# TRANSFER OF TECHNOLOGY AND ORGANISATION BEHAVIOUR : A Diagnostic Survey

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To pursue the policy of upgradation of our national technology which is an avowed objective of public policy, the Government of India has approved over 12000 foreign collaborations since independence. Studies[1] have shown that these agreements have greatly helped in sharpening the technological edge of the Indian industry while enabling them to absorb the local expertise in terms of process, raw materials as well as markets.

Similarly, the impact of technology transfer on society can scarcely be questioned. We are living in a world where transfer of technology and change are more conspicuous by their presence than by their absence. Technology transfers are responsible for the 'movement of people from farms to cities and from industrial to service occupations. They have stimulated the evolution of modern economic organisations; altered class structures and affected political institutions. The corresponding effects of technology on management and job structures have been almost equally profound.

In the light of above observations, an attempt has been made in this paper to study the impact of transfer of technology on organisation as an instrument of institution building, autonomy or perpetual dependence on parent company, social integration in terms of class barriers and mobility, technological integration between University/Research institutions and manufacturing enterprises, and finally on resource management at the national level.

## Sample and Methodology

Seven Indian companies have been studied having collaboration with foreign corporations. Four belong to automobile industry, two to electrical goods and one to chemical products. Six are in the private sector and one in the public sector. The basic characteristics of these companies are given below in the Table.

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TABLE: Characteristics of Sample Companies.

| Companies | Collaborators | Main Products | Holding | Year of agreement | Year of expiry |
|---|---|---|---|---|---|
| A | Siemens A.G. West Germany | Switch gears Motors | 51% | 1957 | 1972 |
| B | Ford Motor Co. USA | Tractors | 40% | 1970 | — |
| C | Daimler Benz West Germany | Trucks, Buses Chasis Bodies | 16% | 1954 | 1969 |
| D | N.V. Philips Netherlands | Lamps Radios sets | 39.7% | 1930. | — |
| E | Piaggio, Italy Kawasaki, Japan | Scooters Motor bikes | — | 1960 | 1972 |
| F | Unilever, U.K. | Soaps/Detergents | 51% | 1956 | — |
| G | Suzuki, Japan | Small Cars | 26% | 1982 | — |

Source: Annual Reports

To arrive at certain conclusions detailed investigations have been undertaken through the medium of interviews and other supplementary research.

## Results

### *Institution Building*

It is a process of establishing or transforming an organisation into an integrated and organic part of a community in a way that will help the organisation to play a pro-active role in projecting new values and become an agent of change in the community.[2] In brief, an organisation starts becoming an institution when it starts following the diffusion (development of several institutes by one expert source) as well as self-renewal (internal development of an organisation) process.[3] This process is characterised by the following features.

Its function and services are related to the society's commonly agreed requirements as tested by its adaptability, over time, to human needs and values.

Its internal structures embody and protect commonly held norms and values of the society to which it is related.

Its achievements over time include influencing the environment in positive ways.

Company A has received manufacturing and patent rights as well as tech-

nical know-how for certain products of its world reputed "Siemens" designs. The company has improved its performance following the increase in sales of its improved products like switchgears, electric motors and generators. On the advice of its collaborator, it has also entered the area of industrial electronics with plans to increase its presence in electronics, telecommunications and automation. A "Soft-ware Centre" has already been established in Bombay to tap the growing software package export market, besides catering to its local requirements.

Recently, the company has also made sweeping changes in its management and organisation including splitting up of the organisation's seven large divisions into a large number of "more flexible and operational units" as a follow up of its collaborators' strategies. It has also set up training and apprentice workshop on the lines of Siemens A.G. of West Germany.

In India, the company has finally found ways to exploit its technological strength in areas barred for it on its own, by setting up two joint ventures: Webel Telematic Pvt. Ltd., to manufacture electronic teleprinters with Siemens A.G. know-how; and Delted Systems Pvt. Ltd., to manufacture electronic private automatic branch exchange. The Company is also planning to set up a new manufacturing unit for miniature circuit breakers at Aurangabad, a backward area in Maharashtra.

Company B has built up its industrial complex through a series of successful technical collaborations and joint venture agreements. Its main collaborators are from West Germany, Poland, U.S.A., Denmark, the U.K. and Japan.

This company has benefitted by adopting various techniques of its collaborators. For example, on the job training has already been intensified, job rotation has begun in a modest way at the general managers' level and the workers are forming quality circles. They are being encouraged to come up with suggestions for cutting costs and improving shop-floor operations.

The Rajdoot plant in Faridabad, which commenced production in 1962 with Czech collaboration has seen a gradual introduction of automation in a modest way which has helped the company to raise productivity per person per annum from 15.29 units in 1980 to 20.81 units in 1986.

Escorts's new 100 CC bike plant in collaboration with Yamaha, not only provided the best Japanese technology but also work practices such as wearing of identical uniforms by workers and executives, eating in the same canteen, performing exercises at the start of each day, and there are no cabins for managers.

Company C admits that much of what the company is today is owed to the technology, values and perfectionism of Daimler-Benz of West Germany. Over the years, the collaboration has been a happy, fruitful and mutually beneficial one and the German heritage, the spirit of being able to produce the best, lives in the company, which is why its products are competing with the best even in the international market.

Company D enjoys high-tech glamour which is associated with N.V. Philips of the Netherlands. Besides redefining its priorities the company is

also attempting to increase awareness within the company itself about the need to improve performance. It adopted a programme called the Company Wide Quality Improvement (CWQI) programme which was developed by N.V. Philips borrowing heavily from the Japanese management practices. Recently, the company has identified four areas: consumer electronics, electronic components, telecommunications and data systems and started to improve quality, reduce cost of production and increase productivity through the expertise of its parent organisation. Recently it has also participated itself financially with Music India, Duphar Interfran and Punjab Anand Batteries.

Company E signed a technical collaboration agreement in 1960 with Piaggio of Italy for the production of Vespa scooters. After renewal in 1967 that agreement remained operative till 1971. In 1960-61 production was around 4000 Scooters; by 1965-66 it was 7358 and by 1969-70 it had gone up to 29,299. By then the Vespa scooter had established itself in consumer preferences, and become the preferred choice of two-thirds of scooter buyers. Today, it is the world's largest three-wheeler manufacturer, the second largest scooter maker and the fourth largest two wheeler manufacturer. Recently, the company has entered into a technical agreement with Kawasaki Heavy Industries, Japan to manufacture 100 cc motor-cycles. By giving Kawasaki no equity stake in this company, it remains the only two wheeler manufacturer to have only a technical collaboration with the Japanese, thereby ensuring itself the kind of managerial flexibility that other Indo-Japanese two wheeler ventures may not have.

In the best Unilever tradition, Company F's management system has reached an outstanding level of effectiveness. The subsidiary linkages with Unilever ensure that the entire knowledge, skills, capabilities and know-how of the Unilever organisation are made available to it for maintaining its premier position in Indian industry. Moreover, by its emphasis on professional management and training it has added to the national stock of capable people which the country has drawn on for service. It has obtained about 45 patents from its parent company, which have been adapted to Indian conditions.

Company G adopted a people-oriented culture in the company. Many avenues for promoting team building, information sharing, effective interpersonal communication and joint discussions on vital issues have been created. In this context, deliberations in the company's Sahyog Samiti and the Joint Management Committee as well as in the Suggestion Scheme and in small group activities, are proving to be successful. The objective is to provide a healthy work environment where each member would respect his fellow workers' opinions. They have imbibed not only the technology but also the work culture of their collaborator in which all employees have equal office space, work in open offices, wear the same uniform, come to office by common buses, eat in the same canteen, make use of common toilets, etc.

**Autonomy or Perpetual Dependence**

Reliance on external sources for technical change is the question of participa-

tion of the parent unit in supplying this technology. This important point concerns the independence of subsidiaries, for while it may be true that most subsidiaries are dependent upon external sources for technical change, some may be more 'independent' than others from their parents in the acquisition of this new technology. The question of who is responsible for the actual choice is thus important, but so, too, is the question of the ability of the subsidiaries to make the choices themselves.

Company A had entered into foreign collaboration in 1957 and continued it for 15 years. Even after the expiry of such an agreement, the company is completely reliant on its parent for new technology. All products, processes and raw materials in the form of knocked-down-kits are supplied by the parent company.

Company B lacks autonomy in the purchase of new technology. In the case of material technology it has almost complete autonomy. However the company is still depending on its collaborators for product technology. Some of the products are of their own creation and for that they are fully independent.

Company C's collaboration has already expired. The company has complete autonomy in the choice of its men, machine, product and material technology.

Company D's dependence on its collaborator can be exemplified by a few instances. In spite of having equity participation, a separate technical agreement has been entered into for a period of 10 years from 1967 onwards for the production of fluorescent lamps, fluorescent power and glass products. In 1977, it requested the Government of India to renew the old agreement to borrow the technology from Holland including drawings to manufacture multimeters.

Company E's agreement has already expired. During that period, the company had no autonomy to enter into any agreement with other manufacturers. Only after the expiry of the agreement, the company is now free to purchase any product, process or raw material technology from any source.

Company F equally lacks autonomy in the purchase of new technology. In the case of material technology it has almost complete autonomy. Since materials comprise largely agricultural inputs and packaging materials (which are made locally) this autonomy is not surprising.

In the case of company G, there is little evidence to make choices with regard to new product, materials & process technology without referral to the parent company.

**Social Integration**

Imported technology affects people in organisations in many ways. It is a key factor in determining the required tasks and degree of specialization. It often determines the size and composition of the immediate work group and range of contacts with other workers and supervisors and frequently prescribes the extent of physical mobility. Following paragraphs will throw light on transfer of technology and its impact on class consciousness and employees' mobility in subsidiary companies.

Company A has a limited number of employees from the parent organisation. The Board of Directors of the company includes about 50% directors from the parent organisation. The Company always recruits engineers and professionals solely on merit and ensures that they are provided adequate opportunities for career development and personal growth. The Company's fast growth within the country and a large number of turnkey projects abroad have promoted mobility and weakened class barriers.

Company B's board consists of Indian nationals but day to day management is run on professional lines. Although management always rests with the company, collaborators still could influence inter group relations within the organisation. The Company's ability to attract, develop and reward professionals in their fields has been of an exceedingly high order. In the recent collaboration with Japan's Yamaha Heavy Industries, the company started following certain work practices of its collaborators which weaken class consciousness and help the company to promote mobility of managers and workers.

Although company C's collaborator held 16% equity shares, the management has always rested with the Indians. The company has one of the best qualified managerial staff in the country, selected and promoted on the sole criterion of merit without considerations of linguistic or social political affiliation or geographical origin. The company pays a great deal of attention to management training and development as well as technical and supervisory skills development. This professionalism has weakened class consciousness and promoted occupational mobility among managers and workers.

Company D's technological changes and developments in the market combined with growth plans have created new demands on human resources of the company at all levels. In order to update the knowledge and skills for overall greater effectiveness, the company has intensified development activities. Majority of directors are Indian; however, the chief executive is the representative of the parent company.

Company E is free from collaborator's men on the Board; however, in the market, growth plans have created new demands on human resources of the company at all levels. In order to update the knowledge and skills for overall greater effectiveness, the company has intensified development activities. Majority of directors are Indian; however, the chief executive is the representative of the parent company.

Company E is free from collaborator's men on the Board; however, the company is managed by family members on professional lines. Collaborator's impact on company's employees is negligible. Employees are class conscious and vertical mobility is almost limited to a selected group of people.

Company F has high regard for its standards of professional management. In a sense, the company is more truly Indian in the sense of being national rather than regional or ethnic as most Indian companies had tended to be in the past. The career mobility is highest in the company where key personnel are trained and being shifted from one Unilever group company to another. However, the company does not promote the interest of a particular class or

ethnic group.

Company G, being a public sector company, follows the rules and regulations of the Government of India in the selection of its employees. Sixty-one employees have been trained by Suzuki, Japan. Present work practices followed from its collaborator have weakened class consciousness and promoted mobility of employees.

**Technical Integration**

There are three stages in the process of technological integration. The first stage relates to the correct interpretation of technical information obtained from the supplier of technology and manufacture of products as per the given specifications and design. In the second stage, local technicians are able to introduce minor changes/alterations to the given designs and other technical specifications to adapt to the local environment. The third stage arises when local technicians are able to innovate further to improve upon the imported technology. The latter would happen when the imported technology has been mastered by the local technicians.

Company A includes in R&D work only that part of research which pertains to new processes, development of products and raw materials uses. Engineering and quality controls are not included in the purview of R&D for which there are separate laboratories. R&D units are headed by Indians.

Company B established in 1977 an R&D Centre with about 40 to 50 engineers and a budget of about Rs. 50 to 60 lakhs. The Centre is now engaged in developing a whole family of engines from 35 HP to 70 HP. The first one of 35 HP has already been developed. This has been done by the centre without any collaboration. This company not only acquires but assimilates the imported technology.

Company C has one of the best research and development centres in Asia. It was first started in 1966 at Jamshedpur and later moved to Pune in 1968. By early 1979, the centre had a staff of 650, of which 200 were engineers. The annual budget was around Rs. 4 crores. After the expiry of technical collaboration, the R&D centre came forward with many improvements and new indigenously developed models. Several types of changes were made: direct fuel injection engine with lower fuel consumption, improved steering systems, full flow oil filter, new engine, gear boxes and rear axles. The company has not only successfully absorbed foreign technology but also improved the product, developed new products and exported the technology to international markets.

Company D has ten laboratories recognised by the Government of India. They are attached to the production units in Loni, Pimri, Kalwa and Calcutta. According to the management, R&D work in these laboratories started right from the inception of the company but it appears that these were quality control and component testing laboratories. The only field in which the company has undertaken applied research is in the area of materials. The Central Chemicals and Materials Laboratory in Loni, which employs 20-25 people, is

its only laboratory where research projects not related to day-to-day problems are undertaken.

Company E has a fulfledged R&D centre. After the expiry of technical collaboration in 1970, the company developed the rear engine for three wheelers (which gives a much more comfortable ride), the M-50 and the M-80 motorcycles in their R&D Centre. Even the problems regarding the quality of the M-50 vehicle's spoke and shock absorbers have been overcome through the efforts of the company's technical team.

Company F has obtained a number of patents from its parent company. Inspite of that, it has adapted all its products to Indian conditions. This work is done by research scientists in their in-house R&D centre at Andheri. Although R&D expenditure is small by international standards (Rs. 4 crores annual) the company must be given credit for being one of the few private sector companies in India which has done any research or evolved processes applicable to Indian needs.

Company G has also established Quality Control Centre with sophisticated equipment like Ozone Weather Test Equipment. Engineers with interest in research do not have any importance in corporate structure. Research as such is given little importance and designs are not specially encouraged to suit local conditions and needs. The company does not do any significant research.

It is not surprising that none of the companies showed any sign of undertaking any basic research, because even at the global scale, it is unlikely that any multinational would undertake either pure or basic research. Most basic research is undertaken by government bodies, universities and other research institutes. Much of the output of basic research is non-proprietory in nature and this is perhaps one of the factors which leads to the abstention of multinationals in undertaking basic research.

**Resource Management**

Foreign investment and technology may provide positive contribution to the host economy. The aim of regulation and control is therefore not simply to curtail the activities of foreign firms in the host country, but rather to shape these activities in accordance with national objectives and priorities.

The implication of FERA provisions with regard to foreign equity participation directly affected the net inflow of foreign capital. Certainly, most of the foreign controlled companies were instructed to dilute and choose to do so by raising new capital from the Indian capital markets. Consequently, their actions did not directly affect the net inflow of foreign capital.

Company A has uplifted its exports by six percent to Rs. 16.90 crores in 1985-86 from Rs. 15.90 crores in the earlier year, following special emphasis on the export front. Exports further increased to 22.3 crores in 1986-87 and Rs. 25 crores in 1987-88. The management sees encouraging prospects for exports with large orders having recently been booked for supply and erection of electricals for the World Bank-aided port facilities project. The erstwhile

USSR had also repeated orders for supply of electro-medical equipment involving a total export order over Rs. 20 crores. Today, the company's products, 'Made in India' are supplied to Asia, Africa and the Federal Republic of Germany, the CIS (Commonwealth of Independent States) and Australia. The company has also won prestigious turn-key contracts in Iraq, Iran, Indonesia, Bangladesh, Burma, South Yemen, Syria, Srilanka, Oman, Tanzania, Libya, Mauritius and Algeria.

Company B's thrust is now on exports of pistons and shock absorbers. Company exported pistons worth Rs. 1.22 crores in 1986 and Rs. 1.50 crores in the 1987 and hoped to increase this figure in 1988.

Company C has all along been an exporter also. Further the company has an assembly plant in Malaysia. The Company exports CKD and certain components they make. Over the subsequent years, the company was invited to set up similar plants in Nigeria, Ghana, Zambia, Saudi Arabia and Srilanka. It has set up, in collaboration with the Government of Singapore, a tool room there with the purpose of training skilled manpower. Besides this training establishment, it has also established a tool manufacturing room in Singapore. The company is reviewing its facilities in the light of a positive collaboration with Dailmer-Benz, for the manufacture of the 'World-Concept-Truck' being developed by them. Extensive studies are under way to study the capital investments needed for the manufacture of these trucks in India for export and domestic needs.

Company D, drawing upon the international experience of Philips Exports B Y Holland, has made impressive forays into some new markets in Asia, Africa and East Europe with its consumer electronic products.

Company E's technical collaboration was over in 1972. However, the company's success has not remained confined to India only. In 1979, it exported Rs. 8.4 crore worth of scooters and spare parts compared to exports of Rs. 4.5 crores by the remainder of the entire two-wheeler industry. In 1979-80 its exports were worth Rs. 10.2 crores. It was proving to be a tough competitor to its original collaborator, Piaggio, Italy. The company has put itself strongly in Sri Lanka, Greece, Indonesia and Taiwan. In Indonesia, the brand name Bajaj has even come to be employed as the generic term for three wheelers. To penetrate the American market, the company has established a subsidiary, Bajaj American Inc. and is keen to meet US requirements on standards.

As regards Company F's transfer of economic surplus out of the country, data for two decades, from 1945 to 1965 shows that 97% of the company's income stayed within the company. The thrust in exports continued with export turnover of the company (including its subsidiary) reaching a new high of Rs. 104 crores (1988). The new 100% export-oriented ventures in Kandla Free Trade Zone for the manufacture of herbicides and garments got off to a good start by registering export orders valued at over Rs. 13 crores in the very first year of commercial production. The company also made fresh inroads into the North African markets by exporting detergent powder and packaged tea and consolidated its position in Europe and Japan for exports of value added items.

Since the time the first kit was assembled at company G, it has paid out over Rs. 600 crores in foreign exchange to Suzuki for the import of CKD (completely knocked-down) kits. Since the company started chipping in with rubber mats, seat covers, head lamps, radiators, engine lamps and coach work, the import content has come down to about 40%, but the revaluation of the yen kept the outgoing percent per car about the same. Exports of the Company are marginal.

**Limitations of the Study**

The major problem with this study has been the smallness of the sample of subsidiaries. This has not made it possible to systematically explore, a set of hypotheses, and although this is regrettable, it is believed that the absence of research[4] in this field justified such a tentative approach. The research must tentatively be seen in the context of the generation of hypotheses with regard to the behaviour of subsidiaries in under-developed economies like India, rather than drawing definite conclusions in this respect. One further problem has been the absence of detailed quantitative data on institution building efforts, social integration and the break-up of research and development expenditures of the firms in the sample, and therefore, there was no alternative but to sidestep the problem of quantitative data and to concentrate instead on a qualitative approach.

**Conclusions**

From the case studies which have been dealt with in this paper a number of points can be made. First, although these companies have absorbed the managerial and work practices from their parent firms, research needs to be done to find out whether productivity has indeed increased in these firms consequently. Secondly, although it is assumed that multinationals are bringing in modern technology and for that reason are welcomed by the Government of India, this survey of the operations of the well-established companies shows that the extent of technical change generated within the subsidiaries, was limited. Where it did occur, it is largely explained by government policy (e.g., the heavy emphasis put on import substitution by the Indian government) or by geographical necessity (e.g. adaptation of production and product technology for climatic reasons). There is a clear indication that wherever possible, the parent prefers to undertake its research and development itself and to subsequently pass on the results to the subsidiary. Diffusion of technology does not seem to have taken place. Even in the cases of companies controlled by the same multinationals, the technology was not available to the sister company, let alone to the industry at large. The equity participation in a company does not necessarily involve access to technical information. We have seen in the case of Philips that the Indian counterparts, in addition to the outflow of dividends, have to make extra payments for a number of technical agreements.

Further, the technological content of foreign collaboration rarely made any significant addition to the depth and breadth of Indian firms' knowledge resource; only a minority of agreements enhanced the Indian partner's capability to pursue trajectories of continuous technical change. While some firms do import technologies which were recently developed, they rarely acquire the skills and experience required for absorbing the basic knowledge and process of technological change. Although this enables firms to carry out profitable operations, it rarely prepares them to undertake innovative activities.

## NOTES AND REFERENCES

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