

- etc. Organizations can analyse customer feedback to measure customer experience, satisfaction, expectations etc.
4. **Accurate launch of new products:** Market surveys are influential in understanding where to test new products or services. Market surveys provide marketers a platform to analyse the scope of success of upcoming products and make changes in strategizing the product according to the feedback they receive.
  5. **Obtain information about customer demographics:** Customer demographics form the core of any business and market surveys can be used to obtain intricate and sensitive details about customer demographics such as race, ethnicity or family income.

### ***Types of Market Survey with Examples***

Multiple types of market surveys are used by enterprises to collect data depending on the objective of their market research. The information collected can be used to study various aspects of the market to address topics such as the right time to launch the product/service, to understand the trends in the market, to measure customer loyalty, to study their competitors and many more.

There are various types of market surveys out of which we will talk about the top 10 to get information from customers about their demands, expectations and what they opine about the competitors. Each one of these market surveys has a different approach and has a marking impact on the various aspects of a business.

In order to conduct various types of market surveys, successful enterprises in today's world, use powerful market research survey software to get actionable market insights through real-time data collection and robust analytics. Following are the top 10 types of market surveys that are conducted by successful enterprises.

1. **Market Surveys for segmentation:** An organization can spot existing and prospective customers and understand why the customers have chosen their products/services and the prospects have not yet made a purchase. This can lead to a structured market segmentation and analysis.
2. **Market Surveys for exploring various aspects of the target market:** Get information about factors such as market size, demographic information such as age, gender, family income etc. to lay out a roadmap by considering growth rate of the market, positioning, and average market share.

3. Market Surveys to probe into purchase procedure: How does a customer decide on making a purchase? What are the factors that convert product awareness into sales? This type of market survey will unveil awareness, information, free trial, purchase, and repeat.
4. Market Surveys to establish buyer persona: These surveys are to build a buyer persona by knowing about customer preferences, inclination, and capabilities of purchasing a product.
5. Market Surveys to measure customer loyalty: What is the degree of loyalty that the customers have towards and organization? The answer to this question can be obtained by conducting a market survey.
6. Market Surveys to analyse a new feature or concept: It is essential for an organization to include market-compliant features and concepts. By carrying out a market survey to understand which features to launch, will help all the teams involved in the feature development process to do that with proper research.
7. Market Surveys for competitor analysis: Healthy competition is always good for an organization's progress. Market surveys done with the motive of competitor analysis will produce results about how does the target market weigh the organization's products/services in comparison to the others in the market?
8. Market Surveys to understand the impact of sales activities: Sales activities are the backbone of an organization and it becomes crucial to keep track of these activities. Market surveys for sales activities will produce a report of the impact of sales activities, whether their frequency needs to increase or any changes the audiences think should be inculcated in the sales process.
9. Market Surveys to assess prices for new products/services: Affordability of products also is an aspect that drives the market for organizations. Price ranges, product variants to cater multiple price ranges, target customers for each of the products etc.
10. Market Surveys for evaluation of customer service: Good customer service can lead to enhanced satisfaction levels among customers. Factors such as time taken to resolve issues, the scope of improvement, best practices of customer service etc.

## **Data Analysis in Market Research**

The data analysis stage in a market research project is the stage when qualitative data, quantitative data or a mixture of both, is brought together and scrutinised in order to draw conclusions based on the data. These conclusions then provide the key insights for the research project and any associated reports or presentations.

The aim of data analysis in research is to discover useful information from a set of data, and conclusions that can be used to form insights. Large quantities of data must be summarised and presented in a way that clearly communicates the most important features and conclusions.

Data analysis in research projects that involves quantitative methods have similar techniques, including analysing the frequency of variables and the differences of variables. Statistical testing is often used during data analysis in research. These are carried out to estimate the significance of any conclusions the results may suggest and determine that they did not occur by chance.

Data analysis in research projects that include qualitative methods still require the results to be coded like in quantitative data analysis. This is in order to identify the similarities and differences between the responses. As systems for pre-coding qualitative data are limited, each project involves bespoke coding methods. This form of data analysis in research is known as content analysis.

DJS Research offers clients either full market research projects, or is able to conduct the data analysis of research projects where the information has already been gathered. DJS Research also provides the service of data analysis in research from a wide range of sectors - we have our own internal data processing and analysis units, as well as a team of coders and an array of statistical software.



## Marketing માર્કેટિંગ

❖ 2 primary function of any business activities:

1. Manufacturing 2. Marketing.

### ❖ Marketing - Definitions:

Specialized activity which brings together a producer & consumer. (or buyer)

વિશિષ્ટ પ્રવૃત્તિ જે ઉત્પાદક અને ગ્રાહકને એકસાથે લાવે છે.

It is human activity directed at satisfying needs & wants through exchange process. વિનિમય પ્રક્રિયા દ્વારા જરૂરિયાત & ઇચ્છાઓ ને સંતોષવા તરફ દોરી જતી માનવપ્રવૃત્તિ.

## 4 p's of marketing

### 1. Product પ્રોડક્ટ

❖ Bundle of satisfaction

❖ Product = Working value

+ Aesthetic value સૌંદર્યલક્ષી મૂલ્ય

+ Esteem value એસ્ટિમ મૂલ્ય

+ Emotional value ભાવનાત્મક મૂલ્ય

❖ Product have 4 phase in life

1. Introduction
2. Growth
3. Saturation
4. Decline

## Importance

1. For all unit of product & service
2. Small, medium & large for all industry
3. Local, National & International level
4. For non-profitable organization also
5. Production & marketing - 2 are main

## 2. Price પ્રાઇસ

❖ Floor limit – cost of production  
નીચેની સીમા - ઉત્પાદન ખર્ચ

❖ Ceiling limit- customer price beyond they can not want to pay.

ઉપરની મર્યાદા- ગ્રાહક કિંમત કે જેની ઉપર તે ચૂકવવા માંગતા નથી.

❖ 3 criteria: 1. Production cost

2. Demand satisfy

3. Competition in market

❖ Customer surplus ( Diff. Between Satisfaction-level & selling price) ગ્રાહક સરપ્લસ

### 3. Place or channel of distribution.

પ્રદેશ અથવા વિતરણ વ્યવસ્થા

#### ❖ Channels:

Producer/નિર્માતા

Agent દલાલ

Whole-seller સંપૂર્ણ વિક્રેતા

Retailer છૂટક વેપારી

Consumer/ગ્રાહક

1. Zero link  $P \rightarrow C$

2. Single link  $P \rightarrow A \rightarrow C$

3. Two links  $P \rightarrow W \rightarrow R \rightarrow C$

4. Three links:  $P \rightarrow A \rightarrow W \rightarrow R \rightarrow C$

#### ❖ Channel selection based on

- Productions

- Markets

- Products

-Intermediaries

-No. of customer to be serve

#### 3. Construction of message/સંદેશનું બાંધકામ

"I get what I want" "હું જે ઇચ્છું છું તે હું મેળવું છું"

Incentive like પ્રોત્સાહન જેમ

"25% more in same price" "એ જ કિંમતે 25% વધુ"

"2 get 1 free" "2 પર એક મફત મેળવો"

#### 4. Media selection/મીડિયા પસંદગી

-Television/ટેલિવિઝન

-Internet/ઇન્ટરનેટ

-News paper/ન્યૂઝ પેપર

- Paper note/પેપર નોટ

-Radio/રેડિયો

-Poster in road side રસ્તા બાજુ માં પોસ્ટર

#### 5. Follow up/અનુસરણું

-Maintaining customer/ગ્રાહક જાળવી રાખવા

### 4. Promotion/પ્રમોશન

#### Activity in promotion:

❖ Introduction of products/ઉત્પાદનોની રજૂઆત

❖ Entering new market/નવા બજારમાં પ્રવેશ

❖ Increasing consumption of existing customer

હાલના ગ્રાહકનો વધારાશ વધારવો

❖ Grabbing higher market sales ઉચ્ચ બજારના વેચાણને પકડવું

#### Consideration:

1. Target audience/લક્ષ્ય પુસ્ટાકી

2. Development of favorable attitude/અનુકૂળ વલણનો વિકાસ

- By AIDA process (Attention, Interest, Desire, Action) એઈડાની પ્રક્રિયા ક્રમ (ધ્યાન, રસ, ડિઝાયર, એક્શન)

#### ❖ Product Life Cycle:

4 stage 1. Introduction/પ્રવિષ્ણ

2. Growth/વૃદ્ધિ

3. Saturation/સંતૃપ્તિ

4. Decline/અસ્થીકાર



#### ❖ New product investment areas:

1. Intro of new product entry in business

2. Expansion/વિસ્તરણ of existing product

3. Diversification/વેલિયકરણ in new line of product

i. Related product

ii. Unrelated product

4. Business integration/વ્યાપાર એકીકરણ

i. Backward

ii. Forward

### 3. Place or channel of distribution

પ્લેસ અથવા વિતરણ વ્યવસ્થા

❖ Channels:

Producer નિર્માતા

Agent દલાલ

Whole-seller સંપૂર્ણ વિકેતા

Retailer છૂટક વેપારી

Consumer ગ્રાહક

1. Zero link  $P \rightarrow C$

2. Single link  $P \rightarrow A \rightarrow C$

3. Two links  $P \rightarrow W \rightarrow R \rightarrow C$

4. Three links:  $P \rightarrow A \rightarrow W \rightarrow R \rightarrow C$

❖ Channel selection based on

- Productions - Markets
- Products - Intermediaries

-No. of customer to be serve

3. Construction of message મેસેજનું બાંધકામ

"I get want I want" "હું જે ઇચ્છું છું તે હું મેળવું છું"

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"25% more in same price" "એ જ કિંમતે 25% વધુ"

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-Radio રેડિયો

-Poster in road side રસ્તા બાજુ માં પોસ્ટર

5. Follow up અનુસરવું

-Maintaining customer ગ્રાહક જાળવી રાખવા

### 4. Promotion પ્રમોશન

#### Activity in promotion:

❖ Introduction of products ઉત્પાદનોની રજૂઆત

❖ Entering new market નવા બજારમાં પ્રવેશ

❖ Increasing consumption of existing customer

હાલના ગ્રાહકનો વપરાશ વધારવો

❖ Grabbing higher market sales ઉચ્ચ બજારના વેચાણને પકડવું

#### Consideration:

1. Target audience લક્ષ્ય પ્રેક્ષકો

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- By AIDA process (Attention, Interest, Desire, Action) એઇડાની પ્રક્રિયા દ્વારા (ધ્યાન, રસ, ડિઝાઇર, એક્શન)

#### ❖ Product Life Cycle:

4 stage 1. Introduction પરિચય

2. Growth વૃદ્ધિ

3. Saturation સંતૃપ્તિ

4. Decline અસ્વીકાર



#### ❖ New product investment areas:

1. Intro of new product entry in business

2. Expansion વિસ્તરણ of existing product

3. Diversification વેવિધ્યકરણ in new line of product

i. Related product

ii. Unrelated product

4. Business integration વ્યાપાર એકીકરણ

i. Backward

ii. Forward

### (E) RISK MANAGEMENT :

The term risk is used in wider context in the business situation. In a general context risk refers to a situation whose occurrence of outcome is uncertain and it results into several types of losses.

The term uncertainty is closely related to the term risk, because risk involves the occurrence of uncertain events resultating into losses. The risk and uncertainty, they are used as synonyms. However, there is a technical difference between the two terms. The term risk refers to the probability of occurrence of some unwanted event causing losses to the organization. The term uncertainty refers to the possibility of occurrence of the risky events.

There are several types of risk exposures in the business environment. However in the context of the enterprise project the risk is defined in terms of uncertainty of operating cash inflows. The risk features of the project are as under :

- (i) Initial project cash **outflows are certain** while the operating cash **inflows** during the operating life of the project are **uncertain**. Thus every project investment tends to be risk.



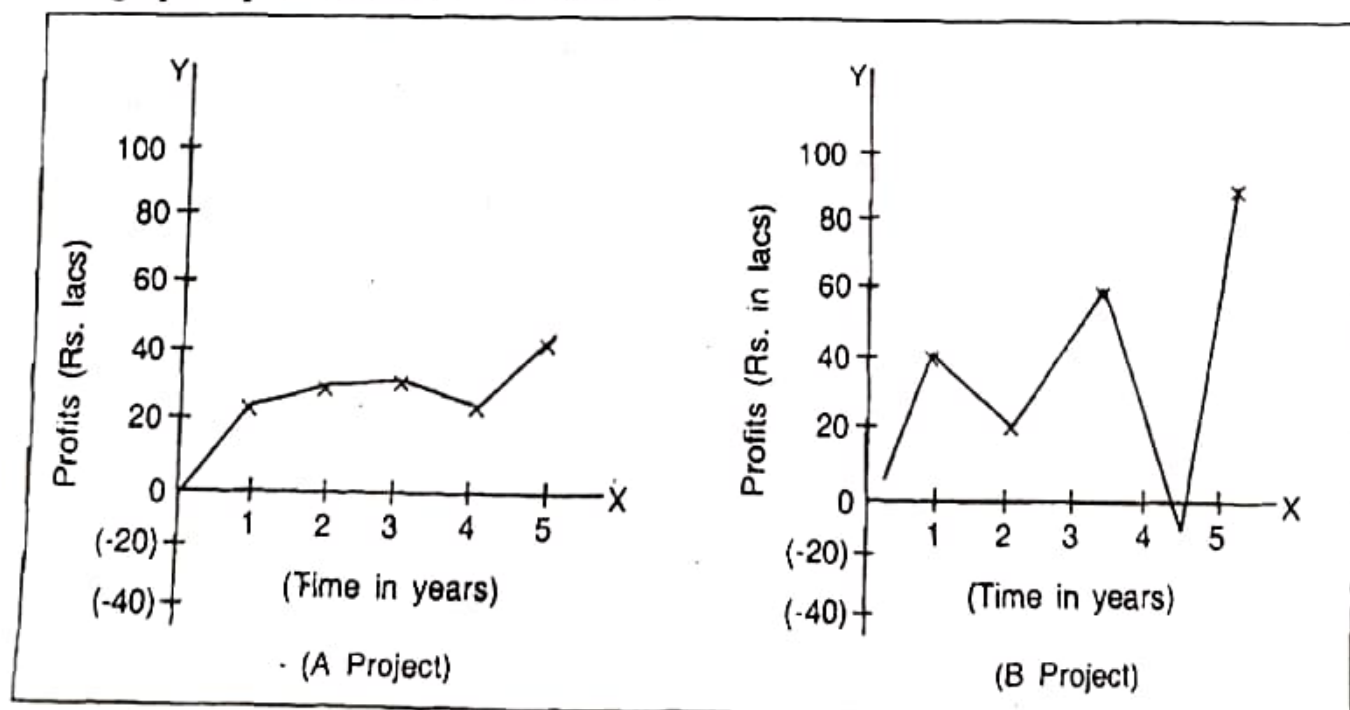
- (ii) The initial project cost outflows are projected in advance, while the actual project costs may be higher due to the cost over-runs and time over-runs, i.e. longer time than the projected time estimated for completion of the project.
- (iii) The risk is generally measured in terms of the variations in the operating cash inflows in relation to the projected cash inflows estimated as the time of project plan. For meaning the variability in the cash inflows, the mean value of the returns is ascertained and the spread from the mean values are presented in the form of the standard deviation. Higher the variability in cash inflows, higher is the risk reflected in the higher value of the standard deviation. The mean value of the return can also be ascertained with the use of subjective probability assignment calculated as the expected values of the cash inflows.

Business enterprise is exposed to several types of risks. One important for-runner or risk management in a strategic way presupposes the quantification of risk. The quantification of risk with the use of mathematical tools with the illustrative cash flows is briefly explained with the help of the following illustration.

**Illustration :** The projected net cash inflows from two projects having a project life of 5 years is as under :

Project	Year 1	2	3	4	5
A (Rs. in lacs)	20	22	24	22	25
B (Rs. in lacs)	40	20	50	(-10)	80

The measurement of the risk with the quantitative methods alongwith the graphic presentation is as under :





The above-mentioned risk can be quantified mathematically. Generally following methods are popular for measuring the risk :

- (1) Range
- (2) Standard Deviation (SD)
- (3) Coefficient of Variation (CV)

These all methods are explained with the help of the above illustration of profitability of company A and company B as under :

**(1) Range :** Range refers to the difference between the highest and lowest values of the variables. Thus,

$$\text{Range} = \text{Highest value} - \text{lowest value}$$

For Project A and Project B, the ranges will be as under :

$$\text{Project A} = \text{Rs. 25} - \text{Rs. 20 i.e. Rs. 5 crores}$$

$$\text{Project B} = \text{Rs. 80} - (-\text{Rs. 10}) \text{ i.e. Rs. 90 crores}$$

As the range of project B is higher than that of project A, project B is more risky.

## **(2) Standard Deviation (SD) :**

In the process of calculation of SD, the differences of mean values are squared and the sum of the square values are square-rooted. Through the squaring process, the minus values of the differences are converted into positive values and then the sum of square values is made. This is done as presented in the following formula of Standard Deviation. The SD is presented by " $\sigma$ " (small sigma - a greek letter).

$$\sigma \text{ (or SD)} = \sqrt{\sum_{i=1}^n \frac{1}{n} (X_i - \bar{X})^2}$$

The standard deviation of the profits of project A and project B will be ascertained as under :

Taking  $A_i$  for  $X_i$  and  $\bar{A}$  for  $\bar{X}$ , the standard deviation of the profits of project A will be :

$$\begin{aligned} \sigma_A &= \sqrt{\frac{(A_1 - \bar{A})^2 + (A_2 - \bar{A})^2 + (A_3 - \bar{A})^2 + (A_4 - \bar{A})^2 + (A_5 - \bar{A})^2}{5}} \\ &= \sqrt{\frac{(20 - 22.6)^2 + (22 - 22.6)^2 + (24 - 22.6)^2 + (22 - 22.6)^2 + (25 - 22.6)^2}{5}} \\ &= \sqrt{\frac{(-2.6)^2 + (-0.6)^2 + (1.4)^2 + (-0.6)^2 + (2.4)^2}{5}} \end{aligned}$$

### (G) **PRODUCT LIFE CYCLE (PLC)** :

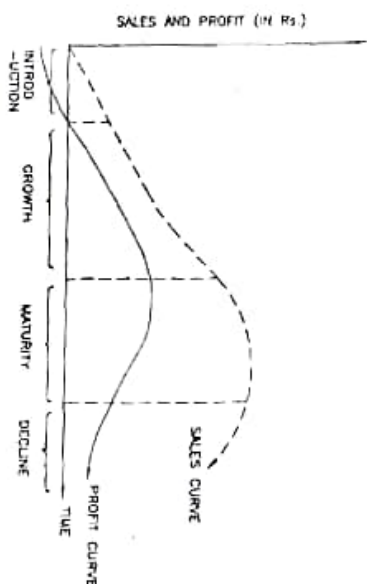
The concept of product life cycle is analogous to the periodic phase in a life of a living system. The human beings have birth, infancy, youth and old age. In the similar manner the product life cycle is classified as under :

- (1) Introduction
- (2) Growth
- (3) Maturity and
- (4) Decline

It should be noted that the concept of PLC is relevant for both - a commodity and a brand. **A commodity** is a common product of mass consumption like television or scooter, while **a brand** is a specific product falling in a commodity class like Sony television or Bajaj motor bike. A commodity generally enjoys a growth stage because of the growth in population, urbanization, education, culture etc. However, a commodity may also face a decline stage caused by long-term secular change. In the modern business, certain commodities like gramophone, typewriter, fountain pen etc. have totally disappeared. In the modern marketing management, generally the concept of PLC is considered in relation to a specific brand of a particular business unit. The PLC is a firm level or micro-level strategy which is considered by the business house for the survival in the modern competitive market.

Generally, the sales history of every product is broken into four distinct stages as stated above and presented in following figure. Every stage is characterized with distinct opportunities and problems. The "knowledge of the specific stage helps the marketers to develop an appropriate marketing strategy and to reap profits accordingly. The shape of the sales curve during the PLC is generally S-shaped as depicted in the following figure. Corresponding profit curve is also depicted

In the introduction a new product is introduced in the market. The relative profit is in non-existence because of heavy promotional expenditure for developing the



awareness about the product. **Growth** indicates rapid acceptance by the market and significant profit improvements. During maturity sales slow down as product is accepted by potential buyers also. Profit declines because of increased marketing expenditure for maintaining product position against competition. During **decline**, sales decrease and profits margin gets eroded away. The existence of a product at such volume is not justified in terms of marketing expenditures incurred on them.

It should be noted that it is not precisely known from where one stage ends and the other begins. Generally the stages are decided on the basis of percentage changes in the sales volume. Similarly it is very difficult to spell out any specific periodicity for each stage. Some products show a rapid growth from the very beginning, others instead of going through a rapid-growth stage, go directly from introduction directly to the decline. Philip Kotler states that the PLC of **fads** and **fashions** is typical. **Fads** comes into being quickly and are adopted with great zeal, peak early and decline very fast. **Fads** indicate an abrupt need which

arise in those people who wants to distinguish themselves from others. Fads do not survive because they do not satisfy a strong need. On the other hand fashion, tend to grow slowly, remain popular for a while and decline slowly. Generally fashionable products have normal PLC.

All the four stages are described in brief as under :

#### (1) "Introduction stage :

When a new product is introduced it is said to be in the introduction stage. The sales and profits are low in this stage because of following reasons

##### Reasons for low sales :

- (i) Unawareness about the product.
- (ii) Absence of distribution channel.
- (iii) Lack of estimating demand and adjusting production accordingly.
- (iv) Consumers' hesitance to switch over to other product.

##### Reasons for low profits :

- (i) The profit is lower or even sometimes negative because of following reasons
- (ii) Lower sales volume - so economies of scale cannot be tapped.
- (iii) Promotion and distribution expenses are relatively high. The ratio of promotion expenses to sales tends to be very high.

##### Strategies :

Efforts are intensified to enhance the demand for the product through the marketing mix - i.e. four P's - price, place (distribution), product and promotion. As regards price and promotion following strategies are followed :

- (i) The absolute sales volume increases at decreasing rate because of **distribution saturation**.
  - (ii) Stable maturity - Sales tend to stabilize at some level because of **market saturation**.
  - (iii) Decline maturity - sales volume declines because customers turn to other products or substitutes.
- The other features of this stage are :
- (i) Competition become tense and tactics like markdown pricing or off list pricing are employed by competitors.
  - (ii) Promotion expenses are diverted from product acceptance to consumer deals.
  - (iii) More expenditures on Research and Development (R & D) for devising better versions of the product.



(iv) The existence of weaker competitors is weeded out.

#### Strategies :

Defensive marketing efforts are developed through following strategies :

✓ **(i) Market modification :** This is achieved through (a) tapping new markets or new segments (b) stimulating increased usage and (c) considering repositioning of brand for increasing the brand sale.

**(ii) Product modification :** This is achieved through (a) quality improvements (durability, speed, taste etc.) (b) feature improvements (safety, convenience etc.) (c) Style improvement (aesthetical appeal instead of functional appeal).

#### (iii) Marketing mix modification :

Here sales is stimulated through altering one or more elements of marketing mix, i.e. four P's.

- (a) Price reduction to attract new triers or to snatch away competitors customers.
- (b) Effective advertisement campaign to attract customers' attention and interest.
- (c) To move to higher volume market channels.
  - (i) Rapid skimming - through charging high price and high promotion expenses.
  - (ii) Slow skimming - through charging high price with low promotion expenses.
  - (iii) Rapid penetration - through charging low price with high promotion expenses.
  - (iv) Slow penetration - through charging low price with low promotion expenses.

#### (2) Growth stage :

Growth stage is followed by introduction stage. The demand for the product increases as a result of continued promotion expenses, increased awareness, early adopters of products and their followers. Generally the product awareness increased by word of mouth. They take advantage of large market, many competitors enter in the market with slightly different versions of the product. The promotion expenses are maintained at same level are increased because of competition (say more advertisement, increased distribution outlets etc.) While price is maintained at the same level or slightly reduced because of competition (A part of cost advantage is passed over to consumers in the form of reduced price). Profit margin is increased because of two reasons :

- (a) Scale economies due to increased volume of production.
- (b) Promotion expenses to sales ratio goes down. In this stage growth in market share is attained through following strategies :
  - (i) To improve quality or to add new features in the product.
  - (ii) To search for new market segment.
  - (iii) To adopt new distribution channels.
  - (iv) To change advertising from product awareness objective to product acceptance and purchase appeal objective.
  - (v) To identify opportune price reduction to attract price sensitive customers.

#### (3) Maturity stage :

In the real business world most of the products are in this stage. The periodicity of this stage is also relatively longer. This is the most challenging stage in among all the stages of PLC.

#### (4) Decline stage :

In this stage sales declines steadily - at slower or faster rate. Sales decline due to following reasons :

- (i) New product class enters the market resultive from technical advancements.
- (ii) Buyers migrate to other products due to shift in taste and fashions.
- (iii) Market is flooded with imported cheaper products or substitutes.
- (iv) Price competition arising out of over production decreases sales volume.

#### Certain important features of this stage are :

- (i) reduction in price
- (ii) reduction in promotion expenses.
- (iii) products are withdrawn from small and marginal segments.

Sometimes products are allowed to continue under certain illusionary conditions :

- (i) the reduction in sale is due to cyclical phenomenon which will revive after sometime.
- (ii) Management emphasis product modification to enhance sales.
- (iii) It is argued that the dying product supports the sale of other products.
- (iv) the variable expenses are recovered from the price continuation of weak products is disadvantageous as under :
  - (i) It eats away relatively more time of management.

- (ii) Short production runs for small quantities are carried out.
- (iii) It takes away more advertising and sales force attention at the cost of other profitable products.
- (iv) It impairs company image.
- (v) It necessitates frequent price changes and inventory adjustments.

#### Strategies :

The best strategy is to identify the product in this stage and to drop them out when some firms are dropping the product they release customers for those who are still in the market. If it is decided to continue the product, then following strategies be followed :

- (i) Continuing strategy - to continue with the existing segments channel pricing and promotion.
- (ii) Concentration strategy - to concentrate only on strongest segments and channels.
- (iii) Harvesting strategy - to reduce expenses and increase profits, so that the decreased returns from reduced sales may be compensated.

#### (B) NEW PRODUCT DEVELOPMENT PROCESS :

Generally new product development process is mostly applied to new product development. It can also be applied for process innovation and developing of innovative services.

- (1) Idea generation
- (2) Screening the ideas.
- (3) Concept development and testing
- (4) Initial marketing strategy.
- (5) Business analysis.
- (6) Product, Process or service development.
- (7) Market testing.
- (8) Commercialization.

#### Each stage is briefly explained as under :

- (1) **Idea generation** : The new idea generation is an outcome of the creative thinking of human mind. The divergent fluency of thinking of promoters, executives, employees, agents, dealers, distributors, suppliers, scientists research institutes etc. give birth to a new product, process or service idea. The basic motive behind idea generation is to offer totally a new product or

to suggest any refinement, addition or deletion in the existing products. The suppliers primarily show their concern for the higher degree of customer satisfaction, and secondarily contributing to the higher profitability.

- (2) **Screening the idea** : All the new ideas are not worth implementing if it is feasible to translate into reality. Sometimes, they are feasible but not financially viable to put into practice due to high cost of production not affordable to the consumer. Such new ideas are screened in terms of **benefit-cost analysis**. Those ideas which generate **net benefits in long-run** are selected e.g. in U.S.A. "General Foods" Company developed 600 new ideas from which only 30 ideas were tried for commercial production.

- (3) **Concept development and testing** : The new ideas are primarily tried by the promoters of business entrepreneurs for a new idea to succeed it is necessary to verify whether the consumer confirm to it. Thus, the ideas are required to be tried and tested among the selected customers panel before it is put before prospective customers. This is managed as under

- (i) Who are the buyers ?
- (ii) What do they want to buy ?
- (iii) Under what conditions they would buy ?

This is done through segmentation, targeting and position (STP) process of the marketing.

- (4) **Initial Marketing strategy** : The term strategy refers to a decision of an entrepreneur who considers the long term advantage of a present specific spending on an idea. Generally there are several **strategic options** available in a particular market environment. The business-men prefers the one which is best integrating the internal environment which are controllable with the external environment which are uncontrollable.

The development of strategic options are made as under :

- (i) Size decision (i.e. high or low volume), long-term or short-term impact, change in market share, relative contribution from the decision etc.
- (ii) To consider the segmentation, target market, the price offer or quotations the marketing budget, media and media selection etc.
- (iii) Lastly to develop an appropriate marketing mix of 4Ps i.e. product, price place and promotion, i.e. either to select any one or any combination of the 4 P's best suited to the company.

- (5) **Business analysis** : The business analysis considers the cost-volume-profit analysis. For this purpose, the total costs are classified into fixed costs and variable costs. The variable costs varies directly and proportionately with the



volume of production, while the total fixed costs remain fixed within the given volume of production and installed capacity. Because of such a cost relationship to sales, the profit generation increases as the volume of production and sales increases. As the market structure and the market share enjoyed by a company determines how much volume should be produced, it becomes very necessary to decide a production level and pricing strategy that proves overall profitable to the company. Such business analysis is popularly known as **break-even analysis** and **cost-volume-profit analysis**.

- (6) **New Product Process or service development** : A new product, process or service which primarily appears attractive and profitable is conceived on paper like a blue-print of a construction activity. This is the preliminary stage of the novel development. Then they are produced as a proto-type or a sample production. In this stage of the product, process or service development, following aspects are considered :
- Availability of technology, machines, skills, raw-materials and utilities like electricity.
  - The cost of production.
  - Preparedness of a customer to lift the product at a proposed price.
  - Safety of use and cost of after sale services etc.
  - Degree of customer satisfaction
- (7) **Market testing** : The prototype developed is tried and tested on the target market. Generally the samples of products are administered on the selected customer groups. Their opinions and suggestions are obtained before the product is organized on a mass production. The market testing is done as regards change in composition, colour, size, attributes, acceptable price range etc. It is interesting to note that the Lipton India, a multinational tea company operating in India tried soft drink first in the Delhi market for market testing. As it was not accepted by the consumers in the initial market testing, the company dropped its idea of its commercial production.
- (8) **Commercialization** : Once a product, process or service is tested and proved commercially viable, following decisions are made :
- To produce a new product or refine the existing product on a defined capacity.
  - To segment the market-local, regional, national or international.
  - To target the customer group like income group, age-group, rural-urban market etc.

- (iv) To adopt an appropriate marketing mix of 4P's - product, price, place and promotion.

### (i) MORTALITY CURVE :

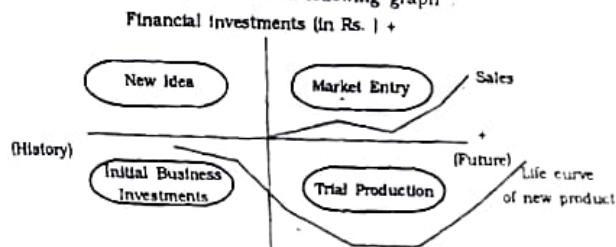
The term mortality refers to the life span of an entity in terms of time. The term infant mortality refers to a short span of life of a new product. Certain new products which are developed through the innovative process, disappear from the market with a short life existence, while there are certain products which sustain in the market for the longer time span. Of course, they do face certain life cycles as explained in the concept of the product life cycle in above paragraph (G). The product life cycle consists of four phases viz., introduction, growth, maturity and decline.

The short mortality curve of a product proves to be a big financial blow to the company because the huge Research and Development (R & D) expenses incurred by such products are not recovered through its longer life and the volume of production during the life because they vanish from the market in short-time. The profit skimming available from the growth and maturity of a product are not available on such product having short mortality curve.

The concept of the mortality curve is briefly explained as under :

A life of a new product spreads from a **conception stage** to the ultimate **consumption stage**. For the short, lived, mortal products, this time gap tends to be very short. The huge expenditures incurred on certain product idea, testing its feasibility of converting into the commercial production, production of proto-type or trial production, proving its market acceptance and then producing it on a mass scale go waste. Substantial monetary investments are made during the conception and trial production stage. The cash inflow and profitability occurs only when the product is properly positioned in the market in the form of the consumer acceptance through consistent repeat orders.

This situation is presented in the following graph :



(Figure : Life curve of a new product)



The above figure clarifies the following aspects about the mortality curve of a new product.

- (i) The historical time reflects the conception of idea. Idea testing involves monetary investments without any return and the assurance of returns.
- (ii) The furtherance of idea needs cumulative monetary investments made during the experimental stage.
- (iii) The commercial possibility through market testing is shown as 'trial production' quadrant of the figure. At this stage investments are made in trial run production and market testing among the panel of the selected consumers.
- (iv) If a product is found promising as reflected through its feasibility of production based on long-term availability of inputs like raw materials, electricity, labour skills, technology etc. the production is made at affordable costs and affordable price. The product is produced on a mass scale and introduced in a market as shown in the "Market entry" quadrant. The recovery of the costs and generation of profits occurs at this stage. The "market entry" stage of a product in terms of costs, sales and profits is explained by a concept of a product life cycle (PLC). But the PLC of the mortal product is very short.

#### (J) CREATIVITY AND INNOVATION IN PRODUCT MODIFICATION / DEVELOPMENT:

The creativity is an articulative and innate mind power of a person. Such creative and innovative human power becomes the basis for the resolution of some current problem to be resolved. It is popularly described as modifications in the existing products. It can also become the basis for novel and original idea which might not have been tapped previously. Such unique power of the human capital is identified as intellectual property. Such ideas are intangible and are to be nurtured through the incubative process to encourage the entrepreneurship.

Among all the field of skill development, the engineering field is most suitable for the modification and development of new products because it combined both the soft skills as well as hard skills.

There are substantial scope of application of creativity and innovativeness in designing, manufacturing and maintaining diverse categories of products either invented exclusively or are modified to resolve a problem faced by the existing consuming community.

The illustrative diversity of products amenable for engineering applications based on creativity and innovativeness are as under:

#### THE IMPORTANCE OF ENTREPRENEURSHIP AND INNOVATION

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Plants (series of machines)</li> <li>• Industrial machines</li> <li>• Heating &amp; Cooling system</li> <li>• Transport system-road</li> <li>• sea and air transport</li> <li>• Water crafts</li> <li>• Robotics</li> <li>• Metallurgical products</li> <li>• Hydrocarbon refinement</li> <li>• Hinges and fittings including fasteners</li> </ul> | <ul style="list-style-type: none"> <li>• Mechanical devices</li> <li>• Weapons</li> <li>• Apparatus</li> <li>• Vessels</li> <li>• Excavations</li> <li>• Cranes</li> <li>• Automation in materials handling</li> <li>• Enclosures and guarding systems</li> <li>• Machine accessories</li> </ul> |
|---|--|

The application area is still very large in relation to overlapping of mechanical engineering with chemical engineering, petroleum engineering, metallurgical engineering, electrical engineering, civil engineering, information and communication technology, naval engineering, nuclear engineering etc.

The applicability of creativity and innovativeness can occur at every stage of engineering starting from designing and drafting, product study and testing, manufacturing, storing, transporting, after use services etc. It can also be applied in architectural models, ergonomic studies, simulational overmoulding, injection moulding, bonding and guiding, thermoforming, sealing FDM parts, optimized support etc. Thus, the use of creativity and innovative use of the engineering skill clubbed with the entrepreneurial skill, opens up a very wide array of the products which have not been yet tried.

#### EXERCISE

- (1) What is innovation? State its characteristics.
- (2) Briefly explain the importance of innovation for an entrepreneur.
- (3) State various sources for development of innovativeness.
- (4) How is the innovativeness developed? State various ways to develop innovations.
- (5) State various steps involved in the innovation process.
- (6) Briefly explain the concept of Product Life Cycle (PLC).
- (7) Briefly explain the new product development process.
- (8) Explain the concept of mortality curve.

- (9) Explain the need of creativity and innovation in the product modification and development.
- (10) Write notes on :
- (i) Meaning and characteristics of innovation.
  - (ii) Ways to develop innovation
  - (iii) Importance of innovation in entrepreneurship development.
  - (iv) State the sources of innovation for entrepreneurship.
  - (v) Innovative process.
  - (vi) Product life Cycle (PLC)
  - (vii) Mortality curve
  - (viii) Modification / Development of product and innovation.



### (E) RISK MANAGEMENT :

The term risk is used in wider context in the business situation. In a general context risk refers to a situation whose occurrence of outcome is uncertain and it results into several types of losses.

The term uncertainty is closely related to the term risk, because risk involves the occurrence of uncertain events resulting into losses. The risk and uncertainty, they are used as synonyms. However, there is a technical difference between the two terms. The term risk refers to the probability of occurrence of some unwanted event causing losses to the organization. The term uncertainty refers to the possibility of occurrence of the risky events.

There are several types of risk exposures in the business environment. However in the context of the enterprise project the risk is defined in terms of uncertainty of operating cash inflows. The risk features of the project are as under :

- (i) Initial project cash **outflows are certain** while the operating cash **inflows** during the operating life of the project are **uncertain**. Thus every project investment tends to be risk.



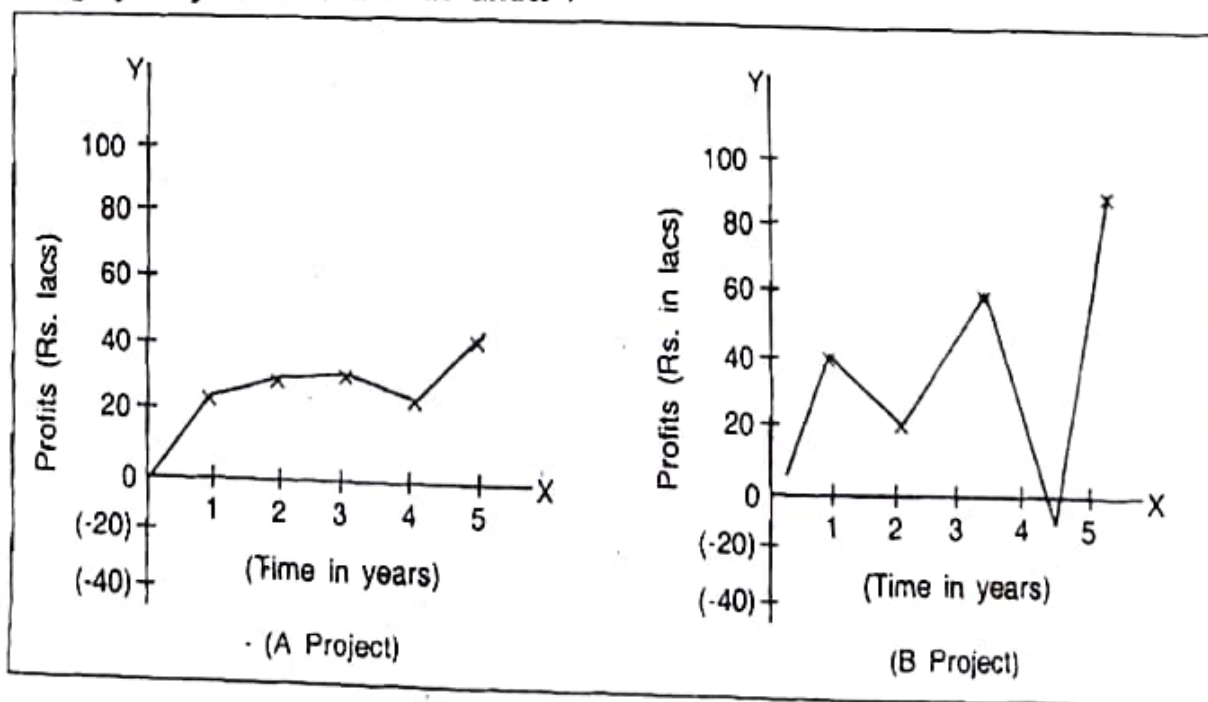
- (ii) The initial project cost outflows are projected in advance, while the actual project costs may be higher due to the cost over-runs and time over-runs, i.e. longer time than the projected time estimated for completion of the project.
- (iii) The risk is generally measured in terms of the variations in the operating cash inflows in relation to the projected cash inflows estimated as the time of project plan. For meaning the variability in the cash inflows, the mean value of the returns is ascertained and the spread from the mean values are presented in the form of the standard deviation. Higher the variability in cash inflows, higher is the risk reflected in the higher value of the standard deviation. The mean value of the return can also be ascertained with the use of subjective probability assignment calculated as the expected values of the cash inflows.

Business enterprise is exposed to several types of risks. One important for-runner or risk management in a strategic way presupposes the quantification of risk. The quantification of risk with the use of mathematical tools with the illustrative cash flows is briefly explained with the help of the following illustration.

**Illustration :** The projected net cash inflows from two projects having a project life of 5 years is as under :

Project	Year 1	2	3	4	5
A (Rs. in lacs)	20	22	24	22	25
B (Rs. in lacs)	40	20	50	(-10)	80

The measurement of the risk with the quantitative methods alongwith the graphic presentation is as under :



The above-mentioned risk can be quantified mathematically. Generally following methods are popular for measuring the risk :

- (1) Range
- (2) Standard Deviation (SD)
- (3) Coefficient of Variation (CV)

These all methods are explained with the help of the above illustration of profitability of company A and company B as under :

**(1) Range :** Range refers to the difference between the highest and lowest values of the variables. Thus,

$$\text{Range} = \text{Highest value} - \text{lowest value}$$

For Project A and Project B, the ranges will be as under :

$$\text{Project A} = \text{Rs. } 25 - \text{Rs. } 20 \text{ i.e. Rs. } 5 \text{ crores}$$

$$\text{Project B} = \text{Rs. } 80 - (-\text{Rs. } 10) \text{ i.e. Rs. } 90 \text{ crores}$$

As the range of project B is higher than that of project A, project B is more risky.

## **(2) Standard Deviation (SD) :**

In the process of calculation of SD, the differences of mean values are squared and the sum of the square values are square-rooted. Through the squaring process, the minus values of the differences are converted into positive values and then the sum of square values is made. This is done as presented in the following formula of Standard Deviation. The SD is presented by " $\sigma$ " (small sigma - a greek letter).

$$\sigma \text{ (or SD)} = \sqrt{\sum_{i=1}^n \frac{1}{n} (X_i - \bar{X})^2}$$

The standard deviation of the profits of project A and project B will be ascertained as under :

Taking  $A_i$  for  $X_i$  and  $\bar{A}$  for  $\bar{X}$ , the standard deviation of the profits of project A will be :

$$\begin{aligned} \sigma_A &= \sqrt{\frac{(A_1 - \bar{A})^2 + (A_2 - \bar{A})^2 + (A_3 - \bar{A})^2 + (A_4 - \bar{A})^2 + (A_5 - \bar{A})^2}{5}} \\ &= \sqrt{\frac{(20 - 22.6)^2 + (22 - 22.6)^2 + (24 - 22.6)^2 + (22 - 22.6)^2 + (25 - 22.6)^2}{5}} \\ &= \sqrt{\frac{(-2.6)^2 + (-0.6)^2 + (1.4)^2 + (-0.6)^2 + (2.4)^2}{5}} \end{aligned}$$

$$= \sqrt{\frac{6.76 + 0.36 + 1.96 + 0.36}{5} + 5.76}$$

$$= \sqrt{\frac{15.2}{5}}$$

$$= \sqrt{3.04}$$

$$= 1.74$$

Similarly the SD of the profits of project B will be :

$$\sigma_B = \sqrt{\frac{(B_1 - \bar{B})^2 + (B_2 - \bar{B})^2 + (B_3 - \bar{B})^2 + (B_4 - \bar{B})^2 + (B_5 - \bar{B})^2}{5}}$$

$$= \sqrt{\frac{(40 - 36)^2 + (20 - 36)^2 + (50 - 36)^2 + (-10 - 36)^2 + (80 - 36)^2}{5}}$$

$$= \sqrt{\frac{(4)^2 + (-16)^2 + (14)^2 + (-46)^2 + (44)^2}{5}}$$

$$= \sqrt{\frac{(16 + 256 + 196 + 2116 + 1936)}{5}}$$

$$= \sqrt{\frac{4520}{5}}$$

$$= 30.07$$

Thus, the SD of the earnings of project A is 1.74 while that of project B is 30.07. Higher the SD, higher is the risk and vice versa. So, it can be concluded that project B is more risky as compared to project A. Similar conclusion was derived in the earlier methods.

### (3) Co-efficient of Variation (CV) :

Coefficient of variation (i.e. CV) represents the relative relationship between mean and standard deviation values as under :

$$CV = \frac{\sigma}{\bar{X}}$$

The CV in the profits of project A and project B would be as under :

$$CV_A = \frac{\sigma_A}{\bar{A}}$$



$$= \frac{1.74}{22.6}$$

$$= 0.077$$

$$\text{and } CV_B = \frac{\sigma_B}{\bar{B}}$$

$$= \frac{30.07}{36}$$

$$= 0.835$$

It is to be noted that CV is a relative relationship presented in the quotient form and thus, it is amenable for comparison. Sometimes it happens that the mean of the observations are the same while the SD may be different. Conversely, the mean may be different and the SD could be the same. In such cases, the comparison made of CV basis proves more reliable.

#### Uncertainty and Certainty of Project Elements :

One popular definition of business is that, it is a sum of project. During the successful life of a business, various types of projects in the form of modernization, replacement or restructuring, expansion, diversification are undertaken at different time interval. All such types of projects and their related elements, give birth to the risk and uncertainty. All such risk elements of the projects result into the exposure of the business risk.

Every business proposal is developed on the basis of some expected events, e.g. plant capacity, decision, forecasted demand etc. When such expectations do not come true, any deviation in that results into some unwanted events resulting into financial losses. The smart planning by the management adjust to the uncontrollable external environment and manageable internal environment. Some important external and internal environment affecting the project management are as under :

External Environment	Internal Environment
1. <b>Technological factors</b> : fast change in technology (mobile, computer) etc. turns the existing assets into obsolescence.	1. <b>Availability of inputs</b> : Assured availability of raw-materials, power, water reduces the risk.
2. <b>Economic factors</b> : The occurrences of booms and depressions results into deviations in existing activities and the resultant risk.	2. <b>Production</b> : The adoption of technology, machine set-up, capacity utilization etc.

<p>3. <b>Political factors</b> : Stable government and consistent business policies versus unstable government and whimsical decisions affecting business environment.</p> <p>4. <b>Legal factors</b> : Frequent changes in laws affecting business operations.</p> <p>5. <b>Social factors</b> : The internal peace, honesty, commitment, patriotism etc.</p>	<p>3. <b>Marketing and distribution</b> : Loyal customers, favourable net working of dealers and logistics.</p> <p>4. <b>Finance</b> : Ability of the company to raise short and long term funds at favourable terms.</p> <p>5. <b>Human resource</b> : Honest, committed and loyal officers and employees reduce the risk.</p> <p>6. <b>Management team and philosophy</b> : Sober and smart management resolves the risky events in a strategic manner.</p>
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Moreover, various events of the project life like modernization, replacement, expansion, diversification and the relevant risks involved in them, help in managing the risk and uncertainty of the project elements in efficient and effective manner. They are briefly explained as under :

Business Activities	Nature of Risk
(i) Investments in <b>modernization</b> and <b>replacement</b> of fixed assets.	The risk level is <b>lower</b> because the fresh investments are made in the known area of the business.
(ii) Business <b>integration</b> of <b>backward</b> and <b>forward</b> nature. e.g. textile weaving company <b>manufacturing spun yarn through spinning unit</b> and also (backwardation) processes the grey cloth of weaving (forwardation).	Here the risk is <b>lower</b> because such investments result into known area of activities, it results into self-sufficiency through control on inputs and assured disposal of outputs.
(iii) Business <b>expansion</b> in the same line of business activities. e.g. A cement plant is increased from 100 MT per annum to 200 MT per annum.	Relatively <b>moderate risk</b> because the company invests in the known areas of the activities and it has also understood the market conditions and the marketing strategies.



(iv) Business **diversification** in

(a) allied areas e.g. a beverage company bottling plant also enters into fruit-juice bottling or milk-bottling and

(b) non-allied diversification or conglomerate e.g. a textile company enters into hotel chain or petrochemicals.

(a) In allied diversification the **risk is moderate** because the company has some core competence in either manufacturing or marketing or both.

(b) In case of conglomerate the **risk is higher** because the company invests in an activity which is totally new to it.

(v) **Strategic investments** in services or utilities which contribute indirectly to the prime business activities.

(a) In **plant services**, generation of captive power generation, automation in material handling.

(b) In **employee services** like providing pick-up transport service, provision of in-plant staff quarters, air-conditioning the office premise, training to employees etc.

The risk element is **higher** because as such services contribute indirectly to the prime activity, there is no direct relationship between the cost of the investments and the benefits from the investments. Due to such relationships, such investments are known as strategic investments and they are made at the discretion of the management.

**Decision Making Under Risk :**

The success of a business enterprise largely depends on the ability of an entrepreneur to foresee the external environment and his ability to manage the internal environment in relation to the forecasted external environment. Business has to deal with futurity which is uncertain and unpredictable. The business planning for the forthcoming period long-term and short-term is based on the forecasting of the future everchanging environment. An entrepreneur always strives to reduce the severity of such future uncertainty through manipulating the existing resources. He is adjusting them to future events through increasing or decreasing them as per changing environment. The adverse effects of the future uncertainty can be managed through following considerations in the decision-making process.



**(i) To forecast the variables on scientific basis :**

An appropriate forecast can be made about future demand, projected sales, estimated project costs, replacement of machines, increase in working capital needs etc. Generally based on the past data, some intelligent guess work is carried out and projected details are developed in the form of operating and financial budgets. Accordingly projected profit and loss account and balance sheet are prepared. Instead of subjective judgements, scientific estimates are developed with the help of certain statistical techniques like correlation, regression, time series analysis, probabilities etc. The use of scientific techniques reduces the possibilities of the budget error.

**(ii) To plan for the shortest foreseeable future :**

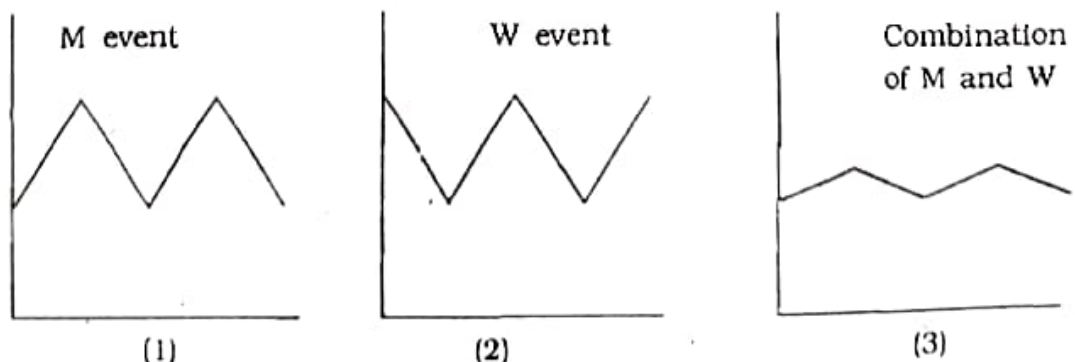
As longer is the time horizon, higher is the uncertainty in future estimation. So, as far as possible future forecasts should be made for shorter period like one-year or even coming quarter in an year. Shorter period estimates reduce the possibilities of budget errors. Moreover, executives and employees are in a better position to visualize the things which are going to occur in the near future.

**(iii) To develop compartmental decision through periodic revision :**

Instead of deciding one time long-term decision, it is always desirable to wait and watch the changing environment, and then to decide as per the then prevailing environment. Generally decision-tree method and Bayesian probabilities are used for such periodic revisionary decisions.

**(iv) To balance the counter cyclical behaviour of events :**

Sometimes two or more events occur in a counter cyclical manner, e.g. seasonal variation in demand of two product - one having a peak demand in April and the other becomes peak in December. Such counter cyclical behaviour is known as 'M and W' events. Through combining both such events the severity of the both the individual events are reduced. This is explain in the following figure :



**(v) To avail insurance arrangement for risk :**

Where risks are incidental and inevitable in a business situation then risk can be transferred to a specialized risk managing institutions like insurance companies. Against the payments of marginal insurance premium, the entire risk of the investments are transferred to the insurance companies. Risks can also be managed through the market-created specialized arrangements like options and futures.

**(vi) To use the strategic contracts :**

As risk is inherent in the business enterprise, some financial innovations have tried to manage the risk with the use of the contractual relationships. The application of such contracts are contingent upon the probable creation of risk events. Some such contractual relationships are as under :

- (a) Venture capital :** Under the venture capital arrangement, the venture capitalists provides the initial venture fund to finance a totally new untried area of risky investments. The reward to the venture capitalist is linked to probable success of the project. If project fails he loses, if project succeeds he is entitled to claim the windfall profits.
- (b) Options :** Options are one sided obligation for the option buyer against the nominal payments of option premium to the option seller. Such options are generally used to cover the price risks which prevails in commodity markets, share markets and foreign currency market. The real options are also in use for managing the probable risk in business investments.
- (c) Output purchase agreement :** Where the demand for a product is uncertain like use of toll roads, generally the government assures some toll revenue or traffic to the private sponsor of the infrastructure project. This is the arrangement for the power purchase agreement for the electricity generation projects.

**Methods of Risk Management :**

The enterprise risk management is considered in terms of the following :

- (1) Strategies for managing the risk resulting into lower severity of losses caused by the occurrence of uncertain risky events.
- (2) Risk reduction managed by the use of some techniques reflected in the reduced quantity of risk.