TECHNOLOGY MANAGEMENT IT-504

FARHAN KHALID

WHAT IS TECHNOLOGY MANAGEMENT

- Technology refers to practical knowledge, product, process, tool, methods or system and purpose is to
  - "Make our lives easy".
  - "To solve our problems".

Management is the process of planning, organizing, controlling and motivating to achieve goals of an organization.

TECHNOLOGY MANAGEMENT refers to management of technological resources to get competitive advantage.

- Competitive advantage may include more profit, more production, more sales, more market value etc.

WHAT TECHNOLOGICAL MANAGEMENT INCLUDES?

Technological management includes

- Technology policy
- Technological forecasting and assessment
- Technology strategy
- Technology transfer
- Technology project management;
- Technology research and development

TECHNOLOGY POLICY

- The policy of a technology defines that what we expect from the user of that technology. The policy includes

1. Acceptable use of technology:

- Policy includes what is acceptable use of hardware, software, fax machine, email and voice mails etc.
- There is need to mention consequences of misuse of that technology.

2. Security of Technology:

- Policy should also include security of the technology (HW & SW). Only authentic user should allow to use it.
- Technology is for official use, not personal use.

3. Business Continuity:

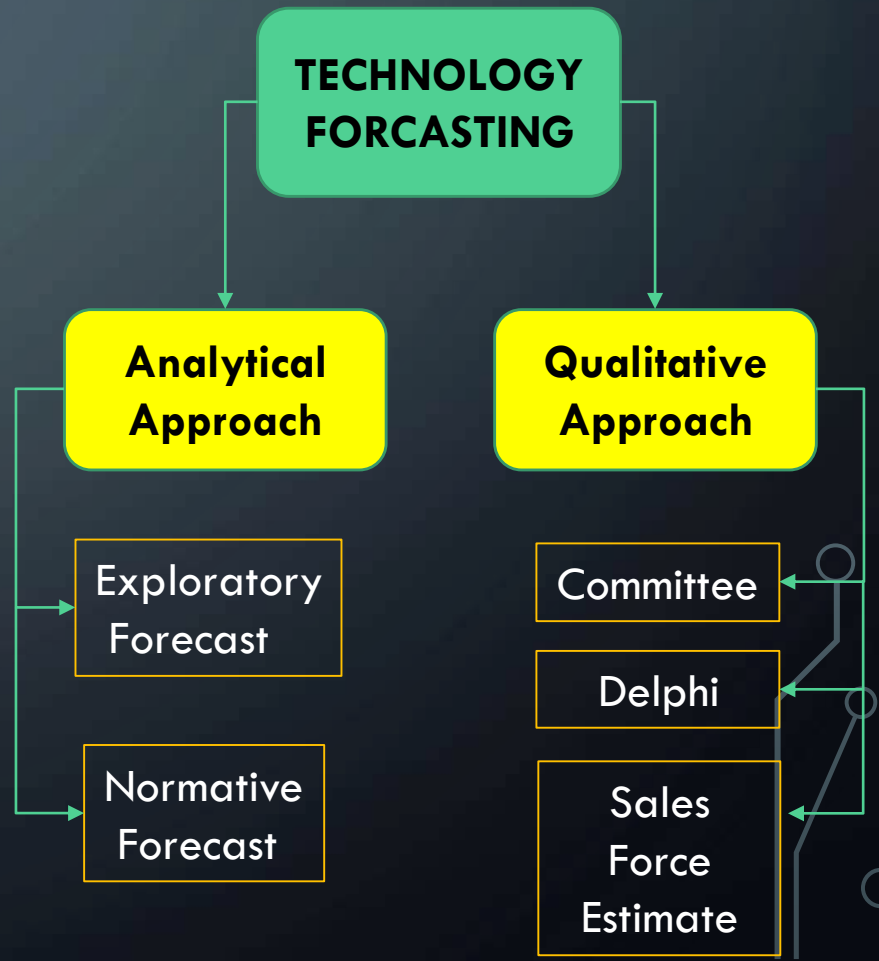
- Policy should also mention that in case of disaster, system crash what should be done.
- Hot site management, cloud services etc.
- A personal should be assigned duty for these tasks.

IT Services:

- Policy should also define what IT services should be provided within company.
- Like User training

TECHNOLOGY FORECASTING

- Due to competition, growth and survival of firms, each firm should take decision that that have to continue with old technology or they should move towards NEXT LEVEL.
- Technology forecasting means to predict the future characteristics of the technology. Technology means process, tools or machines etc.



QUALITATIVE APPROACH

- If no historic data is available, then Qualitative Approach is used.
- In Qualitative Approach, Expert opinion is the only choice for technology forecasting.
- Historic data is absent due to
  - If the technology is totally new. No data exists for this technology.
  - If past data has become irrelevant because of some external factor.
  - Ethical or moral considerations restrict the use of old data.
- Different experts are involved, they generate an idea, analyze that idea and make technological forecasting. The technical experience of experts matters a lot.

1. COMITTEE:

- Committee is a group of experts. They make open discussion for technological forecasting. Following are advantages of a committee.
  - More experts mean more knowledge of an area which is far better than knowledge of an individual's knowledge.
  - More factors can be discussed. More issues can be considered.
  - A member with LESS knowledge can be compensated by other members.
  - Removes biasness. But Pressure of seniors may change juniors point of view even he is correct.

2. DELPHI:

- Like committee, Delphi is also a panel of experts but it is a structured technique for technological forecasting.
- Questionnaire is prepared for experts. It also assures privacy.
- Depending upon answers their feed back is analyzed and presented in statistical form.
- 2nd round starts and again above two steps are repeated until experts find suitable solution.
- Multiple rounds are carried out for technology forecast.
- Benefits: Physically presence not necessary, Inexpensive, No Pressure on Subordinates.

3. SALESFORCE ESTIMATES:

- A company's sales force present in different geographic regions is in direct contact with the customer.
- Sales force has exact knowledge of the demand of the customers.
- The views of the sales force can be used for technological forecasting.

QUANTITATIVE APPROACH

- When historic data is available, then Quantitative approach is used for technological forecasting. Following are two types

EXPLORATORY FORECASTING:

- The data available from past and present, future of the technology is identified. It starts from today' knowledge and moves towards future. Like weather forecast.

NORMATIVE FORECASTING:

- It focuses on future needs of the market and then forecasting what technology will be required to full fil those needs.

ASSIGNMENT

Submit an assignment in soft form.

- Normative Forecasting with EXAMPLE
- Copy paste will be marked zero.
- You can take help from Research Paper, Journal, Internet
- Mention the source as well.
- Use your own wording to explain

Deadline: 17-04-2020

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TECHNOLOGY STRATEGY

- "Technology strategy is the utilization of technological resources of a firm to achieve its goals".

ABSENCE OF TECHNOLOGY STRATEGY:

- Having a technology strategy shows management broad vision and thoughtfulness in business.
- Study (2005) shows only 2% of IT organizations meet their targets.
- According to survey (2008), 50% of projects are poorly planned and poorly perform.
- According to study (2012), 50% of IT projects deliver less than predicted.

- Study in 2017 shows that even with most advanced technologies, 14% of companies believe that they are not getting competitive advantage.

SO WHAT IS THE REASON?

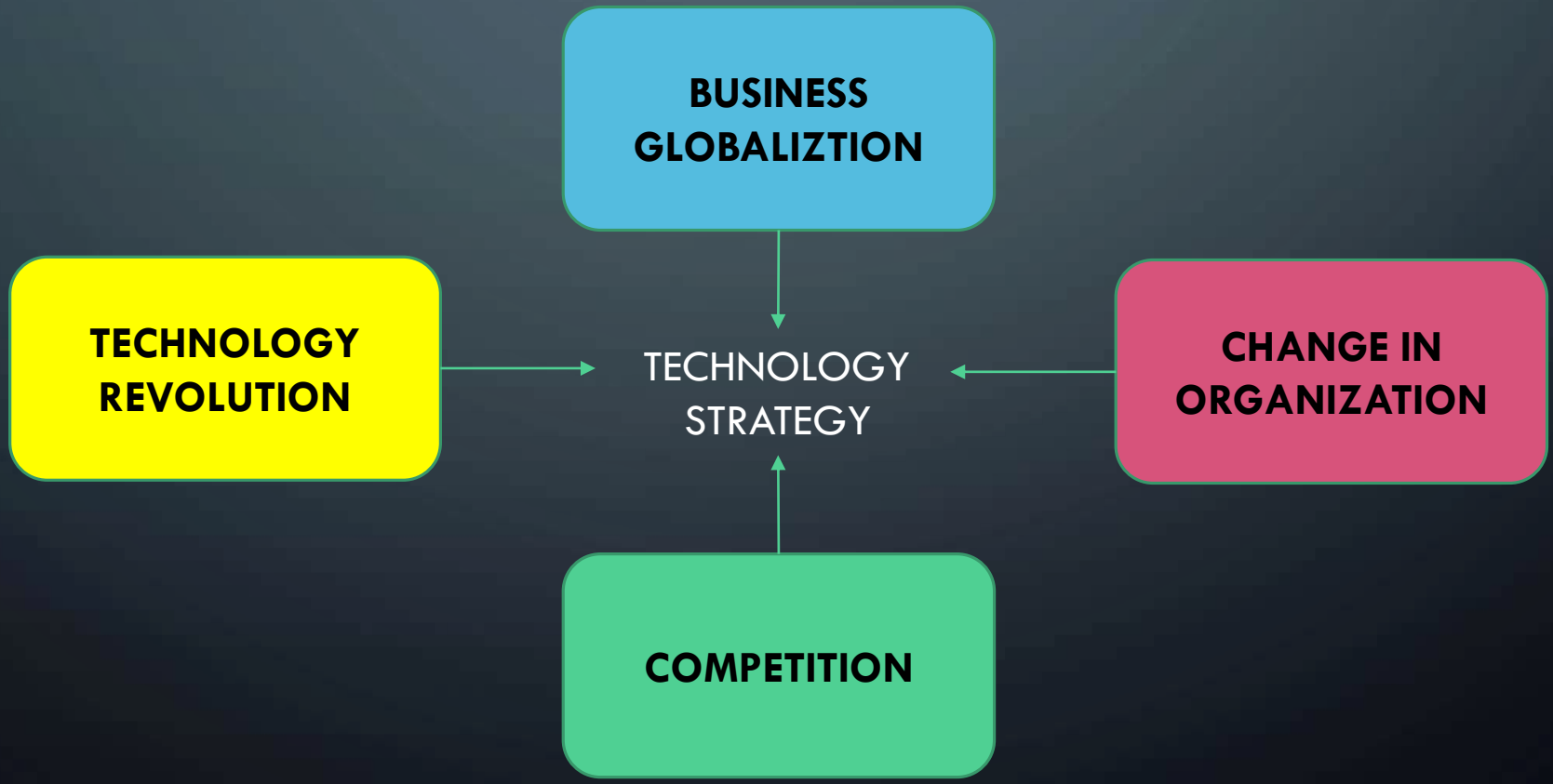
- Using a technology but absence of technology strategy is having a technology but still hitting in dark.

NEED FOR A TECHNOLOGY STRATEGY

- In current century, the business is not as simple as it was in past.
- Now technology is not just a luxury, it's a NEED for survival.
- Each organization is using most advanced form of technology and they are at their maturity level. Maturity level mean……. No Growth.
- Now the race has been started to earn profit by having more productivity, reduce cost, error free products, add values, good customer service, improved communication and a systematic business process.
- Now company cant afford to take a simple technology and start using them in their business.
- Companies need a proper TECHNOLOGY STRATEGY to align with business strategy.

DRIVERS BEHIND TECHNOLOGY STRATEGY

- Following are the drivers behind implementation of Technology Strategy.



A. COMPETITION:

- In advanced countries, companies are at their maturity level. Maturity level mean……. No Growth.
- Now the competition starts between companies by

1. Reducing Operating Cost: Companies need proper technology strategy to reduce the cost of operations. Technology strategy may be to do it by "automation". Example: FESCO is doing it through computerized bill generation and account management.

2. Improve Product Quality: A proper technology strategy can be implemented to compete by improving the quality of the product. An error free product will get more customer attention leading towards more market share.

3. Improve Service Quality: Competition can also be won by implementing technology strategy by improving the services provided by a company. Example: A shipping company not only provides overnight delivery but also sends messages to customers about the status of their package.

B. BUSINESS GLOBALIZATION

- **Globalization** refers to the changes in the world where we are moving away from self-contained countries and toward a more integrated world.
- **Business Globalization** is the change in a business from a company associated with a single country to one that operates in multiple countries.
- In past companies were operating in only one area, city or country.
- Now business has become global, working in different countries of world.

- Company, Supplier and buyer may locate in different parts of world.
- Moving across border results in different language, culture and time zones.
- These all factors require a proper communication which is the backbone of any business.
- So deployment of a simple technology is not enough, a proper Technology Strategy is required to win market share and compete competitors around the world.
- Global Software Development(GSD) is an example of Business Globalization.

C. CHANGE IN ORGANIZATION:

Technology strategy may be implement because of organizational change or "Reorganization". The reasons behind reorganization are

1. Expense Efficiency:

A company may reorganize to reduce its expenses. Some companies reduce these expenses by flattening the organization i-e eliminating middle manager or company may reorganize by removing its workers and deploying technologies instead of them. So it requires a full fledged Technology Strategy Implementation.

Example: Using Robots for Automobiles, Using Machines for weaving.

2. Merging and Acquisition: Companies may acquire or merge with other companies. Reason behind merging or acquisition may be crisis, business expansion or giving tough time to competitors.

This merging or acquisition is not a blind process, it requires development of a technology strategy and then its implementation.

The merging of automobiles with appliances.

An airline company integrates with plane crew, ground staff, ticketing system or flight schedule etc.

D. TECHNOLOGY REVOLUTION:

Only One thing is permanent “CHANGE”.

Demands of the customers are changing day by day and to fulfil those demands companies require to update their technology.

In past, people just want to talk to each other. But now they are sending voice message, pictures, videos, emails, video calling even engaged in conference calling.. Was that possible before 10-15 years ago?

Now companies have to change their setup by looking at future demands of the customer otherwise they will be out of market.

- Lets talk about FACEBOOK.
- Do you know how simple is their work? What they have future plans?

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HOW TO DEVELOP AND IMPLEMENT TECHNOLOGY STRATEGY

1. Focus on Business Goals.
2. Identify Future Intentions
3. Identify Technological Gaps
4. Technology Capability
5. Establish Timelines
6. Appropriating Technology
7. Technology Maintenance

1. FOCUS ON BUSINESS GOALS AND STRATEGY

- It is our business for which technology strategy is going to be developed.
- So before developing Technology strategy, once again focus on your business goals and strategy.
- You should be clear that why technology is important for your business. Why you are thinking of having a technology in your business.
- You want more productivity, more customers, new market, reduce product cost, reduce production time, improve product quality, or improve some process etc?

2. FUTURE IN MIND

- Before beginning to think the appropriate technology for our business, Remember this phrase. "***BEGIN with the END in mind***"
- Investments that only address immediate needs result in fewer benefits and soon expire.
- We cannot afford our business to stay behind, not NOW, not TOMORROW and not in COMING YEARS.
- *A FIRM SHOULD ALSO BE CLEAR ABOUT ITS FUTURE PLANNING*
- The choice of technology should be such that it could give us competitive advantage for coming years as well.
- A flexible and upgradable technology is the best choice to support business for a long period. Such technology will give us more as compared to our investment.

3. IDENTIFY TECHNOLOGICAL GAPS

A way towards developing and implementing technology strategy requires

- Review of current business operations and processes.
- This review will give us information about deficiencies in existing system.
- Identify which operations and processes have technological gaps or short fall.
- There could be multiple short falls but *set priorities of projects*.
- The biggest mistake is to start all at once which may lead towards collapsing in the heap.
- This prioritized list represents the main areas which require attention first.

4. TECHNOLOGY CAPABILITY

- Technology capability is defined as “The knowledge, skills and experience for developing, selecting, installing, maintaining and improving technologies”.
- Technology capability represents technological strength of a firm and help to get competitive advantage.
- Once gaps are found now check Technological capability of your firm so that you can develop, select or improve technology to fill these gaps.
- The gap can be filled by 3 ways.
  - Internal sourcing
  - External sourcing
  - Mixed Sourcing

INTERNAL SOURCING

- When development, improvement or installation of technologies is done after creative efforts WITHIN organization, it is called “Internal Sourcing”.
- Internal sourcing shows that firm is having technology capability.

WHY INERNAL SOURCING ? :

1. If required technology is not available.
2. Technology is available, but not available for sale OR at reasonable price (Other want competitive advantage).
3. If a company wants to be the FIRST/ FRONTIER of the technology.

Advantages of Internal Sourcing:

- Internal sourcing gives you ownership of invention/new technology.
- The firm becomes patent of invention. Patent is grant of protection for an invention.
- Once registered, no one can develop that product without your permission. It gives you market hold.
- You can sell that invention and can get competitive advantage.
- In addition, the understanding and the knowledge gained from the process of R&D can give the firm a head start on the next generation of technology.

Disadvantages of Internal Sourcing:

- Research and Development is required for improving or developing new technologies within firm, so Heavy Funds or financial assistance is also required for R & D.
- Internal sourcing takes long time because of R & D is time consuming process.

EXTERNAL SOURCING:

- When development, improvement or installation of technologies is done from OUTSIDE organization, it is called “External Sourcing”.

WHY EXTERNAL SOURCING ?

- If required technology is outside of the technological capabilities of the firm.
- If organization needs new technology in short time.
- If organization is lacking in R & D Funds. , then skills or knowledge is required from outside organization.

Advantages on External Sourcing:

- Major advantage of External Sourcing is “Availability of technology in less time.” Time to acquire a technology is less as compared to development time.
- New technology can be gained in less cost because R & D is more costly.

5. ESTABLISH TIMELINES

- TIME IS MONEY and Money is not for wasting.
- After fining technological gaps, setting priorities and arranging source for technology, define timelines.
- For multiple projects, define timeline for each project separately.
- Each project should be complete within predefined time.
- Timelines should be defined on the basis of available resources without putting extra burden on the staff.
- Constraints should also be focused while defining timelines. Like raw material, electricity, gas or busy season.

6. APPROPRIATING TECHNOLOGY

- Appropriating technology is next task in technology strategy.
- After getting technology either through Internal Sourcing or External sourcing within defined timelines, the next step is to implement it for operation. It is called “Appropriating Technology”.
- The implemented technology should behave **effectively** in organization’s operation.
- Effective means, the output of implementing technology is same as expected.

CHALLENGE AFTER APPROPRIATING:

- After Appropriating technology, an other challenge arises.
- The challenge of securing this technology from outer world.
- KNOWLEDGE IS COSTLY TO PRODUCE BUT CHEAP TO SPREAD.
- The leakage of the new technology should be ensured.
- Otherwise it will allow competitors to use firms technology and reducing any competitive advantage to be gained from that technology.
- It could be done by isolating technology and technologist from outer world which is tough task.
- So technologist should understand that they are technological gatekeepers and should assure security.

7. MAINTENANCE OF TECHNOLOGY

- The final component of technology strategy is maintenance of technology.
- Technology should always behave in same way even used multiple times.
- Continuous usage of technology may lead towards its inefficiency
- Maintenance and improvement is required to ensure its efficiency.

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TECHNOLOGY TRANSFER

TRANSFER OF TECHNOLOGY FROM SOURCE TOWARDS RECEIVER

R & D

Source

Both Get Benefit

Receiver

Need

TECHNOLOGY TRANSFER

EQUIPMENT

Algorithm Method PROCESS

KNOWLEDGE

TRANSFER OF TECHNOLOGY FROM SOURCE TOWARDS RECEIVER

Source

Receiver

Method

R & D

R & D

70000

0.1 million meter

90000

Electricity
Gas
Oil

ORGANIZATION A

ORGANIZATION B

BETTER IDEA TO USE TECHNOLOGY

Receiver

Better Use of Technology

More Profit

More Sales

NOT MAKING BETTER USE OF TECHNOLOGY

Less Sales

Less Profit

Source

TECHNOLOGY TRANSFER

- Technological gaps always exist which need to be filled.
- “Technology Transfer” is a new term, coming into existence in 1960s.
- The process by which a technology is transferred from source to receiver is called “Technology Transfer”.
- The process by which technology owned by a person or organization is transferred to other person or organization to fulfil its need is called “Technology Transfer” or “Transfer of Technology”.
- Technology transfer gives benefit to both, Source of Technology and Receiver of technology.

- The receiver of technology may be an innovator, who can better use the developed technology than the source.
- Source can get competitive advantage and can earn money after selling while receiver can fulfil its need.
- The technology that is transferred can be an equipment, process or knowledge. The transfer of knowledge can be through personals having research and development experience.

CATAGORIES OF TECHNOLOGY TRANSFER

1. INTERNATIONAL TECHNOLOGY TRANSFER (ITT):

When technology is transferred from an industrialized country to developing countries.

Industrialized country has Technological Skills Professionals while receiver country is lacking in Technological Skills.

Technology Transfer

2. REGIONAL TECHNOLOGY TRANSFER (RTT):

When technology is transferred from one region of country to another region within a country.

3. CROSS INDUSTRY TECHNOLOGY TRANSFER (CTT):

When technology is transferred from one industry/sector to other industry/sector within a country.

Technology Transfer

EDUCATION DEPARTMENT

AGRICULTURE DEPARTMENT

4. INTER FIRM TECHNOLOGY TRANSFER

When technology is transferred from one firm or company to another.

Technology Transfer

5. INTRA FIRM TECHNOLOGY TRANSFER

When technology is transferred from one company department to another department within a company. Departments may be at same location or other location.

Technology

COMPANY ABC

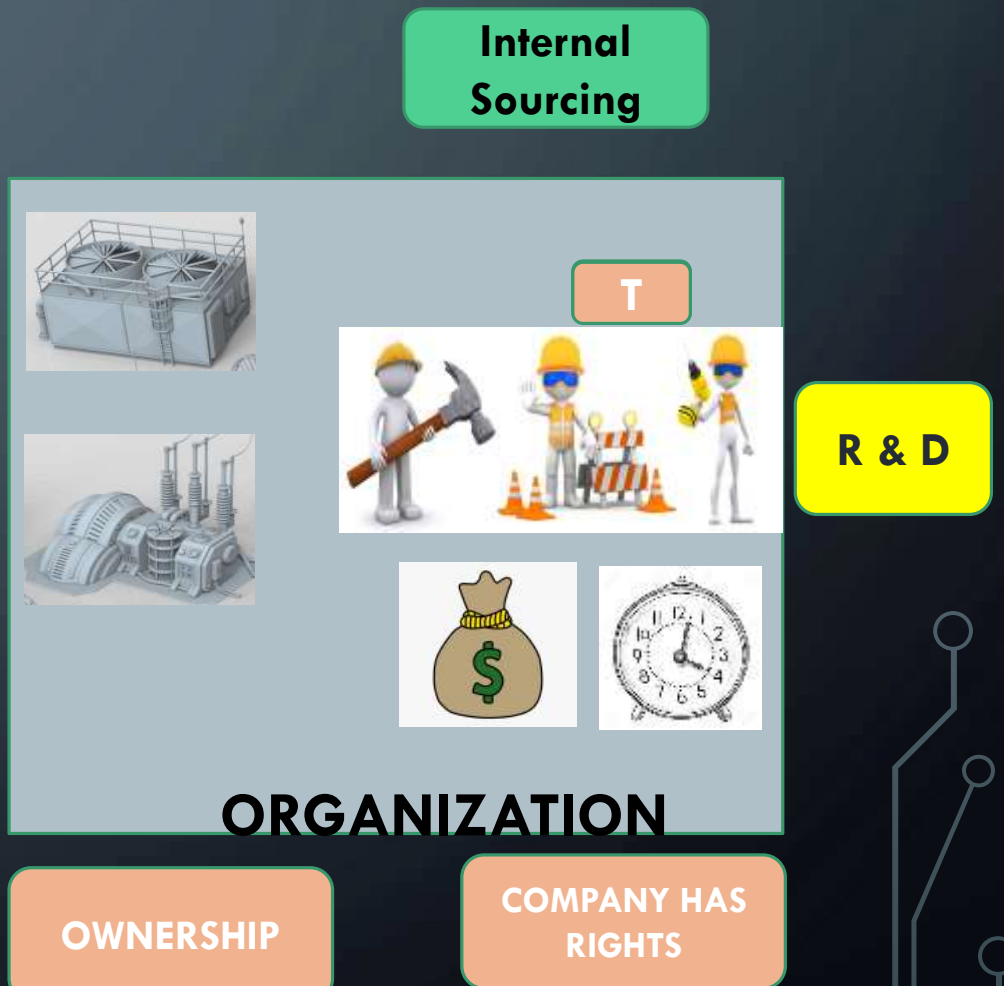
Faisalabad

Shahkot

COMPANY ABC

6. INTRNAL TECHNOLOGY TRANSFER

Internal Technology Transfer entails such a transaction whereby the transferor retains the control on the ownership and usage of the technology. For example, a large entity having R&D department produces technology that can be acquired by the core production department of the company.



7. EXTERNAL TECHNOLOGY TRANSFER

In external TT, technology is developed by an organization after R & D.

This organization transfer technology to some othe organization on their demand.

The control, ownership and usage o technology is passed to the recipien upon some agreement or mechanism