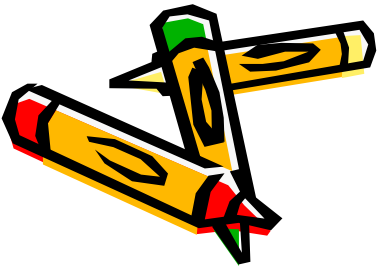
Technology Absorption & Diffusion

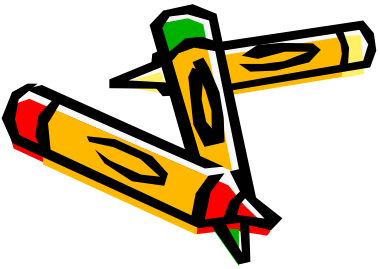
By

Dr. Vijay Kr Khurana



What is Technology Absorption?

- Technology Absorption refers to the acquisition, development, assimilation & utilization of technological knowledge and capability by a firm or some macro entity from an external source. It occurs between transferring & receiving entities.
- The technology absorption is wider in scope than technology acquisition.
- Technology absorbed without changing parameters of acquired technology is called *Technology Adoption.*
- Technology absorbed by changing certain parameters of acquired technology is called *Technology Adaptation.*



What is Technology Adaptation?

Technology Adaptation may arise due to following reasons:

- Non availability of supporting infrastructure
- For meeting location / market specific needs
- To make it compatible with existing plant & machinery
- Non availability of ancillary units for components
- To meet legal requirements
- Pressure from NGOs, environmentalist, human rights group viz.example: Government insistence to not to use BVO in soft drinks, forced cola companies to change their formulations.

Structure/ Components of Technology Absorption

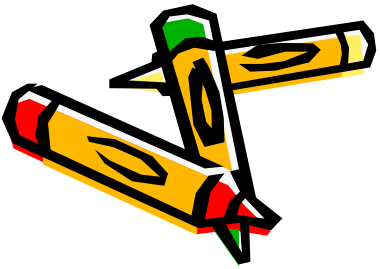
Technology Absorption involves following four basic components:

- Hardware – refers to particular physical structure of components & also their logical layout which are subject matter of absorption
- Software - refers to Know-how of carrying out tasks to achieve goals & objectives
- Brainware - refers to application & justification of hardware, software development, know-what & know-why of technology. That is what to employ, how, when, where, and why?
- Support Net - refers to complex network of physical, informational and socio-economic transformations that support the proper use and functioning of given technology.

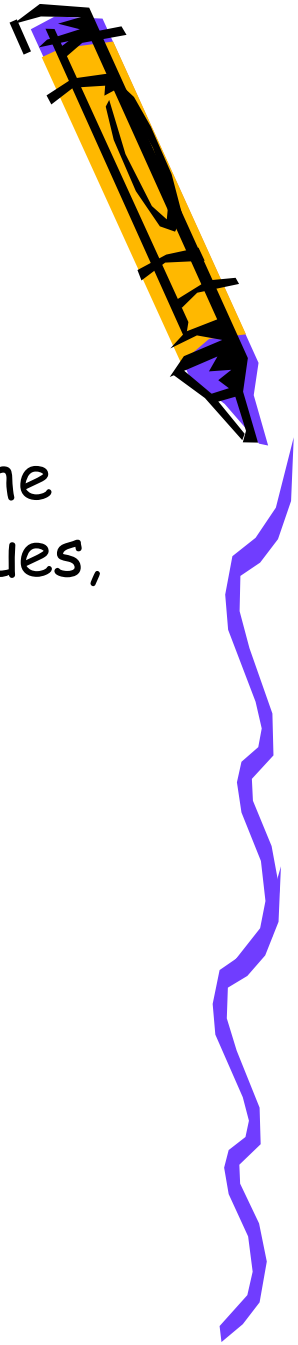
Differences between Technology Acquisition and Technology Absorption

If both Technology Acquisition & Technology Absorption occur simultaneously, then there is no difference in two terms. Sometimes there may be time lag between two. In case of time lag, differences may be as follows:

- 1. *Technology Acquisition* - Focus is on acquiring technology i.e. becoming owner; *Technology Absorption* - Focus is on putting the acquired technology to use; i.e. reaping the benefits from technology acquired
- 2. *Technology Acquisition* - Leads to firm specific technological knowledge and advantage; *Technology Absorption* - Leads to market competitive advantage

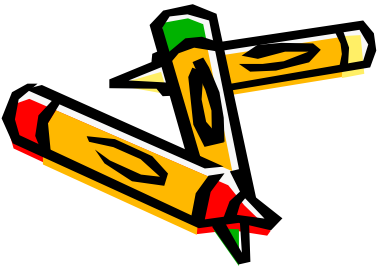


Differences between Technology Acquisition and Technology Absorption



Differences contd:

- 3. *Technology Acquisition* - Requires substanical costs for acquistion of technology; *Technology Absorption* - Inovolves some costs for putting the technology to use and leads to increase in revenues, improvement in efficiences etc.
- 4. *Technology Acquisition* - Precedes technology absorption ; *Technology Absorption* - Succeeds technology acquisition



Management of Technology Absorption by Organizations

- Generally, enterprises / organizations plan for technology absorption within reasonable time / planned time as it provides following advantages like – early use of acquired technology and reaping benefits therefrom, gaining technological competitive edge etc.
- Sometimes there could be delays in technology absorption due to variety of reasons.
- Delays in technology absorption could be harmful to the organization.
- Therefore technology absorption needs to properly managed by the organization.

Management of Technology Absorption by Organizations

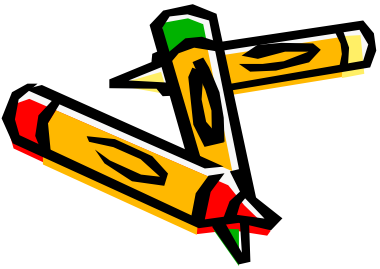
Organizations take following steps to manage technology absorption:

- Developing good understanding and mutual trust between technology transferor and technology recipient organizations
- Proper, clearcut and well-defined agreement between technology transferor and technology recipient organizations
- Developing time-bound and target-oriented schedule for technology absorption
- Top management support to the technology absportion

Management of Technology Absorption by Organizations

Steps contd …

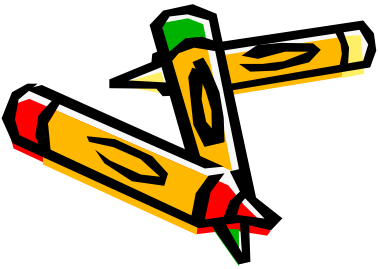
- Use of multifunctional teams by the technology acquiring organization
- Regular review of the absorption progress by the highest level.
- Installation of effective communication system by the technology acquiring organization.
- Seeking workers' particicpation, involving one and all in the absorption process; overcoming the resistance to change through education and motivation through rewards etc.



Management of Technology Absorption by Organizations

Steps contd …

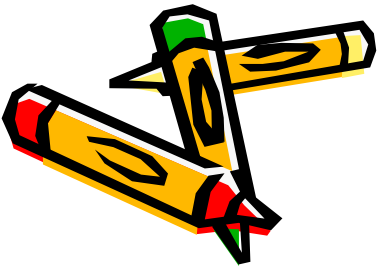
- Hiring of requisite skilled workforce; if same is not available, seeking early training of own current employees by technologists / technicians from the transferor enterprise.
- By actively complying with various government directives and requirements on technology upgradation and technology absorption.



Government Guidelines on Technology Absorption by Organizations

Due to variety of benefits of technology absorption, national governments seek quick absorption of technology.

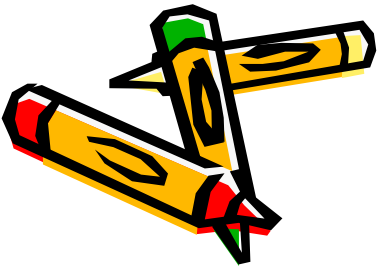
While seeking approval to Foreign Technology Transfer Agreements under the approval route from Government of India, the technology acquiring organizations / enterprises are required to indicate and commit timebound schedule for technology absorption. This puts pressure on organizations to plan systematic and timebound technology absorption.



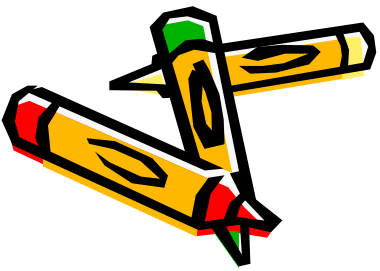
Government Guidelines on Technology Absorption by Organizations

Govt compliance contd …

- In addition, under Section 217(1) of the Companies Act, 1956, every company is required to attach a Board's Report / Directors' Report to every Balance Sheet which is laid before a company in general meeting.
- According to subclause(e) of the above section 217(1), amongst other things, the Board's Report shall deal with the steps taken for technology absorption by the company.

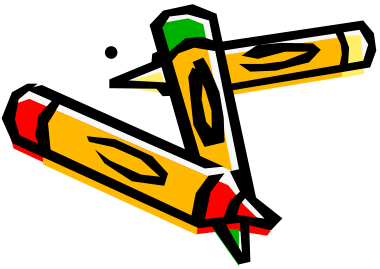


TECHNOLOGY DIFFUSION



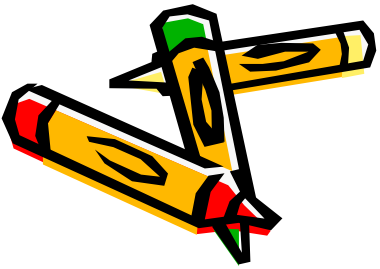
TECHNOLOGY DIFFUSION

- Diffusion is the process by which a new idea or new product is accepted by the market.
- *Technology Diffusion* means the spread of applications / usage of a new technology and its related products, services or processes from one nation to another; from one entity to another; from one industry to another; from the owner entity to user or supplier; and from current user to the prospective user.
- *Technology Diffusion* means the study of how, why, and at what rate new ideas and technology spread across the economy.



TECHNOLOGY DIFFUSION

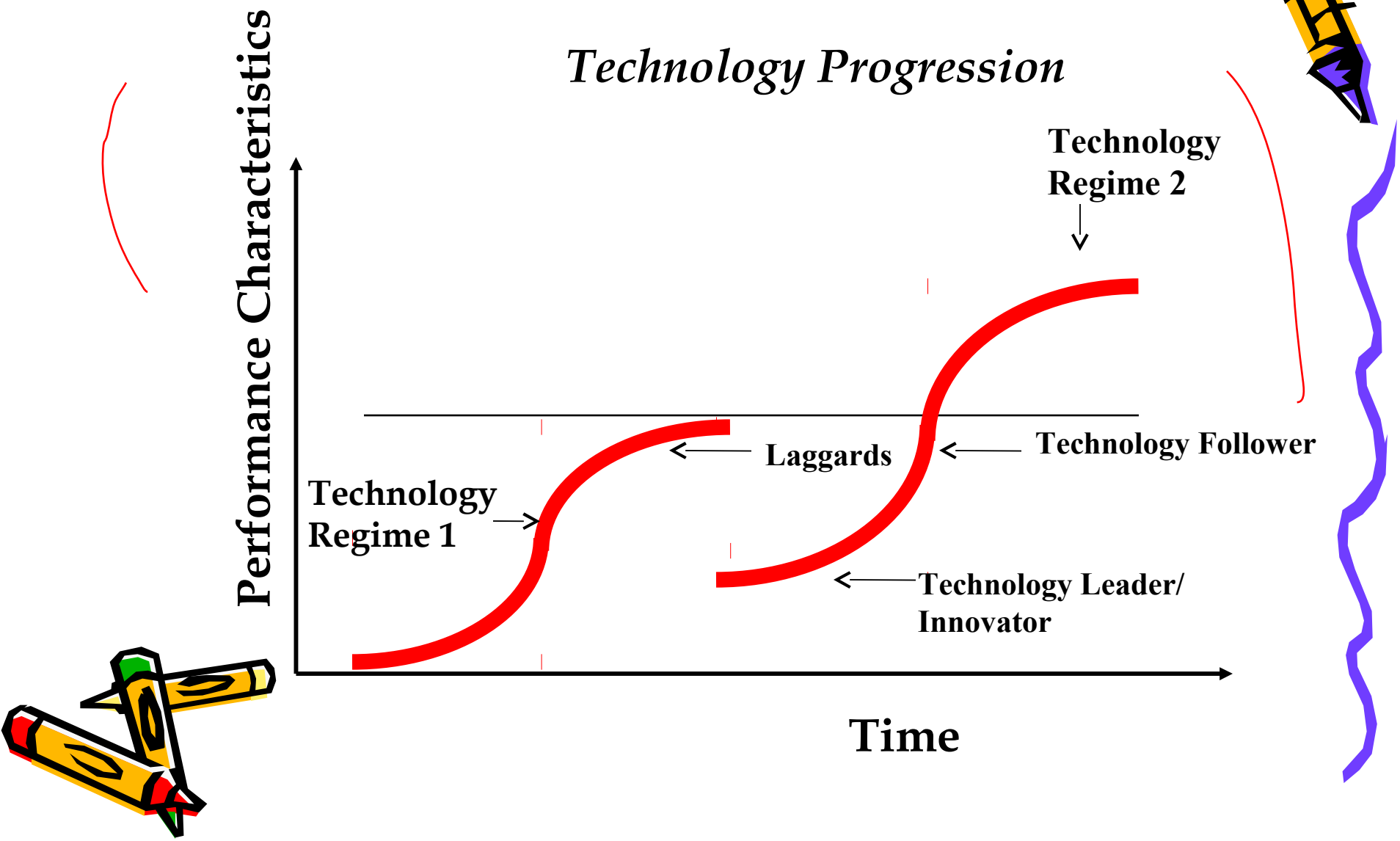
- Technology diffusion carries wide meaning (as also discussed in characteristics / features below).
- In a narrow sense, sometimes, *Technology Diffusion* is also known as *Diffusion of Innovation* as technology gets mainly diffused through its new usages or applications in the form of new products, services or processes.



Pattern of Technology Diffusion

- According to Everett M Rogers' theory, the diffusion takes the shape of bell curve in terms of number of adopters over the passage of time and takes the shape of *S-curve or Logistic curve* in terms of cumulative number of adopters over the passage of time.
- Various studies show that with the passage of time, technology and innovations get diffused from innovators to followers; and lastly to laggards. the trend of the percentage of organizations that adopt a new technology and innovations over a period of time - in cumulative terms - takes the shape of S-*Curve;* also called *Logistic Curve*. It is shown in the figure as follows:

Technology Diffusion



Pattern of Technology Diffusion

- During the intial stage i.e. innovation stage, technology and innovation gets diffused within the innovative organizations. Such organizations usually follow technology leadership strategy.
- During next stage i.e. consolidation stage, diffusion takes place amongst major competitors.
- During the last stage, i.e. mature technology stage, diffusion spreads to laggards. These laggards are, usually, risk-averse and small organizations or small market players.
- The rate of learnings / spread amongst various entities is influenced by profitability and investment required.

Product Diffusion

Product diffusion is a case of innovation diffusion. According to Everett M. Rogers, for any given product category, there are five categories of product adopters:

- Innovators – venturesome, educated, use multiple information sources, possess greater propensity to take risk (2.5%),
- Early adopters – social leaders, popular, educated (13.5%),.
- Early majority – deliberate, many informal social contacts (34%),.
- Late majority – sceptical, traditional, lower socio-economic status (34%)
- Laggards – neighbours and friends are main information sources, fear of debt (16%).

Product Diffusion

Product diffusion takes the shape of bell curve in terms of number of adopters over the passage of time and takes the shape of S-curve in terms of cumulative number of adopters over the passage of time. This is shown in the figure as follows.

Product Diffusion

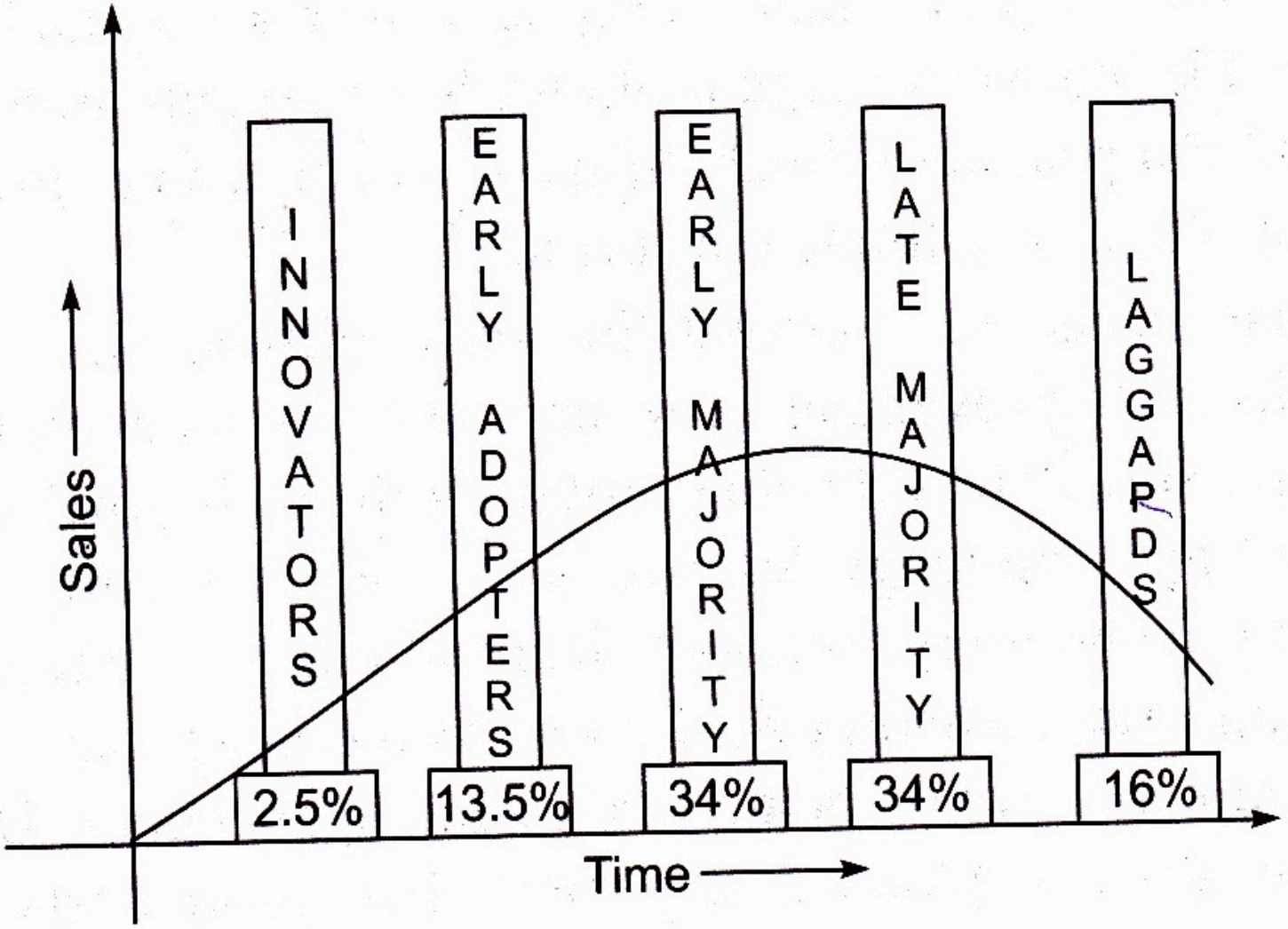
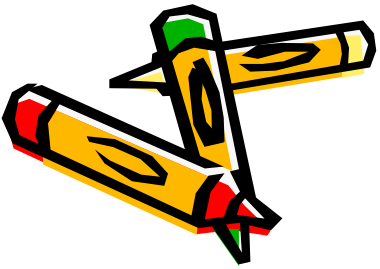


Fig. 8.2 Product Innovation

Characteristics of Technology Diffusion

- Diffusion is not one-way traffic. The innovator can also learn from imitator.
- Diffusion is not once- for-all occurance. It is cyclical in nature.
- Diffusion can take place in varying degrees: IntraFirm - diffusion of lowest degree ; InterFirm- diffusion of medium degree; Economy wide- diffusion of highest degree.
- Diffusion can take place in variety of forms … viz product , service or a process: use & production; stock of technological knowledge



Characteristics of Technology Diffusion

- The pattern of diffusion i.e. shape of S-curve is Influenced by profitability and investment required,

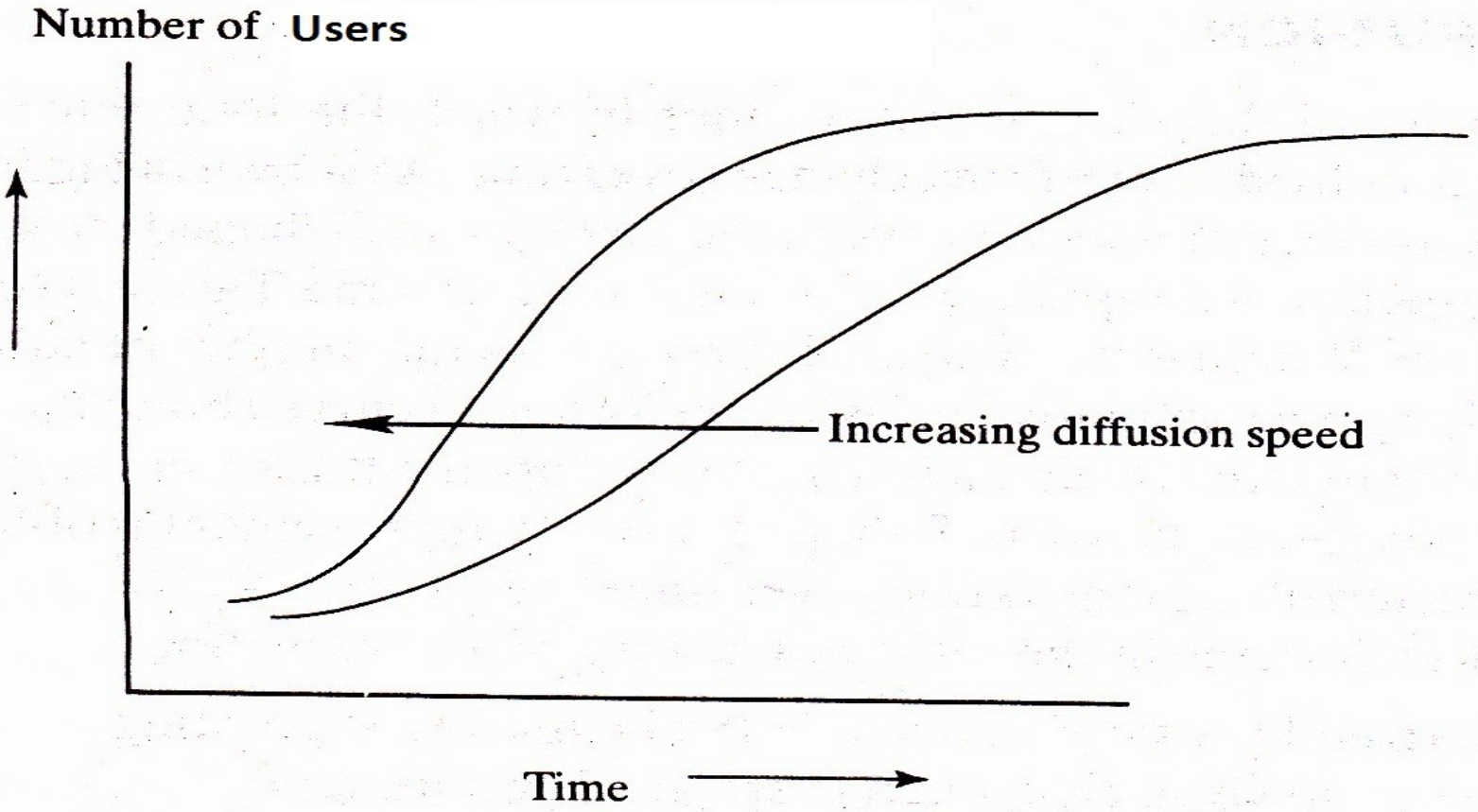


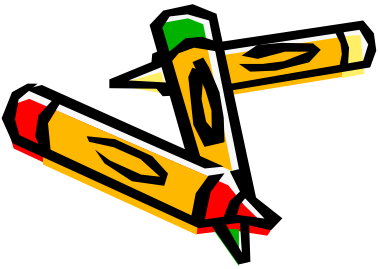
FIGURE 4.5 DIFFERENCES IN DIFFUSION SPEED

What are Global Trends in Technology Management

Prior to 1990, rate of technological change has been slow due to cold war between USA & USSR, restriction on MNCs, existence of high trade barriers across countries. Since 1990s rate of technological change has become faster.

This increased rate of technological change is noticeable in following areas:

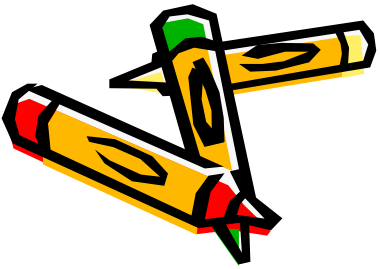
- Most of nations have adopted formal technology development policy and aim at gaining technological progress / advancement.
- Innovations (new product / process developments) are no more confined to developed world. They can take place anywhere, anytime.



What are Global Trends in Technology Management

Contd …

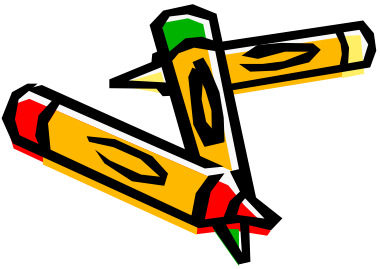
- Globalisation of technology is taking place at a faster pace due to variety of factors
- Technological development is becoming highly customer-oriented. As the customer needs & tastes are increasing and changing, technological changes are increasing.
- Decreasing payback period – to derive benefits of technology development
- Time compression – decrease in time available in various activities / phases of technology development
- There is faster movement of products and services from Research & Development center to markets (reduction in lead times).



What are Global Trends in Technology Management

Contd …

- There is increasing focus on simplification of products viz journey from earlier big computers to modern portable computers; emerging nano-technology.
- There is more focus on ergonomics (human convenience to use)
- Technology life cycle is getting shorter due to fast technological changes or technological discontinuties.
- Product life cycles are decreasing due to fast changes in consumer needs, increasing awareness about new or improved technologies.
- Technological change may occur not only due to development of improved / hybrid / new technology but it can occur even due to some development in unrelated technology.



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