III. SOCIAL SET-UP, SCIENCE AND TECHNOLOGY IN INDIA

SOCIAL SET-UP OF SCIENCE AND TECHNOLOGY IN MUGHAL INDIA

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The upper strata in the Indian society during Mughal times, being consumption oriented, had developed a fondness for 'unique things', which led them to suppress scientific knowledge when they came into its possession. This attitude had developed because they wanted to preserve the 'uniqueness'. Social conditions prevented merchants from taking any active interest in the technique of production. Thus there was no meaningful dialogue between them and the craftsmen who were actually engaged in the task of production. So technology failed to impart any stimulus to the progress of science. The non-emergence of vernacular prose literature as a vehicle of expression of knowledge prevented the craftsmen from transmitting their experiences and problems. Besides, they were unable to obtain sound theoretical knowledge in sciences allied to their profession owing to the prevailing system of education. Thus the craftsmen were ill-prepared for the task of promoting technology.

The sixteenth and seventeenth centuries witnessed remarkable progress in the fields of science and technology in Europe. Some of the fundamental discoveries, influencing and determining the course of future scientific researches were made during this period. As a result Europe experienced the 'origins of Scientific Revolution'. However, during this era in India, not only there was no comparable effort in the realm of creative thinking but there was a complete absence of any attempt to keep abreast of the developments, then taking place. This was happening in spite of some brilliant scholars like Fathullah Shirazi, Abu Ishaq bin Abdullah (sixteenth century), Mir Muhammad Hashim, Mullah Muhammad Jaunpuri, Ismatullah Saharanpuri, Ustad Ahmad, Ataullah Rashid and Lutfullah Muhandis (seventeenth century). This is surprising for the Indians had a rich heritage of scientific knowledge, which had not been forgotten when the Mughals established their sway in India. In the centuries preceding the Mughal rule certain commentaries on mathematical works were written. In view of this, the indigenous passiveness to science and technology is baffling. Could the prevailing social milieu provide a clue to it? Let us examine the nature of the socially dominant Indian elite.

The Indian nobility, which was at the top of the social ladder, was composed of several layers in which immigrant foreigners, arriving in regular streams from Persia and Central Asia, played an important role. These nobles having no independent means of subsistence depended upon royal favour and were forced to look up to the royalty as their model and imitate
its ways and manners. Ostentatious living and colossal consumption were adopted by them after royalty as status symbols. This mode of living had several implications. It stifled individual reasoning, enterprise and initiative. The nobility was rendered incapable of taking any substantial interest either as individuals or patrons in things, which challenged traditional beliefs, for their prolongation was linked with the perpetuation of the status quo. This had resulted in the growth of a peculiar attitude among the royalty and nobility, which constituted the upper strata of the society. Being consumption oriented, they took delight in possessing and flaunting "something unique". That is why the European traders in the seventeenth century found it easier to win the favour of nobles by presenting them 'toys' and other small novelties. The documents of the English East India Company are full of requests by the English traders in India to home authorities to keep on sending them such items, which were, in fact, mere trifles but 'precious' in India owing to their novelty.4

The nobles patronized architecture, which tended to satisfy their vanity as great consumers of wealth, as builders of unique, magnificent monuments. From Babar down to the puritan Aurangzeb, the Great Mughals and the appended nobility squandered wealth in such enterprises. It is needless here to recount the names of the monuments and almost impossible to calculate the money spent over them.

The fondness for 'uniqueness' led the nobles to suppress scientific truth, once they came to possess it. This virtually blocked any efforts for further advancement on the basis of the acquired knowledge. Thus whatever knowledge that had been gained, tended to stagnate and failed to generate fresh endeavours. The conclusion is upheld by the fact that the secret of the design of Taj Mahal was not allowed to be leaked out and still remains a matter of conjecture. However, this is not a singular instance. The mystery behind the methods employed to construct the shaking minarets of Ahmadabad is yet to be unravelled. As a matter of fact, the urge for ostentatious living demanded that knowledge should be concealed rather than shared so that others should be deprived of the chance to know and destroy its 'uniqueness'. As a result sometimes knowledge was lost.

In view of the prevalent social modes, the interest taken by the Mughal Emperors and nobles in sciences and technology remained peripheral. They were unable to comprehend the significance of science and technology and provide the requisite type of leadership as Charles II, for example, had done in England by his association as well as continued encouragement to the Royal Society founded in 1660 or the French Minister Colbert had done by establishing the French Academy of Sciences in 1666.6

Ostentatious living meant increased expenses. The royalty and the nobility were compelled, in order to find means for extravagance, to squeeze
money out of traders by levying various vexatious dues and sometimes they did not shrink even from direct extortion. To supplement their incomes the feudal lords went to the extent of co-operating with the European traders, who were swarming into the country since the sixteenth century. The nobles granted the Europeans several privileges and tax-concessions which put them in more advantageous position than the local traders. The indigenous merchants protested and at times even succeeded in forestalling the grant of liberal terms to Europeans. However, all the time they were fighting a losing battle and the Indian merchants failed to end the evergrowing collaboration between the nobles and the European traders in the seventeenth century. Recognizing the inevitable, the Indians tried to make the best of a bad bargain and themselves decided to co-operate and collaborate with the English, Dutch and other European traders. Henceforth, the Europeans were granted liberal credit facilities by the Indians. The Indian merchants began to settle down in large numbers in their establishments like Bombay, Madras and Calcutta. Thus the Europeans were lucky to receive help, both from the nobles and the merchants. The inevitable result of the collaboration was contraction in the activities of the indigenous merchants, in the realm of foreign as well as internal commerce, whose economic vitality was thus sapped. The Europeans even started regulating and controlling production. This development had disastrous consequences. As economic bases were impaired, the trading class was at a critical juncture, thwarted from investing capital in trade and industry. The Indian business community, therefore, stopped taking any intelligent interest in improving the instruments and techniques of production.

Owing to economic compulsion, the rising Indian bourgeoisie class failed to stimulate the progress of science and technology in India. The inability of the Indian bourgeoisie to spearhead any movement for technological improvement was further accentuated by the traditional social division of labour among the Hindus, whereby the business community took little interest in the actual production technique and confined its activities towards the marketing of finished goods only. The technique of production was left to the care of the craftsmen.

The craftsmen had very little chances of obtaining sound theoretical education in sciences. Among the Hindus the craftsmen were at the bottom of the society. The Muslim religion denied and decried any caste distinction, but in practice, in social hierarchy the Muslim craftsmen fared little better than their Hindu brethren. An important reason for this may be that the majority of the Muslim craftsmen originally belonged to the fold of Hinduism and they kept up their traditional social practices even after conversion. Their low place in the society denied them access to education. Thus the craftsmen were at best able to preserve what they had learnt by experience.
and observation in course of practising their hereditary craft. They were incapable of adding anything new. The society did neither visualize this role for them nor prepared them for this purpose.

A social gulf existed between the craftsmen and those who had the means of obtaining education, which ruled out the possibility of any dialogue between the two, the craftsmen and those who possessed or were likely to possess the requisite theoretical knowledge. Hence the stimulus which technology could have imparted to the development of science was missing in India. It may not be out of place here to mention that Galileo used to frequent the shipyards, talking at length with the workers. His laboratory at home was staffed by various craftsmen.¹⁰

Another contributing factor which hindered the exchange of opinion between the well-read and the simple craftsmen appears to have been the non-emergence of prose literature in vernacular languages. Faint beginnings had been made in the sphere of prose literature in Hindi,¹¹ Bengali,¹² Urdu,¹³ etc., but it had yet to become a vehicle of literary expression or useful information. Hence, the scientific knowledge had to be imparted through the medium of three classical languages—Sanskrit, Persian and Arabic. The ordinary craftsmen were deprived of the opportunity to share in the existing knowledge as well as to transmit their experiences and problems. The use of classical languages was also an obstacle in the path of wider propagation of scientific information. If prose literature in vernacular languages had become popular as vehicle of expression of knowledge as it was gradually becoming in Italy, England, France and other European countries, there was a chance to provide broad base not only to the teaching of science but also to dissemination of scientific information.

The development of vernacular languages was hindered by the unfortunate non-acceptance of printing-press technology. In European countries in the sixteenth and seventeenth centuries with the aid of printing-press it was possible to circulate the existing knowledge among ever-increasing numbers. New works touching various branches of science were being regularly published. In English, German, French, Dutch and other European languages, several travelogues were printed, carrying multitude of information, geographical, cultural, scientific, etc., which served to sharpen the intellectual curiosity of the society. Consequently many of these books were immediately translated and published into other European languages. Thus Linschoten's Itinerario, published in Dutch in 1596 was available in English and German in 1598, in Latin in 1599 and in French in 1610.¹⁴ In India nothing of this kind could happen. The society lacked this intellectual stimulant.

The above also explains the absence of any institutionalized efforts to discuss, disseminate and discover scientific knowledge as it happened by the establishment of Royal Societies in England and France. As an inevitable
corollary there could not be in India any attempt at institutionalized multinational co-operation in the way we find in European countries. The Royal Society in London received papers from the Dutch scientists and the French Academy at Paris invited and associated foreigners with its work. Thus the Dutch scientist Leeu Weuhoock had between 1673 and 1688 sent sixty-four letters to the Royal Society, all of them in Dutch.\textsuperscript{15} The Royal Society got them translated into English. Again the famous Dutch scientist Christian Huygens was connected for some years with the Royal Academy at Paris.\textsuperscript{16}

The nature of the religio-social Protestant movements which developed in India in the sixteenth and seventeenth centuries also contributed to the intellectual passivity. The movement of Kabir, Nanak, Dadu, Chaitanya, Vallabhāchārya, etc., sought to pull down the barriers of caste and creed and simplify the religious rituals, but they failed to instil the spirit of questioning among their followers, which would challenge the basic tenets of the society. They failed to ensure the primacy of the individual as had happened in seventeenth century Europe which had given impetus to rational enquiries in respect of the material world.\textsuperscript{17}

But in India, in the sixteenth and seventeenth centuries, the emerging social ethics for the mercantile communities and craftsmen primarily stressed the cult of Bhakti or devotion and love. The dominant ideology accepted by trading classes in Western and parts of Northern India was that of Vallabhāchārya, together with Jainism, which was already flourishing.

Vallabhāchārya and the successive chiefs of his sect laid stress on devotion and submission of the self to the deity. Although they did not denounce the world, yet they did not glorify reason nor taught their followers to challenge the established order and to seek out the truth themselves.\textsuperscript{18} While this was true of business communities, the craftsmen, both Hindus and Muslims also experienced protestant movements, which wanted to better and upgrade their social status. Mention may be made of Satnamis in the Panjab\textsuperscript{19} and Mominā or Satpanthī in Gujarāt.\textsuperscript{20} The point to note is that all these movements, although challenging the traditional modes of the contemporary Indian society, failed to outline any radical and rational programme capable of reconstructing new social ethos, giving primacy to individual initiative, enterprise and reason.

In spite of all the protest movements, both among the Hindus and the Muslims, social conservatism continued to flourish and it thwarted efforts for liberalization even by the Mughal Emperor Akbar and Prince Dara Shikoh. It is well known that Akbar incurred the wrath of Muslim theologians and nobles for questioning certain practices prevalent among the Muslims.\textsuperscript{21}

Aurangzeb rallied Muslim support against his elder brother Dara Shikoh in his struggle for the throne in the name of Islamic orthodoxy.\textsuperscript{22} So the liberal social tradition in the Indian society failed to play a dominant role.
and it remained subordinate to orthodoxy and conservatism, the antithesis of scientific progress.

The prevailing social conservatism found expression in a number of ways. The educational curriculum was heavily weighted in favour of theology. The tendency was strengthened after the accession of Aurangzeb. Although on one occasion, as Bernier records, Aurangzeb had chided his old teacher and lamented that he had not taught him useful subjects like geography, history, etc., 23 still in his reign the main stress in education was placed on religion. No wonder, the most important work on Islamic laws in India, Fatawā-i-'Alamgīrī was compiled during his reign. 24

Throughout the seventeenth century the Europeans had extensive business dealings with the Indians, but we do not come across any evidence of normal social intercourse among Indians and Europeans. Social taboos prevented Indians from mixing freely with the Europeans and eliciting information about their countries, custom and culture. Thus social conservatism resulted in the deliberate shunning of fresh ideas.

The Parsis, however, were an exception to the prevailing social situation. Originally they were small peasants and craftsmen but in the seventeenth century, when the demand for goods rose in Gujarāt, they gradually became middlemen and traders of the Europeans. Their social structure did not hinder this mobility as in case of the Hindus and Muslims. Thus they were the one trading group which had first-hand knowledge of the process of production. But as they were numerically very small and lacked the trader-cum-craftsman tradition, they also failed to contribute to the progress of technology in India in the seventeenth century. But this accounts for their emergence as the first modern capitalist class in India.

In short, there was an absence of social mobility, which prevented any dialogue between the business community and craftsmen. The social rigidity was reinforced by a system of education which was accessible to the upper castes only. The halting development of vernacular prose precluded any possibility of a broad base being given to scientific education and information. Social conditions barred technology from stimulating the growth of science. The hold of religion on society and education remained unimpaired. The Parsis were the only Indian community unaffected by the above social constraints. Hence, in the seventeenth century from craftsmen they became traders, and subsequently emerged as the first capitalist group in India.

References and Notes

2 Indian History Congress, Proceedings of the Twenty-seventh Session (1965—Allahabad), pp. 268-69; Law, Narendra Nath, Promotion of Learning in India (1916), Bombay, p. 150.
3 Rahman, A. et al., Some Problems of Source Material in History of Science in Medieval India, Bulletin of the National Institute of Sciences of India, No. 21, p. 72; Azeem Pasha recounts


7 **Rahdari** on the toll tax collected by various feudal lords on goods in transit through their jurisdiction was the most pernicious of all. Akbar, Jahangir and Aurangzeb tried to root out this practice by issuing *firmans*. However, they were never fully successful.


9 The situation had not changed since ancient times when the Brahmins and Kshatriyas had almost the monopoly of all higher branches of knowledge. . . . So far as scientific pursuits were concerned, the result was disastrous. The Brahmins and Kshatriyas were naturally more concerned with spiritual things, and the common man had no incentive to higher learning in arts or science. Genius was impossible except among the Brahmins and to a certain extent among the ruling classes*, R. C. Majumdar (1963), *Social and International Relations In The Development Of Sciences*. *Bull. National Institute of Sciences of India*, No. 21, p. 6.

10 Kearney, Hugh F., *op. cit.*, p. 95.
17 '... man had come to occupy the centre of the world owing to the Cartesian Revolution in Europe and whereby all thinking was to be logical and rational.' As Frederick L. Nussbaum states (*op. cit.*, p. 7), 'The Cartesian faith in man’s power to know and understand operated powerfully to turn men’s hopes and interest from religion to Science.'

21 *Ibid.*, see his chapter on Akbar: Heretic or Apostle, pp. 167-181 and also page 182.
23 Bernier’s Travels, p. 156.