Complete pre-project planning

Mission Statements:

→ Brief one sentence description of product
→ Benefit Proposition
→ Key Business goals
→ Target Markets for the pdt.
→ Assumptions & constraints that guide the development effort
→ Stake holder

Initial vision statement of 'Lakes':
'Develop a networked, mid range, digital platform for Imaging, marketing & finishing'

Product Description
→ Networkable, digital machine with copy, print, fax and scan fn.

Key Business Goals
→ Support Xerox strategy of leadership in digital office equipment
→ Serve as platform for all future BW digital pdts & solns.
→ Capture 50% digital pdt. sales in primary market
→ Env. friendly
→ First pdt. introduction 4th Q 1997

Primary Markets
→ Office Depts., Mid vol. (65 ppm, above 42k avg copies/mo)

Secondary Markets
→ Quick print market
→ Small 'satellite' Operations

Assumptions & Constraints
→ New pdt. platform → Digital imaging tech.
→ Comp. with CenterWare software
→ Input devices manf. in Canada
→ Output devices manf. in Brazil
→ Image Processing engine manf. in USA & Europe

Stake holders
→ Purchasers & Users
→ Manf. Operations
→ Service Oper.
→ Distributors & Resellers

Product Specification

Specifications - Tells what a product is supposed to do

↓

has 2 parts → metric — max speed

→ value — xx km/hr

First we would have to understand what the metric of the product is? How will we get to know? Customer will complain / give suggestion / tell their needs

Target specifications - reflects the needs & aspirations of the customers

Mountain bike Suspension fork

Imp → Importance no. is assigned based on no. of customers who specified that they need certain specifications. The specs. which have no. of customers prioritized get a higher Imp. no. and are attempted to be incorporated in the first version of pdt. itself.

The product specs process

→ Prepare list of metrics

→ Collect competitive benchmarking information

→ Set ideal & marginally acceptable target values

→ Reflect on the results and the process

Link Metrics to Need — Should be able to generate need from given metric

Guidelines for forming metrics

→ Metrics should be complete
→ Metrics should be dependent variables
→ Metrics should be practical
→ Some needs aren't quantifiable
→ Metrics should include popular criterion for comparsion in marketplace

These needs are obtained by marketing team. Once the project has obtained approval from management, the needs are converted to metrics by Design Team. This occurs prior to phase - 1