

INNOREGIO

Marketing of innovation

A process is a methodology that is developed to replace the old ways and to guide corporate activity year after year. It is not a special guest. It is not temporary. It is not to be tolerated for a while and then abandoned. (Thomas H. Barry *Managing the Total Quality Transformation*)

Fifteen Key Lessons for New Product Success

1. The number one success factor is a unique superior product: a differentiated product that delivers unique benefit and superior value to the customer.
2. A strong market orientation-a market-driven and customer-focused new product process-is critical success.
3. Look to the world product: An international orientation in product design, development, and target marketing provides the edge in product innovation.
4. More predevelopment work (the homework) must be done before product development gets under way.
5. Sharp and early product definition is one of the key differences between winning and losing at new products.
6. A well conceived, properly executed launch is central to new product success. And a solid marketing plan is at the heart of the launch.
7. The right organisational structure, design, and climate are key factors in success.
8. Top management support doesn't guarantee success, but it sure helps. But many senior managers get it wrong.
9. Synergy is vital to success; "step-out" projects tend to fail.
10. Products aimed at attractive markets do better; market attractiveness is a key project-selection criterion.
11. New product success is predictable and the profile of a winner can be used to make sharper project-selection decisions to yield better focus.
12. New product success is controllable: More emphasis is needed on completeness, consistency, and quality of execution.
13. The resources must be in place.
14. Speed is everything! But not at the expense of quality of execution.
15. Companies that follow a multistage disciplined new product game plan fare much better.

1. Description

New products are clearly the keys to corporate prosperity.

New products account for a staggering 40 per cent of company sales, on average. (defining new products as products that have been on the market by the firm for five years or less). And the figure has been going up dramatically:

33 per cent in the years between 1976 and 1981;
40 per cent from 1981 to 1986; and
42 per cent between 1985 and 1990.
In 1995 accounted for 52 per cent of company sales.

The impact on corporate profits is similar: in the period 1976 to 1981 new products contributed 22 per cent, they grew to 33 in the next five years period (1981-86) and in 1995 grew to 46 per cent.

The reasons of this rapid pace of launching new products are:

Technology advances: The world's base of technology and know-how increases at an exponential rate, making possible solutions and products not even dreamed of a decade or so ago. This phenomenon is being increased by the actual growth of quantity of information.

Changing customer needs: Market needs and wants, and preferences are changing regularly. Customers have come to expect new product with significant improvements. The company that seemed omnipotent only a few years ago suddenly falls from favour with the consumer.

Profesionalisation of consumers: We must take into account the professionalisation of the consumers: they have more and more information and they are increasing their exigencies on products and services.

Shortening product life cycles: Is the result of the increasing pace of technological change coupled with changing market demands. Our new product no longer has a life of 5 to 10 years, but within a few years, sometimes even months, it is supersede by a competitive entry, rendering ours obsolete, and necessitating a new product launch by us.

Increased world competition: We now have access to foreign markets like never before, but at the same time, our domestic market has become someone else's international one. This globalisation of markets has created significance opportunities for the product innovator: the world product targeted at global markets. It has also intensified competition in every domestic market. Both factors have speed up the pace of product innovation.

The last four reasons are clearly related with the market and with the knowledge of the customer behaviour and needs. So we must take the customer into account in each of the steps of the innovation from the idea to the market launching.

One study of Booz Allen and Hamilton revealed that for every seven new product ideas, about 4 enter development, 1,5 are launched and only 1 succeeds. Other study assets that for every 11 ideas, 3 enter the development phase, 1,3 are launched and only one is a commercial success in the market place. (PDMA Product Development and Management Association)

In the study of A.L. Page “PDMA New Product Development Survey”1.991, the reason more frequently considered as responsible of failures of new products, was the first one:

- a) Weak Marketing Investigation,
- b) Technical problems, and
- c) Bad planning,

The importance of Marketing in the innovations has been showed in a study realised taking into account 13000 products from 700 firms. Only the 10 % were really new products 70 % were modifications of existing ones that’ s marketing modifications. . (Booz Allen y Hamilton 1.982). Other American studies reveal that between 60 and 80 % of the success innovations come from the market and only 20-40 %comes from the laboratory.

Taking into account the above figures, the *IMT MARKETING OF INNOVATION* will cover all the development of the innovation; from the characteristics of the persons of the team to the success of the innovation in the market.

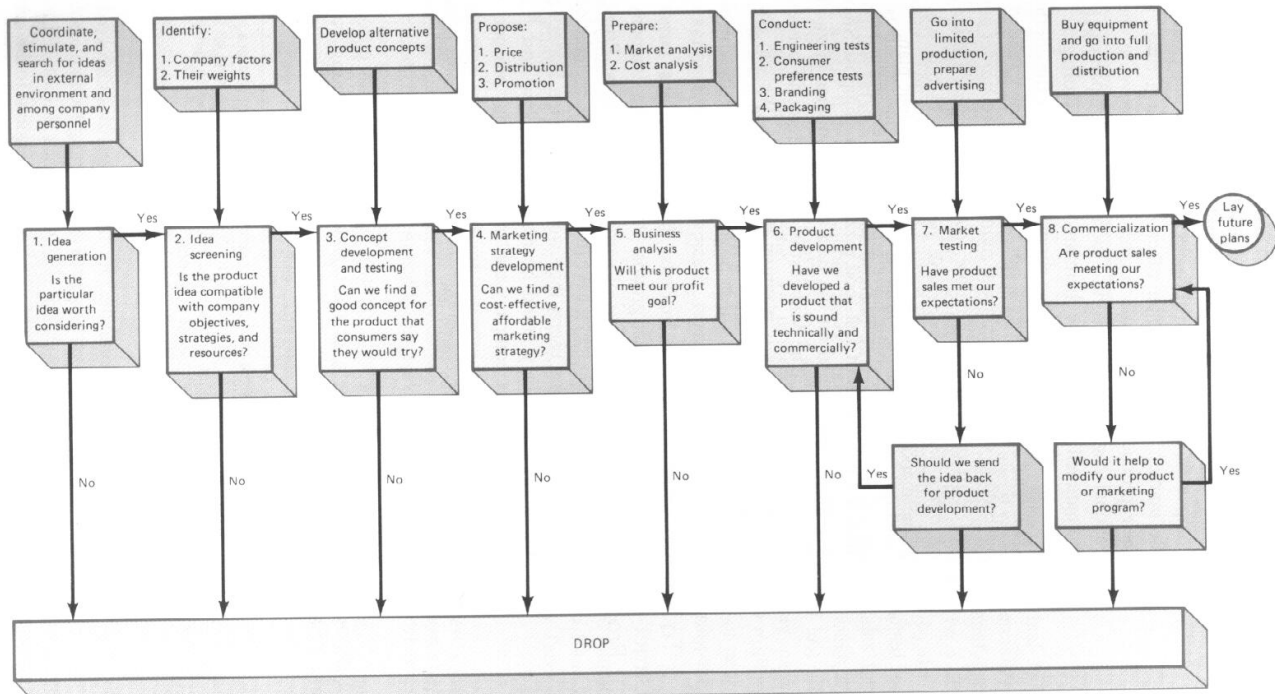
1.1 What is the marketing of innovation?

The Marketing of innovation particularises the common marketing concepts into the innovating process focusing in **the decreasing of risks, uncertainty and optimisation of resources.**

The innovation marketing develops the marketing philosophy all across the innovating process from the stabilising of the climate favourable to the arising of the ideas (*look at Annex IDEASGEN*) with the customer wants and needs satisfaction as an unquestionable goal to the control of the results of the innovation launching.

In the broad successful launching process of innovations there are a borderline between the marketing previous to the product and the launching marketing after the product exists. The previous marketing, frequently forgotten is a “laboratory marketing” and the launching marketing focuses to the consumer with visible actions (Promotions actions) t

Summary of the New Product Development Decision Process



(from "Marketing Management" Philip Kotler)

1.2 Objectives of the technique

The objective of the technique is the successful launching of new products and services helping the enterprise to survive in the actual changing environment.

The final objective should be reached by assuming innovation (in a conscious and predetermined way) creating mechanisms and using the tools we describe in this study. The final aim is the consecution of a well balanced portfolio of innovations (product/service) placed in the secuencial phases of the cycle of life (launching, maturity and declining) that going on with the natural process will replace the products that vanish at the other side of the curve (died products).

The technique goes on beyond the negative side of the time axis. It considers the previous time to the launching of the product and takes into account the products from the moment of the idea definition.

1.3. Description / structure of the methodology / alternative solutions

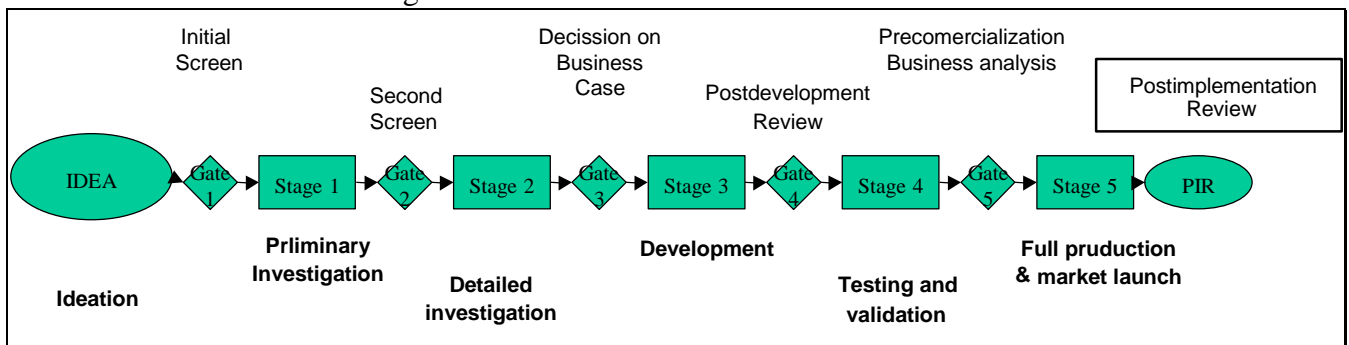
The team

The application of the methodology is a living process. It must be fed by minimal human structure (the size of the team will depend on the peculiarities of the SME. The success depends on the acceptance, for all the firm and the top management. If it does not exist this minimal team, motivated and motivating, the innovation will fail.

The process

The team will have enough decision capacity in the implicated functional areas: Engineering, production, marketing, finances purchasing...

The marketing process aiming to the profitable commercialisation of the innovation is showed in the following flow chart:



The stage-gate system breaks the new product into discrete and identifiable stages, four, five or six. Each stage is designed to gather information needed to progress the project to the next gate or decision point. Each stage is multifunctional: there is no *R & D stage* or *marketing stage*. Each stage consists of a set of parallel activities undertaken by people from functional areas within the firm. These activities are designed to gather information and drive the uncertainties down. And each stage costs more than the preceding one: the plan is an incremental commitment one.

The marketing activities are parallel to all the steps from the idea to the market launch as we express in the graphic *Development of the Marketing Plan page 6*. In the right column of the figure are written the marketing actions to be accomplished simultaneously with the development of the new products.

The cost generated by the subsequent phases of the feasibility study realised to reassure the success and minimise the risk increases exponentially as it goes on and the reject becomes more expensive. That is why it must be considered the acceptance of the idea from the part of the consumer by using all the disposable tools. The focalisation on the customer wants and needs, all along the process is necessary to be sure of the success of the innovation.

Development of a Marketing Plan

<i>Stages in the Game Plan</i>	Corresponding Marketing Planning Activities
Idea Idea generation Initial screening (Gate 1)	
1. Preliminary Investigation Preliminary market, technical & financial assessments	First Cut AT: <ul style="list-style-type: none"> – Marketing objectives – Size-up of market – Defining target market – Defining product concept & strategy – Assessing market & sales potential
2. Detailed Investigation Build business case User needs-and-wants studies Competitive & market analyses Concept tests Detailed technical assessment	Define Precisely: <ul style="list-style-type: none"> – Target market & positioning – Product benefits – Product requirements & features – Expected sales First Cut AT: <ul style="list-style-type: none"> – Preliminary Marketing Plan
3. Development Product Development Iterations with customers Develop test, marketing & production Plans	Initial Customer Feedback: <ul style="list-style-type: none"> – Rapid prototype-and-test with customers Develop Supporting Elements of Plan: <ul style="list-style-type: none"> – Pricing – Advertising & promotion – Customer service – Sales force & distribution
4. Testing & Validation Full customer tests Test market Trial Production	Test the Marketing Plan: <ul style="list-style-type: none"> – Product tests with customers (to validate product & confirm purchase intent) – Test market or trial sell – Revise & modify product & supporting elements of marketing plan – Finalise product and marketing plan
5. Full Production & Market Launch Implement production and marketing plans	Implement Marketing Plan Measure, Control, and Adjust Plan

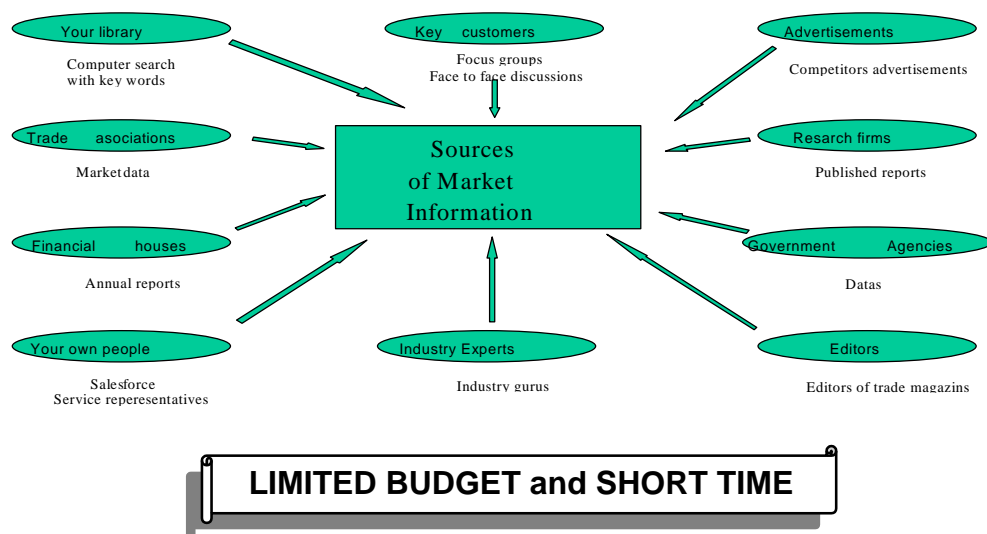
The key stages are:

1.- Preliminary investigation:

A quick investigation and scooping of the project. The first decision to go ahead with the project: The initial commitment of resources. Even if this decision is taken in the very first step the consequences are important because if it is rigorous it could reject possible success and if the contrary the accepted products would suppose wasting of resources. New product success or failure is largely decided “in the first few plays of the game”

A preliminary market assessment A quick and dirty assessment of the marketplace possible market acceptance and competitive situation largely non-scientific and relying principally on in-house sources. This facet of Stage 1 involves a variety of relatively inexpensive activities: a library search, contacts with key users, focus groups, and even a quick concept test with a handful of potential users. In this phase the **Intelligence Business** (Technology watch) plays a very important role gathering information from the market tendencies. It is made relying principally on in-house sources. The purpose is to determine market size, market potential, and likely market acceptance.

Sources of Market information:



Preliminary technical assessment aims to establish preliminary rough technical and product performance objectives, a very preliminary technical feasibility study and pinpoint possible technical risks.

The assessment is carried out, involving a quick and preliminary in-house appraisal of the proposed product. Addressing questions such as “can the product be developed? How? Can it be manufactured? etc based largely on discussions, in-house sources and some literature work. The purpose is to assess development and manufacturing feasibility, possible times and costs to execute and possible technical, legal, and regulatory risks and roadblocks

In this stage the *Technology Watch* plays an important role gathering technical information of the state of the art all around the world.

Preliminary Financial assessment. Following preliminary technical and market assessment comes the preliminary or first-pass business and financial assessment. At this early stage, estimates of expected sales, costs, and investment required are likely to be highly speculative and largely conjecture.

Summary of stage 1 Actions: Preliminary investigation

Preliminary market assessment	Quick scooping of market prospect for product; not detailed market studies or marketing research; detective work only, relying on readily available sources.
Preliminary technical assessment	Conceptual assessment of technical feasibility, probable technical solution, manufacturability, patent and legal, and possible technical risks.
Preliminary financial assessment	A sanity check: an extremely rudimentary and quick check of financial prospects; the possible payback period.
Recommendation and plan for Stage 2	A Go/Kill recommendation or proposal is developed for Stage 2, along with Stage 2 action plans.

A questionnaire for the first step may be found in *Annex PRODIAG*

2.- Detailed investigation

This stage is a detailed investigation procedure, which clearly defines the product and verifies the attractiveness of the project prior to heavy spending. It is also the *critical homework stage* the one found to be so often weakly handled.

In this stage we must fulfil a Marketing research: detailed market studies such as user needs-and-wants studies, concept tests, positioning studies and competitive analysis; involves considerable field work and interviews with customers.

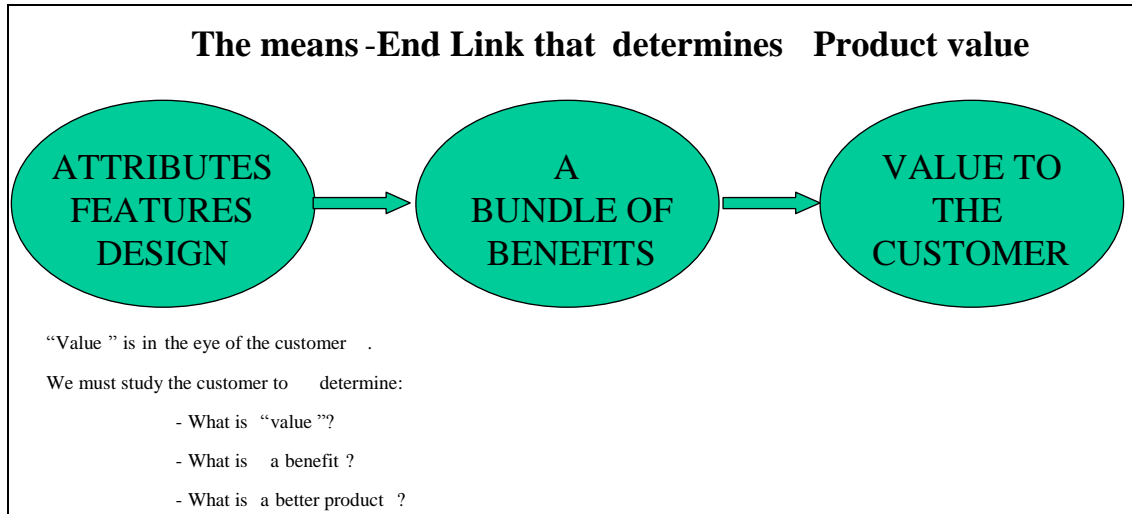
The definition of *protocol for the winning new product* is a major facet of this stage: definition of target market, of the product concept, specification of position strategy, product benefits to be delivered and essential features, attributes requirements and specifications.

A detailed *technical appraisal* focuses on the “do-ability” of the project. The customer needs are translated into a technically and economically feasible solution. This translation might even involve some preliminary design or laboratory work, but it should not be construed a full-fledged development project.

Finally a detailed *financial analysis* is conducted as part of the justification facet of the business case.

The second Stage has three main components:

- definition
- justification
- project plan



Summary of Stage 2 Actions: Detailed investigation

User needs-and-wants study	Detailed market study or marketing research; face to face interviews, in depth; based on formal design and questionnaire; determines what is value and what is a benefit ; seeks to define a winning product from customers perspective; probes customer’s needs, wants, preferences, choice criteria likes, dislikes and trade off regarding product requirements; also product use and economics; seeks competitive product ratings
Competitive analysis	Detailed competitive analysis; relies on varied sources; determines who the competitors are, product strong points and deficiencies, competitor strengths and weaknesses; strategies and performances.
Market analysis	Pulls together all market information from the studies above, plus all the secondary sources noted in stage 1; looks at market quantification, segmentation, buyer behaviour, and competitive situation.
Detailed technical assessment	Translates these markets inputs into a technically feasible product design or concept; may involve some lab or physical work; maps out the technical solution and technical route; highlights technical risks and solutions; looks at patent, legal, regulatory and safety issues; considers manufacturability, capital investments and costs; may use tools like Quality Function Deployment (QDF)
Concept test	The final test prior to full commitment to develop product; tests the proposed product concept with the customer ; market research involving face to face interviews; gauges interest, liking preference and purchase intent; may capture price sensibility.
Financial analysis	Detailed financial analysis to justify the project; includes cash flow methods such as playback and discounted cash flow (net present value) along with sensitivity analysis
Develop plan actions	Development of recommendation for project (Go/Kill) and a detailed development plan for Stage 3; also tentative test plans for Stage 4 and tentative marketing and manufacturing plans for Stage 5. A launch date is specified.

User needs and wants study:

Is a detailed market study with the purpose to probe the customer in order to put meat in the idea- to take a rather simply idea and develop a complete description of the product: benefits, features, performance characteristics and design requirements. The problem is that most of us already have a fixed idea of what the customer is looking for, so we conveniently slip over this critical market study.

A superior product one that delivers unique benefits to customers is the number one success factor.

Only by understanding the interrelations between physical characteristics (i.e., product features) and customer perceptions (i.e., a customer perceived benefit) are you in a position to sit down and design a new product.

The user needs and wants study identifies these relationships and answers the key research questions above about value and benefits. You can start by qualitative research- for example, focus groups of customers- to gain some insights into product value and desired benefits. But a focus group is a start only and certainly not a substitute for a broader-based study.

The specific information objectives of this user needs and wants study often includes:

- to determine customers needs, wants and preferences in a new product
- to identify the order winning criteria and their relative importance
- to pinpoint areas of likes and satisfaction with current (competitive) products and also areas of dislikes, dissatisfaction and problems with these products
- to study how the customer uses the products-his or her use system- and what problems he or she faces in its use; and
- to understand the customer's economics of use-the total cycle costs to the customer.

Competitive analysis

There are several purposes to such an analysis. The first one is to understand the competitor's product and its strengths and weaknesses. If the objective is to deliver product superiority, then the standard for comparison –the competitor's product- must be totally understood. Second a knowledge of how the competitor plays the game –how it competes- can provide valuable insights into the keys to success and failure in this business. An appreciation of competitive strategy and how the competitor's product fits its portfolio may be clues about expected competitive response to the product launch.

Key questions to address in a competitive analysis are shown in *Annex COMPANAL*

Market analysis

The user needs and wants studies combined with the competitive analysis are crucial to designing a superior product. The numerous secondary and other sources of market information can be reassessed, but this time, much more thoroughly for Stage 2. The goal here is to develop a detailed portrait of the marketplace –a market analysis- that includes:

- market size, growth and trends
- market segments: their size, growth and trends
- buyer behaviour: the who, what, when, where and how of the purchase situation.
- The competitive situation

When we develop a detailed marketing plan, this market analysis becomes even more essential. We will talk again in the launching moment.

Detailed Technical Investigation

The customer wish list must be interpreted to take the product requirements that yield product superiority over the competition.

This customer list must be translated into something that is technically and economically feasible. This is where market needs and wants and technical possibilities must be married, in order to arrive at a proposed product design. This is a creative process: it may be enhanced by creative problem solving techniques, but to a large extent, successful translation depends on the technological prowess and brainpower of the technical people. (See the INNOREGIO creativity tool)

The questions addressed in this detailed investigation may be found in *Annex DTI*

Quality Function Deployment

Quality Deployment Function is a technique adopted by a number of firms that help to *translate customer needs and wants into a technique concept or design*.

It was developed in Japan, and brought to the U.S. by Ford and Xerox in 1986.

It is claimed that the success of QDF occurs when the model is used conceptually, not in its detailed form as it is usually described.

QFD uses the model of four houses to integrate the informational needs of market, engineering, R & D and management.

More information may be found in the *Annex QFD*

Conjoint analysis

The C.A. is a well known powerful tool used widely in market research. It is very useful to get information for the development of new products, prospecting of the market share, segmentation of the market and price decisions.

Conjoint analysis helps researchers understand how individuals value features (or "attributes") of products or services by determining their trade-offs between different "levels" of those features. For example, you might use conjoint to determine how consumers trade off between differing amounts of rear-seat room and trunk space in a car.

Conjoint analysis is used for product development, pricing, and repositioning in areas ranging from allocation of government resources to consumer, business-to-business, and industrial marketing.

The C.A. is a statistical tool that gives the information analysing the customer wants and needs without knowing the real buying behaviour.

The actual versions of C.A. are computerised.

More information in the Bibliography references

Lead Users

It is accepted that more or less 2,5 % of the users may be considered as pioneers. They may contribute to collect information on the solutions to their wants and needs.

The immediate results of the technique are estimations of the individual utility functions. The utility represents the value that consumers perceive from each feature, the relative value.

Information in the bibliography references

BENEFITS	Conjoint	Lead Users	QFD
Identification of ideas		X	
Reducing the risk of new products	X	X	X
Reducing reluctance into the enterprise		X	
Increasing the validity of market studies	X		
Better decisions (Marketing Mix)	X		
Reducing development time		X	X
Reducing planification risks	X	X	X
Reducing interface problems			X
Better quality of products			X

Concept Test

We must be sure that the product will meet customer needs and wants better than competitive products and will achieve the sales targets.

Concept tests differ from user needs and wants studies in two major ways: first, in a concept test you have something to show the customer to solicit feed-back; and the second, you are seeking very different types of information than in a user needs and wants study

By using focus groups we get the following information:

- A measure of the customer's interest in the proposed product and a determination of why interest level is high or low
- A measure of the customer...

We show the typical questions in a Concept test in the *Annex C.T.*

Financial Analysis

Reasonable estimates can be made of the inputs for a financial analysis. Market size and share estimates together with pricing analysis should yield expected revenues. The product's design characteristics are known, so the detailed technical assessment should yield costs estimates and reasonable projections of profit margins. Marketing requirements and the expected launch costs have been investigated and capital equipment needs have been forecast. These estimates are the inputs to a financial analysis.

Plans of Action

The final component is the action plan. Usually the rule is that a detailed plan of action should be put together for the next stage and tentative plans for subsequent stages all the way through launch. Following this rule, the plan consists:

- A recommendation on the future of the project: Go versus Kill versus Hold
- The detailed development plan
- Tentative plans for stage 4 testing and validation. Actions frequently undertaken in this stage
- A tentative manufacturing, operations or supply plan
- A tentative marketing plan.

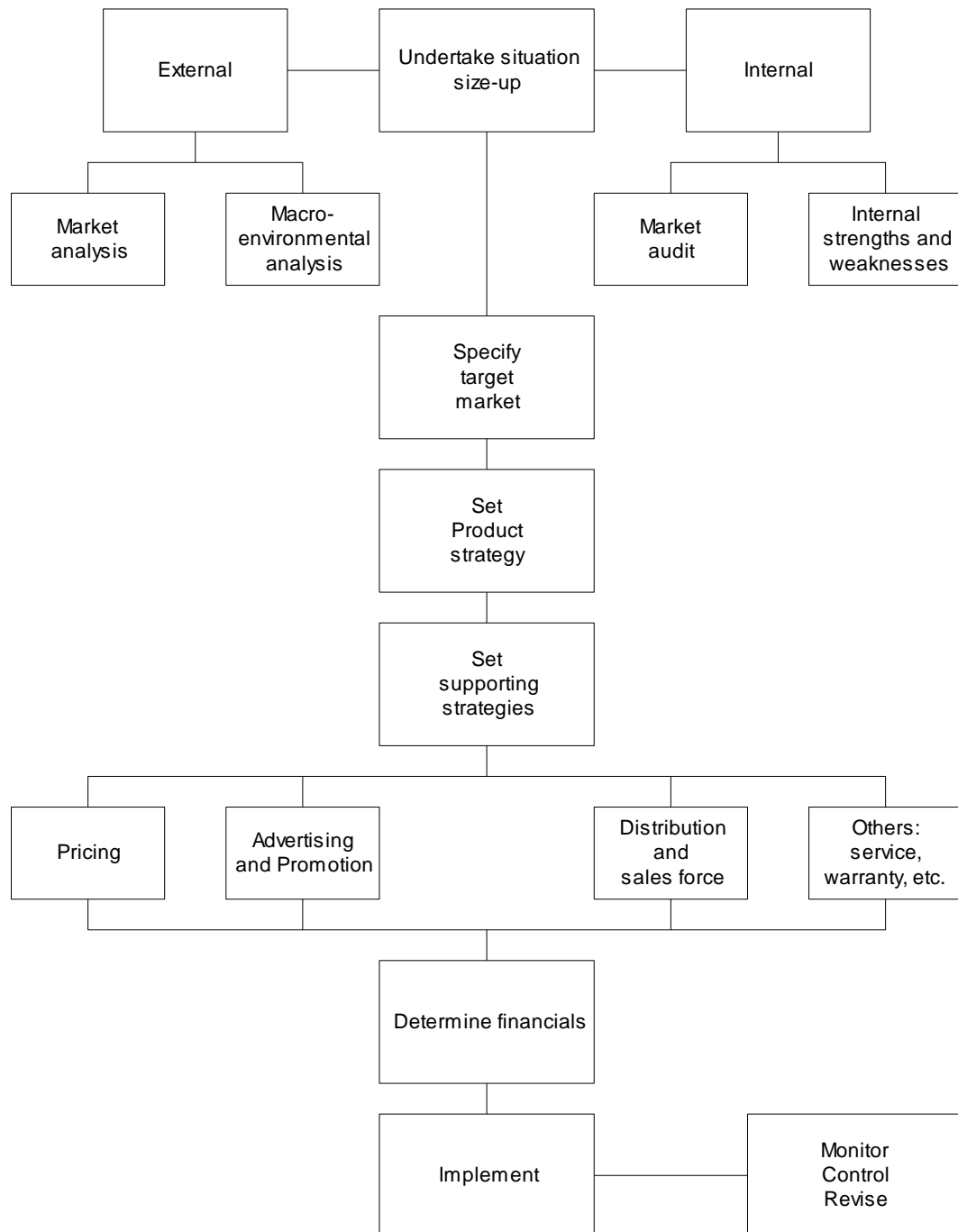
The Marketing Plan

The Marketing Plan is simply a plan of action for new product introduction or launch. It specifies three things:

- the marketing objectives
- the marketing strategies
- the marketing programs

The marketing planning is a series of activities undertaken to arrive at the Marketing Plan. This outgoing activity occurs formally and informally throughout much of the new product process. The development of a full Marketing Plan occurs simultaneously with product development to emphasise that formal Marketing Plan should be in place long before the product is ready for market introduction or even a trial sell. It is an iterative process.

Define marketing objectives



The market analysis

The market analysis addresses the following questions and issues:

- *Market overview:* What are the quantitative and qualitative aspects of market size, growth and trends?
- *Market segments:* What market segments exist in this new product's marketplace? How is each segment unique? What are the quantitative and qualitative aspects of their size, growths and trends?
- *Buyer behaviour:* (in the segments in question) The who, what, when, where, why and how of the purchase process are set out. Who buys? Who are the purchase prescriptors? What do the buyers buy and when and where? Why do they buy what they buy? What are their choice criteria (the order-winning criteria) and what are their preferences, wants and needs?
- *Competition:* Who are the competitors? In which segments? What are their strengths and weaknesses? How good are their products? How does the customer rate their products? What are the competitor's strategies in pricing, advertising and distribution? How well are they doing in market share and profitability? Why?

Much of this market information will not be ready known at the outset of the new project. By the time the project is ready to enter the development stage, however, market studies should have undertaken in stage 2 and a thorough market analysis, with action implications, should be completed.

A good market analysis goes a long way towards charting a winning market strategy

Defining the Market Target

One must have a precise definition of the target market before designing the product and before developing the launch plan. From marketing segmentation, all else flows: segmentation is fundamental to effective marketing planning.

Segmenting the market: No two people or groups of people are exactly alike, especially when it comes to their purchasing patterns. To try to appeal to those different customers with the same strategy –one product, one price, one communications approach- is counterproductive.

Market segmentation is the delineation of groups or clusters of people within a market such that there is relative homogeneity within each group and heterogeneity between groups.

Four broad categories of variables are useful in segmenting a market:

State of being: Sociological variables as age, sex, income, occupation and the stage of the family cycle. The analogous variables for industrial goods are company size, industrial classification and type of buying unit.

Geography is another convenient variable: urban, suburban, exurban and rural; regions of the country and even regions of the world.

State of mind: This type of segmentation is called “psychographics”, describes attitudes, values and lifestyles.

Product usage: Looks at how the product is bought or used. The three major bases are:

Volume segmentation: the popular rule 80-20 applies for many markets. 20 % of the customers buy 80 % of the product. Buyers can be divided into categories of heavy user, light user and non-user.

Loyalty: some customers are loyal to our firm, some other to our competitor some move back and forth.

Market factor: different people respond to different elements of the marketing mix. Price sensitive buyers, quality conscious buyers, convenience buyers, service-seeking buyers and so on.

Benefit segmentation: Benefit segmentation recognises that people have different reasons and motivation for buying a product and therefore they seek different packages of benefits. B.S. is particularly useful for new product strategy. The target market defines the benefits that must be built into the new product. These benefits can be translated into specific product features, which aids the product design process.

Segmentation is a powerful tool in designing a new product strategy. Some market research will be required to determine what benefits are sought and which people seek what benefits.

Product strategy

Target market definition and product strategy, together are the leading edge of the strategy development and are front and centre in the development of the marketing plan.

Product positioning: is a combination of market segmentation and product differentiation. “Position” means *how the product will be perceived by potential customers*.

Step 1 in defining the product strategy is the specification of the product’s position –usually a sentence or two defining how the product will be positioned in the market and in the customer minds, relative to competitive products and in terms of benefits offered.

Product benefits: The benefits that the product will deliver to the customer should be delineated. A benefit is not a feature, although the two can be closely connected. A feature is a part of the product’s design –a physical thing. A benefit is in the eye of the beholder some characteristic that is of value to the customer.

Features and attributes: In this third step we translate benefits into features, attributes and product requirements. Here is where QFD may help. This final facet of the product strategy is an exact definition of what the product will be and something tangible the development group can work towards.

Marketing mix

Pricing strategy: Before reaching the pricing decision, both the market and the product’s positioning strategy must be specified.

There are a number of strategic issues that may affect the pricing decisions:

Skimming versus penetration: High volumes and low production costs or selected marketing segments for which the product has the most value and which will pay a premium for it?

Corporate strategy: The new product’s pricing must be established in the light of the corporate strategy. The new product is not a “stand alone” item; it is a part of a grander plan.

Pricing decision

	A lot	A few	O	A few	A lot	
Inelastic demand						Elastic demand
No expected concurrence						Strong concurrence
Lead users needs unsatisfied						Lead users using the product
No substitutive products exist						There are substitutive products
High production costs						Scale economies
No capacity of production						We have cap. of production
Short life cycle						Long life cycle
High price						Low price

Distribution strategy: Marketing channel decisions are among the most critical decisions facing management. The company's chosen channels intimately affect all the other marketing decisions. The company's channel decisions involve relatively long-term commitments to other firms.

Criteria to choose distribution channels

Characteristics to be considered	Direct Channel	Indirect Short	Indirect long
<u>Buyers Characteristics</u>			
High number of buyers		**	***
High concentration	**	***	
Important purchases	***		
Irregular purchases		**	***
Short delivery time		**	***
<u>Product characteristics</u>			
Perishing products	***		
High volume	***	**	
Low technicality			
No standardised	***		
High Unitary value			
<u>Enterprise characteristics</u>			
Low financing resources		**	***
Family of products	***	**	
High control	***		

In the launching of the new product it is necessary to gather all the information from the market so it is preferable, if possible to use short or direct channels. Anyway the distributors must be informed and motivated over the new products.

1.4 Expected results/benefits

Company' innovative capacity development. Innovation presumes a culture and an apprenticeship. There are companies such as Toyota whose employers engenders 2 million ideas per year (35 employee/year), 85% of them are put into practice.

Increase of innovative ideas' number running into market successes. Upon an easy argument basis, innovative ideas' growth should expect an innovations' increase. In the same way that a products backlog exists, balanced innovations backlog should exist (with products on the different phases of life cycle).

Incertitude decrease at innovations' launch, results foresight at innovations' introduction by defining innovation' potential market and turnout assessment on it, minimising resources wasting.

Development times cutback, due to a better acquaintance of finished product to be developed. Innovation learning helps, once the operative is assimilated, to diminish new products development period.

Products' quality increase, by defining, from the beginning, the product with the client as final addressee and studying the product development, by all the person involved in this process.

1.5 Characteristics of firms/ organisations and service providers

Organisations involved in innovative marketing establishment are those related to market studies, beginning with demographic data supplied by the Statistics Government Organisms, Sectorial Studies (Eustat, Instituto Nacional de Estadística....) consumers panels, sectorial associations.

Technological watch must supply all information relevant to the development of innovations, on a marketing basis.

2. Application

2.1 Where the technique has been applied (firms/ organisations)

GM has implemented its copyrighted *Four Phase* new product game system for product design and introduction based in the Japanese way of producing cars.

3M has traditionally had an enviable new product track record. For years has also had in place various stage-gate systems for managing the innovation process.

Procter & Gamble relaunched in 1990 version of its game plan: *Product Launch Model*, a six stage model or “product launch road map” for driving new products to market.

Northern Telecom implemented a stage –gate system for new products in the early 1980: *New Product Gating System*. It costed approximately \$ 1 million but paid for itself on the first major project.

Others firms have implemented new products game plans or stage –gate systems, including **Ameritech**: *Product Development Process*; **Black & Decker**: *Gobal Product Development Management System*; **Corning**,: *New Product Innovation Process*; ; **Exxon Chemicals**: *Product Innovation Process*; **ICI**: *New Product Commercialisation Scheme* **Polaroid**: *Product Delivery Process* **ICI**: *New Product Commercialisation Scheme* and **Tremco** (**B.F. Goodrich**): *Tremco New Product Process*; **Hewlett-Packard**, **Ethyl Corporation** and various divisions at **Du Pont**, **Emerson Electric**, **Philips**, **U.S. West**, **The Royal Bank of Canada**, **The Lawson Mardow Group**, **Shell**, **Lego**....

2.2 Types of firms/organisations concerned

Any company that develops products or services of an innovative nature.

It is particularly applicable to products and services that are radically innovative.

The methodology can be applied to all products or services that are so innovative that no useful references exist on which to base a classic marketing study. The tool is particularly interesting for those companies that possess the adequate technological capacity and that wish to diversify by introducing new products of their own. A good example would be companies that are subcontractors to larger firms.

2.3 Implementation cost (study and application in separate)

The innovation process is a continuous process. It is more a philosophy than punctual actions. The costs of applying may be considered more like a redistribution of internal costs of the SME's. In some cases the help of external consultants or Marketing experts should be needed.

Prices of the tools software may be found in the annexes

The quantification of resources necessary for the implementation depends on

- the complexity of the development of the product or service,
- the related markets, and
- the amount of available information.

2.4 Conditions for implementation (infrastructures, modifications required, etc.)

Although, in brief, it falls to the management the responsibility of deciding about new products launching, it is essential foreseeing an organised structure and a specific responsibility in the company, responsible for presiding and co-ordinating the innovation process.

The personnel involved in the implementation of this methodology belong to all of the areas of the firm financial, engineering, production, R&D, and mainly to the commercial area of a company. Also involved are those project heads responsible for the development of related innovative projects. In small companies, those involved are simply the management team.

Changes required by the company, simply are organisational, not been necessary, generally for small and medium-sized businesses, to allocate more resources in order to promote innovations.

An initial presentation of the methodology requires at least a daylong seminar. In an SME, the development of the method might require the leadership and monitoring of an expert consultant, at least during the final stage of development of the product, over a period of approximately 10 to 20 days. Also, a two-day training course should be sufficient to train personnel in the methodology.

Several organisation schemes can be considered:

Inter-functional organisation' structures

An open-minded formula and within all companies' reach, whatever size they have, is "new products" committee or "ad hoc" committee responsible for a specific project.

"New products committee a permanent committee holding meetings permanent, for instance once a month. It is set up with the different functions' responsible: R&D, production, marketing, accounts, human resources. Ideally the General Manager chairs it. Its responsibility is organising the dialogue existing among different functions and managing a new product development launch process, from the idea birth to the launching stage.

"Ad hoc" team or venture team is a team, built in particular to develop a specific project (task force). Created by members of different departments who should leave their functions for a period – completely or partially- to focus on the creation of a new activity.

The patterns of organisation mostly used in U.S are:

Inter-functional team	76,2 %
New products department	30,2 %
Product manager	30,2 %
New products manager	25,9 %
New products committee	16,9 %
Ad hoc team (venture team).....	6,9 %

Size and characteristics of small and medium-sized businesses force to create a team, inevitably small in people, even compounded with just one person, but it is necessary that they have a knowledge about company' characteristics and its environment, in a wide sense, to carry out the steps detailed in this study.

2.5 European organisations supporting the implementation of the method

The European Commission adopted in 1996 the First Action Plan for Innovation providing a general framework for action at the European and Member State level to support the innovation process.

The three areas being:

- Fostering an innovation culture
- Establishing a framework conducive to innovation
- Gearing research more closely to innovation at both national and Community level

3. Implementation procedure

INNOREGIO project last aim is achieving that companies will be self-sufficient to innovate.

First uses of this tool will be made with the consultant help, but just as pure mate and never as innovative equipment relief, being this one who from now on, should manage innovations.

The project innovation process needs to be seen as a process with a process management and quality management techniques.

3.1 Step/ phases

- The first step is a meeting with the manager of the SME in order to explain him the essential of the procedure and to diagnose the innovating profile of the firm. *Annex DIAGN* gives a questionnaire to evaluate the marketing innovating profile. (6 hours)
- Secondly is the creation of the innovation team composed of representatives of each of the involved areas of the firm. The Manager of the firm would accomplish the task in order to involve him in the process. (1 week to decide)
- The third step would be the presentation of the technique to the team and to the Manager in a meeting conducted by the consultant. (20 hours)
- The fourth step is the preliminary investigation. An inexpensive stage with the objective to determine the project's technical and marketplace merits. It is a quick scope of the project, often done in less than one calendar month's elapsed time, and for 10-20 person-day work effort.
- The fifth step, the detailed investigation must be performed by the SME with the continuous help of the consultant. This consultant will guide the innovation team across the investigation focusing the developing actions from the marketing point of view.
- As it has been said the Marketing Planning is an overlapping process parallel to the above steps

3.2 Partial techniques and tools included in each step

The tool to be used in the first step is enclosed in the *Annex DIAGN*. Is a simple but useful questionnaire that helps to evaluate the actual state of the innovation art into the firm.

Quality Function Deployment (QFD) is one technique adopted by a number of firms that helps to *translate customer needs and wants into a technique concept or design*. Thus QFD has particular applicability to Stage 2 It was developed in 1972 in Japan and brought to de U.S. by Ford and Xerox in 1986. *Annex QFD*

Conjoint analysis helps to get information from the market by means of statistic procedures. The C.A. is supported by software programmes Information in bibliography

3.3 Related software (existing or being prepared)

The software related with marketing tools used in the technique is well-known statistical software easy to find at software firms.

We are developing software applications for the different tools of the annexes

4. Bibliographic references

- Booz, Allen & Hamilton, *New Products Management for the 1980s*. New York 1982
- Cooper, Robert G “*Winning at New Products: Accelerating the process from Idea to Launch*” Massachusetts 1993
- Griffin, Thomas P. Hustad *Evaluating QFD’s Use in Firms as a Process for Developing products* **The** journal of Product Innovation Management 9 (3) 1992
- Eric Von Hippel “*Learning from Lead Users*” Marketing in an Electronic Age ed. Robert D. Buzzel Cambridge Harvard Business School Press 1985
- D.S. Hopkins “*New product Winners and Losers*” The conference Board Record
- Kotler Philip “*Marketing Management*” Prentice Hall 1991
- Lambin Jean Jacques “*Strategic Marketing* “
- Page. A. “*Assessing New Product Development Practices and Performance: Establishing Crucial Norms*” Journal of Product Innovation Management Vol 10 September 1993
- A.H. Rubenstein et al. “*Factors Influencing Success at the Project Level*” *Research Management* May 76
- Takeuchi H. Nonaka I *The new Product Development Game*” Harvard Business Review: January February 1986
- Edward M. Tauber “*Discovering New Products Opportunities with Problem Analysis*” Journal of Marketing January 1975

More information on QFD may be found at:

- Hauser, J.R. y Clausing D. (1988): *The House of Quality*. [Harvard Business Review](#). Vol. 66, pp. 63-73. (a practical case)
- Tottie, M. y T. Lager (1995): *QFD- linking the customer to the product development process as a part of the TQM concept*. R&D Management, 25, 3. p. 257 (application in a steel manufacturer)
- Lauglaug, A. (1993): *Technical-market research-get customers to collaborate in developing products*. Long Range Planning, 26(2), p. 78.
- Page Web of NASA devoted to [Design for Competitive Advantage](#) and <http://mijuno.larc.nasa.gov/dfc/qfd.html>. (With several links).
- The page of [ICQFD-International Council for QFD](#), <http://www.icqfd.org>, gives information on designing and development of new products.
- Article of Kenneth Crow: [Customer-focused development with QFD](#), with a detailed description applying QFD to develop a product.

Information on Conjoint Analysis:

- Page, A.L. y H. Rosenbaum (1987): *Redesigning product lines with conjoint analysis: how Sunbeam does it*. Journal of Product Innovation Management, Vol. 4, pp. 120-137.
- Software on A.C.: [SKIM Software Division](#), and http://www.skim.nl/Ssd_CVA.html
- Or in [Sawtooth Technologies](#)
- An introduction to C.A.: SCHUBERT, B., «Conjoint Analyses», in: Tietz, B., Köhler, R., Zentes, J. (eds.) *Handwörterbuch des Marketing*, Schäffer Poeschel Verlag, Stuttgart, 1995, págs. 376-390.
- A case: THEUERKAUF, I., *Kundennutzenmessung mit Conjoint*, in: *Zeitschrift für Betriebswirtschaft*, Bd. 59, núm. 1, 1989, págs. 1179-1192.
- Cattin, P. and D.R. Wittink (1982): *Commercial use of conjoint analysis: a survey*. Journal of Marketing, Summer, 46, pp. 44-53
- Green, P.E. and V. Srinivasan (1978): *Conjoint analysis in consumer research: issues and outlook*. Journal of Consumer Research, September, 5, pp. 103-123.

Understanding Conjoint Analysis:

1. [Understanding Conjoint Analysis in 15 Minutes](#) by Joe Curry. A brief but thorough introduction to the principles of conjoint analysis. Reprinted from **Quirk's Marketing Research Review**.
2. [Understanding Conjoint Analysis: Predicting Choice](#) by Joe Curry. A follow-up to the above article, dealing in more depth with three of the most widely used choice models First Choice, Share of Preference, and Likelihood of Purchase. Reprinted from **Quirk's Marketing Research Review**.
3. [Trade-Off Analysis of Consumer Values](#) by Richard M. Johnson. One of the seminal articles on conjoint techniques; reprinted from the **Journal of Marketing Research**.
4. [Discrete Choice Modeling: Understanding a "Better Conjoint than Conjoint"](#) by Steven Struhl. An introduction to the advantages and disadvantages of discrete choice models over rating scales. Reprinted from **Quirk's Marketing Research Review**.
5. [Conjoint Analysis: After the Basics](#) by Joe Curry. A brand-new article intended for researchers already familiar with the basics of conjoint, and who are ready to perform their first studies. Reprinted from **Marketing Research: A Magazine of Management & Applications**

Twenty five Action Items for Generating New Product Ideas

1. Establish a focal point-a person to stimulate and handle ideas.
2. Identify possible sources of new product ideas, prioritise, and access these sources.
3. Use focus groups of customers.
4. Set up a user panel to discuss needs wants, and problems that might lead to new product ideas.
5. Survey your customers.
6. Observe customers as they use (or misuse) your product.
7. Identify your lead users-the innovative customers.
8. Hire sales and technical people who can recognise potential new products. Train, encourage, and motivate them to do so.
9. Routinely survey your competition. Analyse their products, strategies, and business successes.
10. Organise a trade show visitation program.
11. Set up a clipping service for domestic and foreign trade publications.
12. Examine the patent files and the Official Gazette regularly.
13. Get on the mailing list of relevant idea brokers and product license brokers in your industry.
14. Attend product-licensing shows.
15. Visit your suppliers' shops and spend time with their technical people.
16. Set up a procedure for handling ideas submitted by private inventors in a legally sound way.
17. Visit key universities and researchers. Consider putting several university researchers on a retainer.
18. Set up a new product idea suggestion scheme in your company.
19. Run a new product idea contest.
20. Run some group creativity sessions. Use the methods suggested in this list.
21. Organise creativity sessions involving sales and technical people in the session.
22. Invite loyal or highly innovative users to a creativity or brainstorming
23. Session.
24. Provide free time or scouting time for employees to work on pet projects. Set up a seed money fund to support creative projects.
25. Set up an idea bank. Make it an open file so that everyone can see the ideas and add to them.
26. Do something with the ideas-don't just let them sit there! Get them evaluated (Gate 1) and provide feedback to the idea originator. And if the idea is sound, then progress it to the next stage.

The New Product Diagnostic and Screening

Model Questionnaire

INSTRUCTIONS

1. For each of the following 30 questions, indicate your level of agreement or disagreement by circling a number from 0 to 10. Read each question carefully. Anchor phrases are provided to help define what is meant by a 10 or a 0.
2. Answer every question. Give your best estimate, even though you may not be sure of an answer.
3. Indicate how sure or confident you are about each answer. Do so by writing a number from 0 to 10 on the blank line following the numeric scale. Here:
10 = 100% confident; I am certain about this answer.
0 = no confidence; a pure guess.
4. Use a black pen. Circle and write clearly ... press hard. Try not to cross out answers.
5. Most people take about 15 minutes to answer the questionnaire. New users are advised against agonising over questions and, their exact meaning. Answer quickly with feedback you can revise your answers.
6. Remember: two answers are required for each question-a rating and a confidence, both 0-10.

Company_____Tel_____

Product name_____Ref._____

Evaluator's name_____

Title_____

I. Resources Required

First 8 questions are designed to probe whether our company has the capabilities, talents, skills, resources, physical facilities, and experience necessary to undertake the project, that we were to move ahead with the project.

The fact that these resources might otherwise be occupied at present is not relevant.

If certain facets of the project are to be carried out by others (e.g., subcontracted production or product design; distribution via middlemen; etc.), these available outside resources should be considered as available to the project. Be careful to be realistic about the availability and quality of these outside resources.

Remember: for each question

- circle a rating (0-10) of the resource adequacy; and
- indicate your confidence (0- 10) in your rating on the blank line.

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
1. Our company's financial resources are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
2. Our company's R&D skills & people are more than adequate for this project. (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
3. Our company's engineering skills and people are more than adequate for this project. (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
4. Our company's marketing research skills and people are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
5. Our company's management skills are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
6. Our company's production resources or skills are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
7. Our company's sales force and/or distribution resources and skills are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	
8. Our company's advertising and promotion resources and skills are more than adequate for this project (10 = far more than adequate; 0 = far less)	0	1 2 3 4 5 6 7 8 9 10	

II. Nature of Project

These 3 questions provide some general descriptors of the product or project.

Here the terms "market customer," and "competitor" must be defined. The market is defined both geographically and in terms of applications: think in terms of which users our product is targeted at-the target users-in order to define the "market." Competitive products are those products that these customers now use that our product is intended to replace.

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
9. Our product is highly innovative totally new to the market (10 = totally new; 0 = a direct copy)	0	1 2 3 4 5 6 7 8 9 10	
10. The product specifications exactly what the product will be are very clear (10 = very clearly defined; 0 = not defined at all)	0	1 2 3 4 5 6 7 8 9 10	
11. The technical aspects exactly how the technical problems will be solved are very clear (10 = very clear; 0 = not clear; not known)	0	1 2 3 4 5 6 7 8 9 10	

III. Newness to the Company

Is this a familiar project to our company or a totally new one to us? These next 4 questions probe how new or "step out" the project and product are to our company. Again, be sure to define what you mean by "market," "customer" and "competition" (see note before question 9 above).

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
12. The potential customers for this product are totally new to our company (10 = totally new; 0 = our existing customers)	0	1 2 3 4 5 6 7 8 9 10	
13. The product class or type of product itself is totally new to our company (10 = totally new; 0 = existing product class for us)	0	1 2 3 4 5 6 7 8 9 10	
14. We have never made or sold products to satisfy this type of customer need or use before (10 = never; 0 = have done so, or are doing so now)	0	1 2 3 4 5 6 7 8 9 10	
15. The competitors we face in the market are totally new to our company (10 = totally new to us; 0 = competitors we have faced before)	0	1 2 3 4 5 6 7 8 9 10	

IV. The Final Product

The next 7 questions probe our product advantage. Be sure to think in terms of our product versus competitive products the products or solutions that the customer is now using to solve his/her problem.

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
16. Compared to, competitive products (or whatever the customer is now using), our product will offer a number of unique features, attributes or benefits to the customer (10 = many positive, unique features and benefits; 5 = same; 0 = fewer)	0	1 2 3 4 5 6 7 8 9 10	
17. Our product will be clearly superior to competing products in terms of meeting customer needs (10 = clearly superior; 5 = equal to; 0 = inferior to competitors)	0	1 2 3 4 5 6 7 8 9 10	
18. Our product will permit the customer to reduce his/her costs, when compared to what he/she is now using (10 = major reduction; 5 = same; 0 = higher costs)	0	1 2 3 4 5 6 7 8 9 10	
19. Our product will permit the customer to do a job or do something that he or she cannot do with what is now available on the market (10 = clearly yes; 5 = same; 0 = less so)	0	1 2 3 4 5 6 7 8 9 10	
20. Our product will be of higher quality however quality is defined in this market than competing products (10 = much higher quality; 5 = same; 0 = inferior to competitors)	0	1 2 3 4 5 6 7 8 9 10	
21. Our product will be priced considerably higher than competing products (10 = much higher; 5 = same; 0 = much lower)	0	1 2 3 4 5 6 7 8 9 10	
22. We will be first into the market with this type of product (10 = first in; 0 = one after many)	0	1 2 3 4 5 6 7 8 9 10	

V. Our Market for This Product

These last 8 questions look at the nature of the marketplace. Again, be sure to define what you mean by "market," "customer" and "competition" (see note before question 9 above).

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
23. Potential customers have a great need for this class or type of product (10 = great need; 0 = no need)	0 1 2 3 4 5 6 7 8 9 10		
24. The dollar size of the market (either existing or potential market) for this product is large (10 = very large; 0 = very small).	0 1 2 3 4 5 6 7 8 9 10		
25. The market for this product is growing very quickly (10 = fast growth; 0 = no growth or negative growth)	0 1 2 3 4 5 6 7 8 9 10		

RESOURCES REQUIRED

	STRONGLY DISAGREE	STRONGLY AGREE	CONFIDENCE (0 TO 10)
26. The market is characterised by intense price competition (10 = intense price competition; 0 = no price competition)	0 1 2 3 4 5 6 7 8 9 10		
27. There are many competitors in this market (10 = many; 0 = none)	0 1 2 3 4 5 6 7 8 9 10		
28. There is a strong dominant competitor with a large market share in this market (10 = dominant competitor; 0 = no dominant competitors)	0 1 2 3 4 5 6 7 8 9 10		
29. Potential customers are very satisfied with the (competitors') products they are currently using (10 = very satisfied; 0 = very dissatisfied)	0 1 2 3 4 5 6 7 8 9 10		
30. Users' needs change quickly in this market a dynamic market situation (10 = change very quickly; 0 = stable needs, no change)	0 1 2 3 4 5 6 7 8 9 10		

Return completed questionnaire to:

NewProd Evaluation Manager/Co-ordinator _____

Department _____ Tel _____ Date _____

Please complete and return before: _____

Some of the key questions to address in a competitive analysis

16. Who are the key players –the direct competitors- whose product yours will replace (or take business away from)?

17. What are their products' features attributes, and performance characteristics? What are their products' strong points and deficiencies?

It's important to understand just who the "enemy" is and the exact nature of the product that yours must overtake. Understanding its strong points gives clues as to what to build into your product; its weaknesses reveal areas to exploit in a superior design.

18. What other strengths and weaknesses does each competitor have; for example, sales force, customer service, technical support, advertising and promotion? For what is each competitor held in high regard? And where are its weak points?

You must compete not only on the basis of product but also on non product elements, While product advantage is clearly desirable, sometimes the main points of competitive advantage will be found in other elements of the

19. How does each competitor play the game? For example, on what types of customers (or segments) does each competitor focus? And what is the basis for competition? That is, how does each competitor get business-by pricing low? via product advantage? by having a larger or highly skilled sales force? or via a heavier promotional effort?

20. How well are the competitors doing? What are their market shares, and what has been the trend for each of their shares? And why is each doing so well (or poorly) what's the secret to its success (or demise)?

Here the focus is on what it takes to win. We witness different players with different strategies and approaches and observe their results. From this comes valuable lessons about what succeeds and what fails in this market place.

21. (If possible) What are the competitors cost pictures? Their production volumes and capacities? And their profitability –both contribution and net? And how important a product is to their operations and to their total profitability?

Questions to be addressed in the detailed technical investigation

1. What is the probable technical solution that will yield a product to meet marketplace requirements?
2. What is involved in arriving at this technical solution? Is invention required? Or is simply a matter of applying fairly well known technology?
3. What are the technical risks and potential roadblocks? And how might these be dealt with? Can alternate technical solutions be pursued in parallel?
4. What are the key steps involved in arriving at a prototype product? How long will each step take and how much will each cost? What are the personnel requirements?
5. What legal or patent, regulatory, and safety issues might arise? And how would we deal with each?
6. How might the product be manufactured or produced? In our plant or operations facilities? Or would new facilities, equipment, and production personnel be required? What would the production volume be? At what cost?
7. What is the cost, per unit, of producing the product?

Customer-Focused Development With QFD

Kenneth Crow
©1996 DRM Associates

INTRODUCTION

Quality must be designed into the product, not inspected into it. Quality can be defined as meeting customer requirements and providing superior value. This focus on the customer places an emphasis on techniques such as Quality Function Deployment to help understand customer needs and provide superior value.

Quality Function Deployment (QFD) is a structured approach to defining customer needs or requirements and translating them into specific plans to produce products to meet those requirements. The "voice of the customer" is the term to describe these stated and unstated customer needs or requirements. The voice of the customer is captured in a variety of ways: direct discussion, surveys, customer specifications, observation, warranty data, field reports, etc. This understanding of the customer requirements is then summarised in a product planning matrix or "house of quality". These matrices are used to translate higher level "what's" or requirements into lower level "how's" or means to satisfy the requirements.

While the QFD matrices are a good communication tool at each step in the process, the matrices are the means and not the end. The real value is in the process of communicating and decision-making with QFD. QFD is oriented toward involving a team of people representing the various functional departments that have involvement in product development: Marketing, Design Engineering, Quality Assurance, Manufacturing/ Manufacturing Engineering, Test Engineering, Finance, Product Support, etc.

The active involvement of these departments can lead to balanced consideration of the requirements or "what's" at each stage of this translation process and provide a mechanism to communicate hidden knowledge - knowledge that is known by one individual or department but may not otherwise be communicated through the organisation. The structure of this methodology helps development personnel understand essential requirements, internal capabilities, and constraints and design the product so that everything is in place to achieve the desired outcome - a satisfied customer. QFD helps development personnel maintain a correct focus on true requirements and minimises mis-interpreting customer needs. As a result, QFD is an effective communications and a quality-planning tool.

CAPTURING THE VOICE OF THE CUSTOMER

A company doesn't blindly respond to customer needs and opportunities. A business strategy which defines customers and markets to be served, competitors, and competitive strengths provides a framework from which to evaluate potential opportunities. As opportunities are identified, appropriate techniques are used to capture the voice of the customer. The techniques used will depend on the nature of the customer relationship as illustrated in Figure 1.

There is no one monolithic voice of the customer. Customer voices are diverse. In consumer markets, there are a variety of different needs. Even within one buying unit, there are multiple customer voices (e.g., children versus parents). This applies to industrial and government markets as well. There are even multiple customer voices within a single organisation: the voice of the procuring organisation, the voice of the user, and the voice of the supporting or maintenance organisation. These diverse voices must be considered, reconciled and balanced to develop a truly successful product.

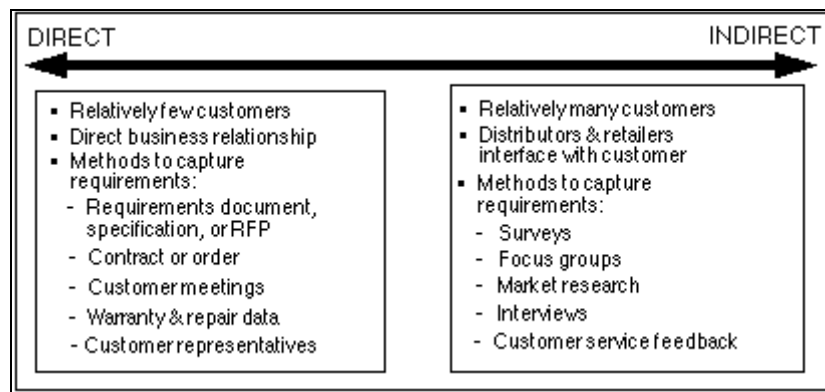


Figure 1. Customer Relationships and Requirements Definition

The interface with the customer should not be the exclusive responsibility of the sales, marketing or customer service organisation. Many of the functional disciplines involved in product development should be exposed to customers and establish relationships to facilitate communication. This insures a wide variety of perspectives on customer needs, develops greater empathy on the part of product development personnel, minimises hidden knowledge, and overcomes technical arrogance. This direct contact with customers can be accomplished by sending development personnel into the field to meet with customer personnel, by observing customers use the company's products, or by rotating development personnel through marketing, sales, or customer support functions. These practices have resulted in fundamental insights such as engineers of highly technical products recognising the importance to customers of ease of use and durability rather than the latest technology.

Where a company has a direct relationship with a very small number of customers, it is desirable to have a customer representative(s) on the product development team. Alternately, mechanisms such as focus groups should be used where there are a larger number of customers to insure on-going feedback over the development cycle. Current customers as well as potential customers should be considered and included.

During customer discussions, identify the basic customer needs. Frequently, customers will try to express their needs in terms of "how" the need can be satisfied and not in terms of "what" the need is. This limits consideration of development alternatives. Development and marketing personnel should ask "why" until they truly understand what the root need is. Breakdown general requirements into more specific requirements by probing what is needed.

Once customer needs are gathered, they then have to be organised. The mass of interview notes, requirements documents, market research, and customer data needs to be distilled into a handful of statements that express key customer needs. Affinity diagramming is a useful tool to assist with this effort. Brief statements, which capture key customer requirements, are transcribed onto cards. A data dictionary, which describes these statements of need, are prepared to avoid any mis-interpretation. These cards are organised into logical groupings or related needs. This will make it easier to identify any redundancy and serves as a basis for organising the customer needs for the first QFD matrix.

In addition to "stated" or "spoken" customer needs, "unstated" or "unspoken" needs or opportunities should be identified. Needs that are assumed by customers and, therefore not verbalised, can be identified through preparation of a function tree. These needs normally are not included in the QFD matrix, unless it is important to maintain focus on one or more of these needs. Excitement opportunities (new capabilities or unspoken needs that will cause customer excitement) are identified through the voice of the engineer, marketing, or customer support representative. These can also be identified by observing customers use or maintain products and recognising opportunities for improvement.

PRODUCT PLANNING

Once customer needs are identified, preparation of the product planning matrix or "house of quality" can begin. The sequence of preparing the product-planning matrix is as follows:

1. Customer needs or requirements are stated on the left side of the matrix as shown in Figure 2. These are organised by category based on the affinity diagrams. Insure the customer needs or requirements reflect the desired market segment(s). Address the unspoken needs (assumed and excitement capabilities). If the number of needs or requirements exceeds twenty to thirty items, decompose the matrix into smaller modules or subsystems to reduce the number of requirements in a matrix.

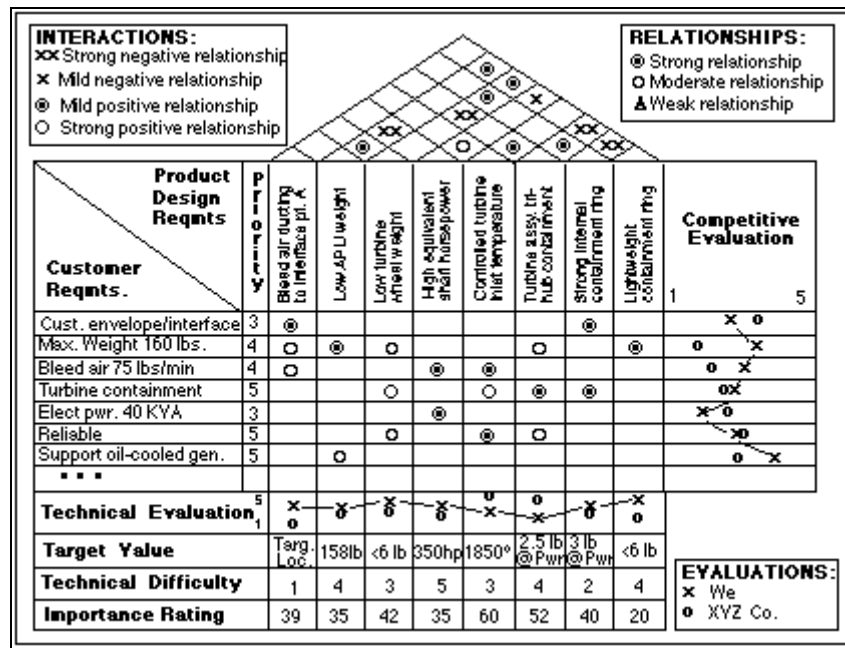


Figure 2. Product Planning Matrix

For each need or requirement, state the customer priorities using a 1 to 5 rating. Use ranking techniques and paired comparisons to develop priorities.

- Evaluate prior generation products against competitive products. Use surveys customer meetings or focus groups/clinics to obtain feedback. Include competitor's customers to get a balanced perspective. Identify price points and market segments for products under evaluation. Identify warranty, service, reliability, and customer complaint problems to identify areas of improvement. Based on this, develop a product strategy.

Consider the current strengths and weaknesses relative to the competition? How do these strengths and weaknesses compare to the customer priorities? Where does the gap need to be closed and how can this be done - copying the competition or using a new approach or technology? Identify opportunities for break-through's to exceed competitor's capabilities, areas for improvement to equal competitors capabilities, and areas where no improvement will be made. This strategy is important to focus development efforts where they will have the greatest payoff.

- Establish product requirements or technical characteristics to respond to customer requirements and organise into related categories. Characteristics should be meaningful, measurable, and global. Characteristics should be stated in a way to avoid implying a particular technical solution so as not to constrain designers.
- Develop relationships between customer requirements and product requirements or technical characteristics. Use symbols for strong, medium and weak relationships. Be sparing with the strong relationship symbol. Have all customer needs or requirement been addressed? Are there product requirements or technical characteristics stated that don't relate to customer needs?
- Develop a technical evaluation of prior generation products and competitive products. Get access to competitive products to perform product or technical benchmarking. Perform this evaluation based on the defined product requirements

or technical characteristics. Obtain other relevant data such as warranty or service repair occurrences and costs and consider this data in the technical evaluation

6. Develop preliminary target values for product requirements or technical characteristics.
7. Determine potential positive and negative interactions between product requirements or technical characteristics using symbols for strong or medium, positive or negative relationships. Too many positive interactions suggest potential redundancy in "the critical few" product requirements or technical characteristics. Focus on negative interactions - consider product concepts or technology to overcome this potential trade-off's or consider the trade-off in establishing target values.
8. Calculate importance ratings. Assign a weighting factor to relationship symbols (9-3-1, 4-2-1, or 5-3-1). Multiply the customer importance rating by the weighting factor in each box of the matrix and add the resulting products in each column.
9. Develop a difficulty rating (1 to 5 point scale, five being very difficult and risky) for each product requirement or technical characteristic. Consider technology maturity, personnel technical qualifications, business risk, manufacturing capability, supplier/subcontractor capability, cost, and schedule. Avoid too many difficult/high risk items as this will likely delay development and exceed budgets. Assess whether the difficult items can be accomplished within the project budget and schedule.
10. Analyse the matrix and finalise the product development strategy and product plans. Determine required actions and areas of focus. Finalise target values. Are target values properly set to reflect appropriate trade-off's? Do target values need to be adjusted considering the difficulty rating? Are they realistic with respect to the price points, available technology, and the difficulty rating? Are they reasonable with respect to the importance ratings?

Determine items for further QFD deployment. To maintain focus on "the critical few", less significant items may be ignored with the subsequent QFD matrices. Maintain the product-planning matrix as customer requirements or conditions change.

One of the guidelines for successful QFD matrices is to keep the amount of information in each matrix at a manageable level. With a more complex product, if one hundred potential needs or requirements were identified, and these were translated into an equal or even greater number of product requirements or technical characteristics, there would be more than 10,000 potential relationships to plan and manage. This becomes an impossible number to comprehend and manage. It is suggested that an individual matrix not address more than twenty or thirty items on each dimension of the matrix. Therefore, a larger, more complex product should have its customers needs decomposed into hierarchical levels

To summarise the initial process, a product plan is developed based on initial market research or requirements definition. If necessary, feasibility studies or research and development are undertaken to determine the feasibility of the product concept. Product requirements or technical characteristics are defined through the matrix, a business justification is prepared and approved, and product design then commences.

PRODUCT DESIGN

Once product planning is complete, a more complete specification may be prepared. The product requirements or technical characteristics and the product specification serve as the basis for developing product concepts. Product benchmarking, brainstorming, and research and development are sources for new product concepts. Once concepts are developed, they are analysed and evaluated. Cost studies and trade studies are performed. The concept selection matrix can be used to help with this evaluation process.

The concept selection matrix showed in Figure 3. Lists the product requirements or technical characteristics down the left side of the matrix. These serve as evaluation criteria.

Criteria	Importance Rating	Concept A	Concept B	Concept C
Low APU Weight	4	● 20	○ 12	○ 12
Low turbine wheel weight	4	● 20	○ 12	● 20
Controlled turbine inlet temperature	6	○ 18	● 30	△ 6
Acceptable turbine assembly life	5	○ 15	● 25	○ 15
Turbine assy tri-hub containment	5	● 25	● 25	○ 15
High equivalent shaft horsepower	4	△ 4	● 20	● 20
Strong internal containment ring	4	○ 12	● 20	○ 12
Total		114	144	100

Figure 3. Concept Selection Matrix

The importance rating and target values (not shown in Figure 3.) are also carried forward and normalised from the product-planning matrix. Product concepts are listed across the top. The various product concepts are evaluated on how well they satisfy each criteria in the left column using the QFD symbols for strong, moderate or weak. If the product concept does not satisfy the criteria, the column is left blank. The symbol weights (5-3-1) are multiplied by the importance rating for each criteria. These weighed factors are then added for each column. The preferred concept will have the highest total. This concept selection technique is also a design synthesis technique. For each blank or weak symbol in the preferred concept's column, other concept approaches with strong or moderate symbols for that criteria are reviewed to see if a new approach can be synthesised by borrowing part of another concept approach to improve on the preferred approach.

Based on this and other evaluation steps, a product concept is selected. The product concept is represented with block diagrams or a design layout. Critical subsystems, modules or parts are identified from the layout. Criticality is determined in terms of effect on performance, reliability, and quality. Techniques such as fault tree analysis or failure modes and effects analysis (FMEA) can be used to determine criticality from a reliability or quality perspective.

The subsystem, assembly, or part deployment matrix is then prepared. The process leading up to the preparation of the deployment matrix is depicted in Figure 4.

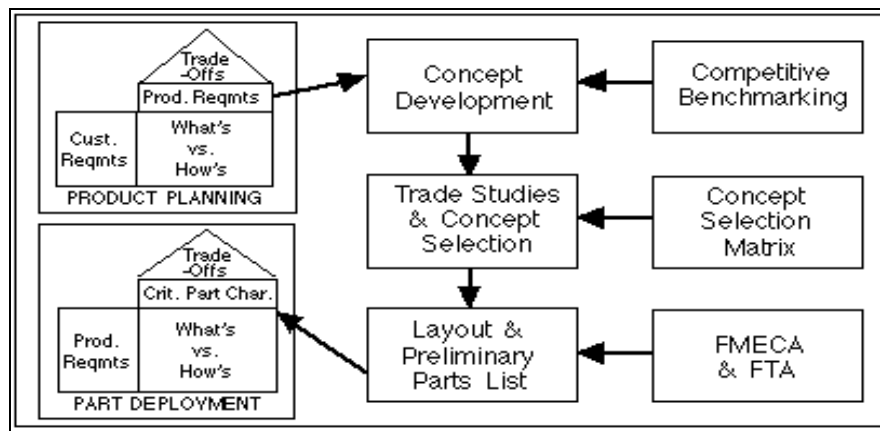


Figure 4. QFD Concept Selection Process

The product requirements or technical characteristics defined in the product planning matrix become the "what's" that are listed down the left side of this matrix along with priorities (based on the product planning matrix importance ratings) and target values. The subsystem, assembly or part deployment matrix is prepared in a manner very similar to the product-planning matrix. These product requirements or technical characteristics are translated into critical subsystem, assembly or part characteristics. This translation considers criticality of the subsystem, assembly or parts as well as their characteristics from a performance perspective to complement consideration of criticality from a quality and reliability perspective. Relationships are established between product requirements or technical characteristics and the critical subsystem, assembly or part characteristics. Importance ratings are calculated and target values for each critical subsystem, assembly or part characteristic are established. An example of part deployment matrix is shown in Figure 5.

Product Design Requirements	Priority	Critical Part Char. Targ. Value	Turbine wheel					Combustor			
			Balance	Surface finish	Backface geometry	Grain refinement	Airfoil geo. & thickness	Material	Linear pattern factor	Nozzle throat area	...
Low APU Weight	4	155 lb					⊙	○			
Low turbine wheel weight	5	< 8 lb			○	⊙	○				
Controlled turbine inlet temperature	6	1850° max				○			⊙	⊙	
Acceptable turbine assembly life	3	3,000 hrs	⊙		⊙	⊙	⊙	⊙	⊙		
Turbine assy. in-hub containment	4	2.5 lb @ PWR		⊙	⊙	⊙		○		○	
High equivalent shaft horsepower	4	350 hp		⊙		○				⊙	
Importance Rating			15	40	35	90	50	39	⊙ Strong relationship ○ Mild relationship		

Figure 5. Deployment Matrix

PROCESS DESIGN

QFD continues this translation and planning into the process design phase. Pugh concept selection can be used to evaluate different manufacturing process approaches and select the preferred approach. Based on this, the process planning matrix shown in Figure 6. is prepared. Again, the "how's" from the higher level matrix (in this case the critical subsystem, assembly or part characteristics) become the "what's" which are used to plan the process for fabricating and assembling the product. Important processes and tooling requirements can be identified to focus efforts to control, improve and upgrade processes and equipment. At this stage, communication between Engineering and Manufacturing is emphasised and trade-off's can be made as appropriate to achieve mutual goals based on the customer needs.

Critical Part Characteristics Critical Process Steps	Turbine wheel					P r i o r i t y	Part Control Parameters
	Balanced	Surface finish	Backface geometry	Grain refinement	Airial geo. & thickness		
Priority	2	4	4	9	5		
Mold preparation	○	⊗			⊗	51	- surface finish - Aerial geometry
Hot isostatic pressure casting	○	⊗		⊗	⊗	96	- surface finish - inclusions, cracks, porosity - Blade tip fill
Mass center balancing	⊗					10	- Machine centers
Turbine tip OD & shroud line contour machining		○				12	- Outer diameter - Profile geometry - surface finish
Low stress grind - backface	○	⊗	⊗			46	- Backface geometry - surface finish

Other Data:

- Equipment
- Location
- Tooling

Figure 6 Process Planning Matrix

In addition to planning manufacturing processes, more detailed planning related to process control, quality control, set-up, equipment maintenance and testing can be supported by additional matrices. Figure 7. provides an example of a process/quality control matrix. The process steps developed in the process-planning matrix are used as the basis for planning and defining specific process and quality control steps in this matrix.

The result of this planning and decision-making is that Manufacturing focuses on the critical processes, dimensions and characteristics that will have a significant effect on producing a product that meets customers needs. There is a clear trail from customer needs to the design and manufacturing decisions to satisfy those customer needs. Disagreements over what is important at each stage of the development process should be minimised, and there will be greater focus on "the critical few" items that affect the success of the product.

Critical Process Steps	Process Control Parameters	Control Points	Control Method	Sample Size & Freq.	Check Method
Hot isostatic pressure casting	Mat'l temp. Mold temp. Remelt %	Mat'l prop. Heat treat FPI	Cert.	100%	N/A
Mass center balancing	Balance mach. calibration Speed	Detailed balance	Cert.	100%	N/A
Turbine tip OD & shroud line contour machining	Set-up Speeds & feeds Tool wear	Dim. insp. Surface finish	X bar & R chart	4 pieces/ lot	Elect. gage Check fixture Visual
Low stress grind - backface	Speeds & feeds Diamond dressed wheel	Dim. insp. Surface finish	N/A	100%	CMM Visual
Florescent penetrant insp. & proof spin	Speed	Cracks Inclusions O.D.	N/A	100%	Visual Spin test

Figure 7. Process Control/Quality Control Matrix

QFD PROCESS

QFD begins with product planning; continues with product design and process design; and finishes with process control, quality control, testing, equipment maintenance, and training. As a result, this process requires multiple functional disciplines to adequately address this range of activities. QFD is synergistic with multi-function product development teams. It can provide a structured process for these teams to begin communicating, making decisions and planning the product. It is a useful methodology, along with product development teams, to support a concurrent engineering or integrated product development approach.

QFD, by its very structure and planning approach, requires that more time be spent up-front in the development process making sure that the team determines, understands and agrees with what needs to be done before plunging into design activities. As a result, less time will be spent downstream because of differences of opinion over design issues or redesign because the product was not on target. It leads to consensus decisions, greater commitment to the development effort, better co-ordination, and reduced time over the course of the development effort.

QFD requires discipline. It is not necessarily easy to get started with. The following is a list of recommendations to facilitate initially using QFD.

- Obtain management commitment to use QFD.
- Establish clear objectives and scope of QFD use. Avoid first using it on a large, complex project if possible. Will it be used for the overall product or applied to a subsystem, module, assembly or critical part? Will the complete QFD methodology be used or will only the product-planning matrix be completed?
- Establish multi-functional team. Get an adequate time commitment from team members.
- Obtain QFD training with practical hands-on exercises to learn the methodology and use a facilitator to guide the initial efforts.
- Schedule regular meetings to maintain focus and avoid the crush of the development schedule overshadowing effective planning and decision-making.

- Avoid gathering perfect data. Many times significant customer insights and data exist within the organisation, but they are in the form of hidden knowledge - not communicated to people with the need for this information. On the other hand, it may be necessary to spend additional time gathering the voice of the customer before beginning QFD. Avoid technical arrogance and the belief that company personnel know more than the customer does.

QFD is an extremely useful methodology to facilitate communication, planning, and decision-making within a product development team. It is not a paperwork exercise or additional documentation that must be completed in order to proceed to the next development milestone. It not only brings the new product closer to the intended target, but reduces development cycle time and cost in the process.

ABOUT THE AUTHOR

KENNETH A. CROW is President of DRM Associates. His firm focuses on product development and the implementation of strategies and practices such as integrated product development, time-to-market, business process re-engineering, and total quality management. He is a recognised expert in the field of integrated product development and quality function deployment with over twenty years of experience. He has assisted management with IPD initiatives, worked with teams to apply IPD practices and QFD methods, and provided product development consulting and training. He led a consortium to identify 250 best practices for product development and developed a benchmarking and assessment methodology based on these best practices.

He has worked internationally with many Fortune 500 companies. He has written articles and papers, contributed to books, presented at conferences, and conducted workshops worldwide on product development, manufacturing, and quality function deployment. He is a founding member and President of the Society of Concurrent Engineering. For further information, contact Ken at DRM Associates, 2613 Via Olivera, Palos Verdes, CA 90274; by phone at (310) 377-5569; by fax at (310) 377-1315 or email at kcrow@aol.com.

Typical Questions in a Concept Test

Face-to-face interview:
(The respondent is asked to look over the proposed concept or concepts..... a written description, or a sketch or drawing, etc.)

1a. First, what’s your reaction to the proposed product? You can answer using this 0-to-10 scale, where 0 means very negative and 10 means very positive. (Show him/her the scale.)

Very negative 0 1 2 3 4 5 6 7 8 9 10 **Very positive**

1b. Why so Positive (or negative) ? _____

2a. How interested are you in the concept? (Show response category scale.)

Not interested at all	Not too somewhat	Somewhat interested	Quite interested	Very interested
-----------------------------	---------------------	------------------------	---------------------	--------------------

2b. Why did you answer the way you did? _____

3a. To what extent do you like the Proposed product? Please answer on this 0- to-10 scale, where 10 means "like very much" and 0 means "don't like it at all"

Don't like it **0 1 2 3 4 5 6 7 8 9 10** **I like it very**
at all **much**

3b. Why did you like/not like it?

4a. What is the likelihood that You would buy this product at price of \$XX?

Definitely not	Probably not	Maybe	Probably yes	Definitely not
-------------------	-----------------	-------	-----------------	-------------------

4b. Why or why not? _____

5a. What do you see as the products main strengths? _____

5b. Its main weaknesses? _____

5c. Would you like to see anything changed? What are your suggestions? _____

Audit Questionnaire for Diagnosing Strengths and Weaknesses in Your Firm's Product Development Efforts

This questionnaire is designed to be used in the first interview between the consultant and the manager. When designing the real questionnaire, provide lots of space for answers.

New Product Project Analysis

This first section is designed to probe what's going well and what's going badly as we move a new product project from idea to launch.

Please select a new product you are quite familiar with-perhaps one you worked on. Ideally, it should be a completed project, and can be either a commercial success or a failure.

The project for discussion is:

This project... ___ is rated as a commercial success
(check only one) ___ was killed; never went to market
 ___ went to market, but failed commercially
 ___ is not yet finished.

Listed below are a number of activities that might have been undertaken in your new product project. We want four answers for each activity:

- a) *Proficiency*: Your assessment of how well this activity was handled or executed (quality of execution). Here: 10 = excellent; 0 = very poor; ND = not done, but should have been (an error of omission); NA = not applicable; (e.g., not done, but this was Ok-there was no need for this activity).
- b) *Explanation of deficiency*: If the activity was deficient (i.e., low score or ND-not done, but should have been), why? What went wrong? Was there no time? No money? People availability? Lack of skills? A lack of appreciation of the activity's importance? No precedent? What were the reasons for a low score?
- c) *Improvements needed*: What should have been done here, in hindsight? What improvements? Try to give a little detail.
- d) *Importance of improvements*: Your assessment of how important it is to improve this activity . . . for this project, and for projects in general.
Here: 10 = great need for improvement; 0 = no need for improvement.

Remember: Four questions per activity-two are scaled (0-10) and two require verbal answers. Note: if the project is not yet complete, then write across that activity "NOT YET DONE."

1. Idea generation-coming up with the original idea.

- a) Proficiency: (circle a number from 0-10 or check ND or check NA).
very poor 0 1 2 3 4 5 6 7 8 9 10 excellent; or ____ND; or ____NA
- b) If deficient, why: _____
- c) What improvements needed? _____
- d) Need for improvements: (circle a number from 0-10 or check NA)
no need 0 1 2 3 4 5 6 7 8 9 10 great need; or ____NA

Repeat question 1 (a to d) for all activities from idea to launch. Include decision points as well.

2. Initial screening-the first decision to go ahead with this project.
3. Preliminary market assessment-an initial, quick market appraisal.
4. Preliminary technical assessment-the first and quick technical look.
5. Detailed market study-market research, detailed customer interviews, etc.
6. Detailed technical assessment-a more in-depth technical look, prior to development.
7. Decision to develop-the decision to move into a full-fledged development project.
8. Development-the actual development of the physical product.
9. In-house product tests-internal, lab, or alpha tests of the product.
10. Customer tests-field trials.
11. Trial sell (or pre-test or test market)-to prove market acceptance.
12. Trial production-limited, trial, or batch production-to prove production.
13. Precommercialization business analysis-the final decision to commercialize.
14. Production start-up-the start of commercial production.
15. Market launch-full marketing of the product.
16. Post launch review-a full review of the project after launch is completed. And now, some other questions about this project:
17. Organization: How was the project handled (check one):
 - As a multidisciplinary, multifunctional team, with identified members from various functions-MI), marketing, manufacturing, purchasing, etc.-as active members of the team; or
 - As a functional effort: each function doing its part of the project, but not really as a team.

Comments: _____

18. Was there a project leader, clearly identified, who lead and was accountable for the project from its early stages through to launch?

____ Yes ____ No

Comments: _____

19. Did the project move as quickly as it might have?

____ Yes ____ No

If No. why not? What slowed it down? _____

The New Product Process: General Practices:

Moving away from this specific project, let's look at the Division's new product practices in general.

For the questions below, to what extent are the following statements true about product development in the Division. Please answer using this 0-10 scale, where 10 = Definitely yes: all the time, and 0 = Definitely not; not at all.

A. Ideas

1. Idea generation is in good shape-there are quality ideas and lots of them. (circle a number).

Definitely not 0 1 2 3 4 5 6 7 8 9 10 Definitely yes Comments:

Comments: _____

[Note to reader: Use the same 0-10 format with room for comments for items 2-28 below.]

2. We are getting more than enough new product ideas as inputs to the process.
3. The ideas are *quality* ones. B. Our new product process

B. Our new product process

4. We use a *formal new product process*-a standardized process to guide product development from idea to launch.
5. There are clearly defined stages that make up this process-these stages are highly visible and known by all.
6. Activities are clearly defined for each stage of this process-what is required or expected is very visible.
7. Go/MI decision points are clearly defined for each stage of the process.
8. There are clear criteria for Go-Kill decisions-these are spelled out and known by all.
9. These criteria are *really used* by decision makers in making these Go/Kill decisions (as opposed to "hidden criteria," or gut feel, etc.).
10. Go/Kill decisions are made in a timely fashion-approvals are handled efficiently and quickly.
11. The decision makers are clearly defined for the process-who will make the Go/Kill decisions.

C. Practices and orientation

12. We have a strong commitment to *quality of execution*--every activity from ideation through to launch must be carried out in a quality fashion.
13. We have a commitment to *completeness*---every key step must be carried out (no uncalled-for shortcuts).
14. The deliverables to each decision point (or project review) in the process are in good shape ... *quality deliverables*.
15. There is a strong focus on *predevelopment or up-front homework* (e.g., market studies, technical appraisal, financial and business analysis, etc.) prior to opening the door to full-scale development.

16. There is a strong focus on *product and project definition* prior to the beginning of development-target market, product concept, benefits, features, and requirements are sharply defined and agreed to before development work can begin.
17. We are committed to a *market orientation*-an emphasis on the customer and marketplace via market studies, market research, customer trials, etc.
18. We *involve the customer* throughout development-our people, who work on the project, constantly interface with customers.
19. There are *tough and demanding decision points* (or Go/MI points) where tough choices are made and projects really do get killed.
20. These Go/Kill project decision points are handled well-they are solid, rigorous reviews.

D. Organization

21. All projects have an identifiable and accountable leader-you can point to a person who's in charge and responsible for driving that project.
22. The leader is dedicated to the one project (that is, he or she doesn't have a dozen projects under way at any one time).
23. The leader is responsible for the project from idea right through to launch-that is, carries the project right through the process and not just for one or a few stages.
24. Every project has a clearly identified core team of players.
25. The project team is multidisciplinary (or multifunctional)-the players are from different functions in the company (R&D, marketing, manufacturing, etc.).
26. The members of this project team are given release time from their normal jobs to work on this project.
27. The project team members are physically close to each other-their offices, labs, or work areas are within 100 yards of each other.
28. The team aspect of new product development is working well-where we have people from different departments working on a project team.

Performance and Suggestions

In this final section, stand back and give us your thoughts on how effective the Division's new product efforts are, and what needs improving-the "big picture."

1. How would you rate the success of the Division's new product efforts in recent years?
 dismal failure -5 -4 -3 -2 -1 0 1 2 3 4 5 great success
2. Why did you rate it the way you did? _____
3. What are the major positive aspects of the Division's new product efforts? What's good about it? _____
4. What are the negative aspects? What's bad? _____
5. What are the major barriers to a highly successful new product effort in the Division? _____

6. Are projects moving along as quickly as they should-rate the timeliness of projects.

poor 0 1 2 3 4 5 6 7 8 9 10 excellent

Comment on timeliness: _____

7. Do we have the necessary resources in the Division to do projects properly (e.g., time, money, people availability)?

not at all 0 1 2 3 4 5 6 7 8 9 10 very much so

Explain: _____

8. Are we trying to do too many projects for the resources available?

not at all 0 1 2 3 4 5 6 7 8 9 10 very much so

Explain: _____

9. What aspects of product development need improving? What specific recommendations do you have for making the Division's new product process more effective? _____

10. Please use the last blank page to add any relevant comments that might help us improve the way we go about conceiving, developing, and launching new products in the Division.

11. Your name (your answers are confidential!): _____