

Technology Transfer & Routes of Technology Technology Transfer

What is technology transfer ? Briefly discuss various routes of technology transfer. Give an example of specific route of technology transfer as adopted by an organisation.

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- Basically there are two ways of acquiring new technology : first is Develop it or purchase it; the second way of acquiring technology is commonly called “Technology Transfer”



WHAT IS TECHNOLOGY TRANSFER?

The issue of technology transfer is made complex by the fact that neither the process itself nor the package being transferred are homogeneous. Technology moves across national borders in many different ways. The most important of these can be placed into five generic categories: (1) the international technology market, which is made up of independent buyers and suppliers; (2) intrafirm transfer, whereby resort to the market is avoided and the transfer takes place through either a joint venture or wholly owned subsidiary; (3) government-directed agreements or exchanges, where the counterparts can be either public or private actors; (4) education, training, and conferences, where the dissemination of information is made public for common consumption by either a general or specialized audience; and (5) pirating or reverse-engineering, whereby access to the technology is obtained while resort to the market is avoided but at the expense of the proprietary rights of the owner(s) of technology. For purposes of this chapter, the two most critical are (1) and (2). This is not to deny the relative importance of the three other channels noted, especially the role of education and training. In fact, some persons would say that "people" constitute the most valuable source of technology transfer.⁷

This acknowledged, the reality is that most of the world's commercially based transactions involving the international movement of technology are linked to the multinational corporation (MNC), which is considered to be the most prolific purveyor of technology transfer.⁸ It is, therefore, the MNC that typically decides whether to depend on the market to determine price and the contents of the package, as in the case of a licensing agreement, or whether to "internationalize" the transfer process in its entirety, as in the case of setting up a wholly owned foreign invested enterprise abroad.⁹ Because of the continued pervasiveness of the MNC in structuring the scope and extent of global technology transactions, the result is that the international market for technology is usually considered to be an imperfect

The flow of technology from one company to other company is called technology transfer.

There are following main types of technology transfer.

1. International Technology Transfer

Here technology flows from a fully-advanced industrial country like USA or UK to less-developed countries like India or Ethiopia.

It may occur due to the following reasons.

- (i) Countries like USA and UK may set up their companies in Indian Soil. This is because they want to take ample advantage of cheap Indian labour, and tax-deductions.

Our scientists and engineers working in these Multi-National companies may learn about sophisticated machines and latest technology through their work experience.

Sometimes they may come and work in Indian companies while working in Indian companies they may apply the sophisticated technology of American multinational Companies in Indian companies.

Thus Indian people know about foreign technology.

- (ii) International Seminars and Conferences. For example, IIT Mumbai may host an international seminar in the field of say power electronics.

Reputed scientists from Stanford university and Michigan university may come and deliver lectures about recent research they have conducted.

The Indian students and professors who attend these conferences may get through knowledge of latest advances in the concerned field (Say power Electronics).

IIM-Ahmedabad may hold a business conference on certain recent topic. Professors from Harvard graduate school of business management, Cornell, North-Western University, Kenan-Flagler business school may come and give lectures, on their discoveries.

Indian business school Students may learn a lot about latest research results.

A live Example

Recently marketing Guru Dr. Philip Kotler (professor at SC Johnson School of management) had arrived for a brief conference of marketing management at Mumbai.

He is a world renowned authority in marketing authority in marketing management. He answered to the questions of Indian business schools on online. The business managers learnt a lot from him

(iii) Technical Journals

Harvard business review, Industrial engineering journal etc. publish various recent research results in their journals.

Scholars and students can set tremendous knowledge by reading. These Journals

2. Cross Industry Technology Transfer

This is a channel in which technology flows from one sector to another. The NASA of USA publishes it's research findings in a journal called tech brief magazine. The industry people can read that magazine and acquire knowledge about latest research results.

NASA has set up it's technology transfer center at Georgia Institute of Technology. Industrial engineers and electronic engineers can acquire knowledge about recent happenings from the Georgia institute, transfer center.

REVERSE ENGINEERING CHANNEL

Here a host may become capable of breaking the code of company's product and become capable of producing of a duplicate of original product. Live Compaq had all the knowledge required to produce a PC except one piece of technology the Read only Chip (ROM), IBM was legal owner of that chip.

Compaq purchases the chip and hired some capable scientists to produce a duplicate to IBM's chip. The chip was duplicated and Compaq could produce it's own PC at a much lower cost than IBM.

Compaq earned billions of dollars in sales, since it's computer was an instant hit.

But one should remember that it is just an IBM-Clone.

Technology Transfer in America

Americans have won highest number of Noble Prizes in the world. Their technology is far more superior to other countries.

The Robots, Total Quality management, all these were invented by Americans but Japanese used these inventions and defeated Americans in Commercial good sales.

The reason of decline of USA lies in the fact that USA didn't apply seriously the cardinal principles of technology management.

The defect with Americans is:

1. Their emphasis on short-term achievements and avoidance of long-term goals.
2. Lack of proper technology Transfer.

It seems that USA has correct that defect. NASA is publishing it's research results in tech brief magazines. NASA has also stated full - fledged technology. Transfer centers at University of Alabama and Georgia Institute of Technology.

Industries of America are learning latest technology from Tech - brief magazines and implementing the same. USA had been spending major amount on defence industry and very less amount on commercial industry. On the other hand Japan did just the reverse.

It spends huge amounts on commercial industrial goods.

Hence Japan emerged as the no.1 in Quality of goods. It is Japanese cars and electronic equipment that is purchased more in USA. USA people don't purchase 'made in America' products. They prefer 'made in Japan' products.

Japan has defeated USA in Car industry in USA itself.

This is directly attributable to the fact that Japanese spend huge amounts on commercial research and development. Plus, they followed teachings of Dr. Edwards Deming guru of statistical quality control. USA seems to have realized it's mistakes and is now engaging in active technology in active technology transfer. It is slowly gaining back it's lost competitiveness. Now courses on technology management are being offered in USA. Indian Universities should also start courses like M.Tech (Technology Management). Many of our talented engineers who are settled in USA are writing books for Indian students.

Thus they are indirectly transferring technology to India. When Indian students read these books, they can get good knowledge about latest technological development in America and other advanced countries.

LESSONS FROM ROBERT MC MATH'S NEW PRODUCT SHOW CASE OF FLOP PRODUCTS

CASE OBJECTIVE

To teach the students, how we can learn from other's failures.

Other's lives should be an example for us.

We should extract valuable lessons, from other's failures.

In Innovation, out of 100 ideas only 5 succeed. Therefore lot of patience is required on the part of the Engineering/Technology Manager to create a successful innovation.

The freedom to make mistakes provides the best environment for creativity. Thomas Alva Edison failed 1,500 times until he found that Tungsten was the correct element to be used for Electric bulb. Determination is required for success.

THE CASE

In the Mc Math's new product show case and learning center, marketers and innovators spend 50 dollars per hour to visit some 80,000 flop product's show case. In the US, some of the failed products are Gerber Food, Micro Wavetable Ice cream, Parsnip Chips and Miller clear beer. There is Garlic cake, Simmons Dijon Vinaigrette and Farrah Shampoo, which are all Flop products. Their innovators had spend millions of dollars from product innovation, advertisement etc. All these Millions of dollars were a big waste. We can learn great lessons from other's failures.

Let other's failure, be LESSONS for us, so that we may not repeat the same mistakes. Let other's lives be an example for us, says Robert Mc Math.

This museum contains 80,000 Flop products. We can learn several lessons from this show case.

Some of the lessons are:

1. The value of a brand or reputation of a brand represents the good name which a company has earned over several years. For example Texas Instruments has a good reputation. Customers place their entire trust on us. We should not lose our credibility by selling second class products under our brand name. This will spoil our good name. We should never introduce bad innovations under our reputed brand name. Doing so, spoils our brand name. Customers lose trust in us and our sales will drop.
2. It is very difficult to defeat an established company. For example Pepsi Company tried for decades together to share No.1 position with Coca-Cola. Out of the dozen Cool drinks like Toca-Cola, Gum-Gum Cola, Afri Cola who tried unsuccessfully to defeat Coca-Cola, only Pepsi-Cola was successful.
3. People usually don't buy products which remind them of their weaknesses. Gillette's 'for only oily hair shampoo' failed because people didn't want to be reminded that they had greasy hair.
4. By hearing the name of products, we can say immediately that the product will be hit or flop. For example toaster egg health, sea savage, were flops because of their unattractive names.

THE OSBORNE COMPUTER COMPANY

THE CASE OBJECTIVE

Correct timing is most essential in launching a new product. This case illustrates the fact that it is most important to introduce a new invention in the market as soon as possible. In other words, the time lag between invention and market introduction should be very less (nearly zero).

THE CASE

Adams Osborne founded the Osborne computer company. He packed all PC components and prepared the first personal computer. It was a portable computer. It permitted businessmen to take their work to their home and do it in their home using the PC. Osborne sold his first PC in 1981. In the first 2 months it earned one million dollars. By the second year it earned 100 million dollars. But by the third year it was a flop and it had to be closed down.

Reasons For Flop of Osborne Computers

Osborne used a 5 inches screen for his computer, which had 60 print columns. The main idea of using 60 inches screen was to keep the computer portable. But customers wanted an 80 print screen computer. Osborne refused to sell 80 print column computer. Thus, it ignored Customer's, tastes and preference. Hence it was a Flop. Meanwhile, Kaypro Computer company an arch rival of Osborne Computer company took advantage of Osborne's weak points. Kaypro introduced a portable 80 column screen computer. Kaypro's computers were an instant hit and Osborne's sales decreased drastically.

Osborne did another foolish mistake. It announced that, Compny is going to introduce new computers soon. At that time it had a large inventory of old computers. The timing of announcement was absolutely wrong. A company should never announce that it would introduce new products, when it has a large inventory of old products. This is because of the fact that people will wait for purchase of new product and they will abandon the old product. As a result the old products will not be purchased. Due to the above fact, nobody purchased Osborne's old computers. Everybody waited for new computers. Osborne went to ruins.

Reasons of Osborne Computer's Failure

A company should cater to the tastes and needs of the customers. We should produce only those products which the customers demand.

1. This vital fact was ignored by Osborne company. It was stubborn and sold only old computers. May be it was exited with it's product so much that it could not hear consumer's demand for 80 print screen computers. Hence, it was a Flop.
2. We should release a new product as soon as it is invented. The time lag between invention and market introduction should ideally be zero.
3. The timing of announcement is vital. Companies should never announce a new product, especially when they are holding large stock of old products in inventory. If they do so, consumers will not buy old products. Rather, they will wait for the new product. Hence, the sales of old product will reduce and the company suffers losses. This was what exactly happened with Osborne Company. It announced but introduction of new computers, when it was holding large stock of old computers. Hence customers waited for new computers. Nobody purchased old computers. Hence, it's sales dropped.

MICROSOFT COMPANY INCORPORATED

MICROSOFT AND THE TECHNOLOGY

The Case Objective

This case discusses the history of Microsoft's Meteoric rise as the computer supremo. It discusses the strategic Technology Management Principles applied by Bill Gates and Paul Allen.

The Case Study

Microsoft is the leading computer company in the world. Globally it has a strong presence in almost every country. This company was started by Bill Gates and Paul Allen. Bill Gates became the richest man in the world with his income crossing 90 billions. Paul Allen also earned billions of dollars. It's starting has been from humble beginnings. Bill Gates and Paul Allen were friends from childhood. They nurtured together a passion for computers.

Later Paul Allen went to Washington State University to study computer science and Bill Gates went to Harvard Business school to study M.B.A. But the two friends managed to keep in touch with each other. We now study the Microsoft's history in greater detail.

Allen had always been very enthusiastic about the advances in Intel's Microprocessor. He believed that a small computer using the Intel's chips could be designed soon. In December, 1974, Paul Allen while working for Honey well company read about a PC developed by a person named Ed Roberts in New Mexico. The machine called Altair utilized Intel's 8080 Technology. He contacted Gates and they prepared a simple Basic language programme for the new computer. Allen and Gates offered to give a demonstration to Ed Roberts. Roberts agreed.

The main challenge for the two friends was that they didn't own an Altair computer or an 8080 chip. Allen worked hard and developed a simulator of the Altair's processor in a PDP-10 machine as well as the assembler programming the chip. Using Allen's simulator Bill Gates wrote the Basic code in one of the Main frame computers of Harvard. On the day of demonstration, when the transfer files was completed, the teletype connected to Altair Printed the word "Ready" indicating that the machine was ready to receive instructions. Thus the program was successfully executed. One small mistake either in the simulator or in the program could have caused the failure of the entire demonstration. But things went right for Allen and Gates.

IBM AND MICROSOFT'S DOS

Bill Gates had tremendous knowledge of technology and business management. He could write Software programs for latest hardware technology. Intel approached Bill Gates with the 8086 chip in 1978 and Gates decided to develop basic code for 8086. At that time there was no Computer using 8086 technology. Gates expected to finish the project in 3 weeks, but it took 6 months. Gates was determined to win.

In 1979, Microsoft company was founded in Seattle and the yearly sale was 2.5 million dollars. In 1980, IBM the computer giant contacted Microsoft to develop Project Chess, whose objective was to design and manufacture a personal computer based on Gate's 8080 chip. Gate's suggested using the 8080 chip.

Microsoft did not own an operating system for it's new PC and so he directed IBM to digital research company. Kildal the Chief Executive Officer of Digital Research turned down the offer. IBM felt insulted and once again approached Gates. Gates decided to cash the opportunity with both hands. Microsoft decided to look for a new operating system. Seattle computer products had developed an operating system called QDOS and Paul Allen negotiated an agreement to license the operating system and use it for whatever purpose it wanted. Microsoft purchased QDOS for 50,000 dollars.

Microsoft offered the QDOS operating system to IBM and licensed BASIC, FORTRAN and even COBOL to IBM.

Now Microsoft had IBM's name to use. IBM went open with it's technology and hence numerous software developers developed a variety of programs. But IBM made a blunder in not acquiring exclusive rights of the new technology. This decision haunted IBM forever. IBM decided to use the 8088 Microprocessor in the PC. Microsoft assigned 35 out of it's 100 Engineers to the Project.

However, finally the IBM PC was launched on August, 12, 1981 with selling prices from 1500 dollars to 6000 dollars. There was a fight between MS DOS and CPN as to who would become the industry leader in operating systems.

Gates convinced many software developers to design software for MS DOS, knowing that applications represent the actual value to the user. A factor that helped the dominance of MS DOS over it's competitors was to launch in 1983 of Lotus 1-2-3, developed exclusively to run under MS DOS. By the 1990's 3 million MS DOS programmed computers were in the market. This gave Microsoft market dominate in operating systems. Meanwhile let us consider the organization structure of Microsoft. It was very unstable Gates was constantly moving programmers from one team to another. In August, 1994 the company was reorganized to face the challenges of computer industry, which were highly volatile. Gates changed the leadership from entrepreneurial to stewardship management. These developments led the Microsoft to launch windows 1.03 in November, 1995. However, there were some initial troubles with windows 1.03 because it lacked applications on modern computers. However, by 1989 numerous applications for Windows flooded the market. In 1990 windows 3.0 was launched selling record one million copies in the year. Windows-95 was launched using Intel's premium Microprocessor. Even though it was launched 2 years late after the official announcements. Fortunately for Gates no other competitor came.