HISTORY OF PAPER TECHNOLOGY IN INDIA
by Lalit Tiwari

Paper manufacturing and book printing mark the beginning of the knowledge revolution. In ancient India knowledge spread verbally through the word of mouth from the teacher to the disciple, hence it was called Shruti. But with the discovery of scripts, written records gradually replaced the verbal transmission of thought.

It is interesting to note that mutual East-to-East technological exchanges among Asian nations were frequent. I am sure, the Silk Road must also have played a significant role in the spread of early technologies. For example, the Bower Manuscript (mss), which is named after its discoverer was found in 1890, in Kuchar, in Eastern Turkestan, on the great caravan route of China. The large medical treatise called Navanitaka forms the second part of the Bower mss. The date of that mss falls in the second half of the fourth century A.D. Similarly, zinc smelting began in China in the Jiajung period (1552-1566 AD) of the Ming dynasty, though it was being produced in India in the 12th Century AD. It is believed that Buddhist monks also played a significant role in the transmission of medicinal and zinc technologies among the Asian countries.

It seems that the Chinese were the first to make paper, from where the technology went to Samarkand. From there it eventually reached India. Soon the Indian paper was being exported to West Asia, Europe and Turkey.

Let us trace the development of writing materials in India. We notice that Al Biruni, the great medieval scholar, always very objective and observant, records a good deal of information about writing materials also.

Ancient Indian Writing Materials

In India, the available writing materials were generally of two types: hard and soft. Stone, metal, shells and earthenware were the examples of hard material. Engraving, embossing, painting and scratching were used for writing. Soft materials were wooden board (pati), dust (dhuli), birch-bark (bhurja-patra), palm-leaves (tada-patra), leather (ajina), cotton cloths (karpasika pata) and paper.

Ancient Hard Writing Materials

Stone: - Stone engravings were made on caves, smoothed or rough pillars, slabs, lids of vases, caskets, etc. These dealt with official and private records, royal proclamations, land-grants, eulogies and memorials.

Metal: - Commonly gold, silver, brass, bronze, iron and tin, copper were used as writing materials.
**Shell:** - Specimens of some inscribed conch-shells have been discovered from the ruins of a Buddhist establishment at Salihundam in Srikakulam district of Andhra Pradesh.

**Bricks, earthenware, terracotta:** - In ancient times bricks, earthenware and terracotta were also used as writing material. Bricks and earthenware were generally scratched before being dried or baked.

**Ancient Soft Writing Materials**

**Wooden board:** - About 5th century BC the wooden board was used for writing purposes. Writing on it could be done with a piece of chalk (*pandu-lekha*). This method was used for teaching. Al-Biruni, the great Arabian medieval scholar, also writes, "The (the Hindus) use black tablets for the children in the school and write upon them along the long side, not the broad side, writing with a white material from the left to the right".

**Birch-bark:** - The inner bark of *bhurja* (*Betula* spp.) tree was the most popular material for writing manuscripts, especially in northern-western India. Al-Biruni informs, "In central and northern India, people use the bark of the *tuz* tree, one kind of which is used as a cover for bows. It is called bhurja. They take a piece, one yard long, and as broad as the outstretched fingers of the hand, or somewhat less, and prepare it in various ways. They oil and polish it, so as to make it hard and smooth and they write on it."

**Palm-leaves (tada-patra):** - In southern India, palm-leaves *tada* or *tala* or *tali* were widely used for writing manuscripts. Al-Biruni has observed, "The Hindus have, in the south of their country, a slender tree like the date and coconut palms, bearing edible fruits and leaves of the length of one yard and as broad as three figures, one put beside the other. They call these leaves *tati* and write on them… They bind a book of these leaves together by a cord on which they are arranged, the cord going through all the leaves by a hole in the middle of each…They write the title of a book at the end of it, not at the beginning".

**Leather:** - Leather was rarely used as writing material in India, but in early and medieval times is was predominant in western Asia and Europe. Al-Biruni also notes, "The Hindus are not in the habit of writing on hides, like the Greeks in ancient times".

**Cloth:** - Smooth and non-porous cotton cloth was also used as writing material in ancient India. Nearchos (4th century BC), an admiral of Alexander's fleet, was the first to mention that the Indians used to write letters on well-beaten cotton cloth.

**Paper:** - Paper, as a writing material, was hardly known in India before the 11th century AD. Al-Biruni writes, "it was in China that paper was first manufactured,
Chinese prisoners introduced the fabrication of paper in Samarkand, and thereupon it was made in various places, so as to meet the existing want”.

**Paper In India**

The Chinese prisoners of war, brought to Samarkand after the battle of Atlakh near Talas, first introduced (AD 751) the technique of papermaking from linen, flax or hemp rags based on methods used in China.

Ibn Nadim observed in *Al-Fihristi*: "The Chinese write on Chinese paper made from a sort of herbage. This (industry) is a great source of income for the city. The Arabs learnt the technique of paper-making from the Chinese captives at Samarkand and diffused it westward". Al-Biruni also stated, "The Chinese captives introduced it in Samarkand whence it diffused to other parts of the world".

After the paper technology reached the Arabs, the Arabians improved the technique and supplemented linen with flax and other vegetable fibres. With the conquest of Sind by the Arabs, Khurasani paper was first introduced in India early in the eighth century AD, and it continued to be imported for several centuries.

The reference to Indian paper suggests that the paper-making industry, however limited, had already been established in India, most probably in Delhi and Lahore, the two chief political and cultural seats of the Sultanate period.

In India, the first paper industry was developed in Kashmir, established by Sultan Zainul Abedin (Shahi Khan) of Kashmir in 1417-67 AD. Actually his father Sultan Sikander (c.1386-1410) was ruling over Kashmir at the time of Timur's invasion of India (AD 1398). Sultan Sikander sent an embassy, led by his son, Shahi Khan, to that formidable personage and sought his friendship. Timur summoned him for a meeting but in the meanwhile political developments at home compelled him to leave India. He hastened to Samarkand but took along Shahi Khan and kept him virtually as a hostage until his death. Shahi Khan returned to Kashmir with many artisans and persons skilled in various trades with a view to introducing new industries there. These included paper-makers, bookbinders, harness-makers and midwives. The author of *Tarikh-i-Kashmir* stated the following about Shahi Khan, "During his stay at Samarkand he acquired knowledge. When he returned to Kashmir he brought with him a number of artisans skilled in different trades such as paper-makers, book-binders, carpet-makers, harness-makers and well trained midwives."

Soon, because of its quality, the Kashmiri paper was much in demand in the world and the rest of the country for writing manuscripts. According to *Tarikh-i-Farishta*, "Sultan Abu Said sent fine Arab horses and strong camels of good breed as presents to Sultan Zainul Abedin. Pleased with this act of courtesy, Sultan Zainul Abedin in return, sent saffron, paper, Musk, perfumes, rose-water, vinegar, elegant shawls, glass bowls and other fine products of Kashmir industry".
Indian Paper Manufacture Centers

With the rapid demand of writing materials the paper making centers were established in different parts of the country like in Sialkot (Punjab); Zafarabad in district Jaunpur (Oudh); Bihar Sharif in district Azimabad (Patna) and Arwal in district Gaya (Bihar); Murshidabad and Hooghly (Bengal); Ahmedabad, Khambat and Patan (Gujarat); and Aurangabad and Mysore in the south.

- Out of these, the Punjab was the leading center. Sialkot paper was white in colour and very stout. It was used throughout Punjab.
- In Uttar Pradesh, Zafarabad is a famous town of district Jaunpur. It was known as Kaghdi Shahar (paper city) in olden times. It produced a very fine, glossy and strong variety of bamboo paper. Generally two varieties of paper were produced here, first was the polished paper, which was exceedingly glossy, and second was unpolished paper.
- Bihar had two major papermaking centers in medieval times. First was Arwal town in district Gaya, and second was Bihar Sharif in district Azimabad (Patna).
- In Bengal, Murshidabad and Hooghly were the major papermaking centers in the medieval times. At a later period, Dinajpur also started manufacturing paper.
- After some time, Gujarat developed as the largest producer of paper. It supplied paper to rest of India and also exported to the West, other Asian countries and Turkey also. In Gujarat, Ahmedabad was the largest papermaking center, it produced white and glossy paper.
- During the Mughal period, Daulatabad, with Aurangabad as its capital, emerged as an important papermaking center. The most remarkable feature of Daulatabadi paper was its durability and glossiness. Daulatabad was the chief supply center of paper to south India.
- Tipu Sultan developed papermaking centers in Mysore. The paper produced by Mysore, was a high quality paper, which was employed only for royal use.
- Other big paper making centers of medieval India were: Sanganer (in Jaipur, Rajasthan), Kotah (Rajasthan), Tijarah (in Alwar, Rajasthan), Kannauj (in Farrukhabad, Uttar Pradesh), Kalpi and Pukharayan in Kanpur (Uttar Pradesh), Maler-Kotlal (Punjab), Hariharganj (in district Shahabad, Bihar), Kalita (in district Pabna, now in Bangladesh), Panchannagar (in district Damoh, Madhya Pradesh), Dharangaon and Erandel town (in district East Khandesh, Maharashtra) and Poona.

Generally Indian papermaking centers produced glazed paper. Rahman has categorized ancient paper into seven categories: Kashmiri, Ahmedabadi, Hyderabadi, Faizabadi, Khasah-i-Jahangiri, Kanpuri and Aurangabadi.

- Ahmedabadi paper was a little thick and was of two qualities: fine and superfine. The paper had extra whiteness and glossiness.
• Kashmiri paper was stout and glazed. Some Kashmiri centers produced superfine paper called silken paper.
• Khasah-i-Jahangiri paper was made at Sialkot. The paper was glossy, thin, polished and bluish white.
• Hyderabadi paper was well glazed; some was polished and of brown colour with very fine shades.
• Faizabadi paper had three varieties: i) unpolished paper (medium quality); ii) pale yellow; and iii) polished dark yellow.
• Kanpuri paper was prepared from bamboo and was greyish in colour.
• Aurangabadi paper was glossy and stout, had a few varieties like, Bahadur Khani (medium quality paper, thick, stout and durable), Sahib Khani paper (medium quality, thick), Murad Shahi paper (fine quality), Sharbati paper thick and fine), Qasim Begi paper (thick), Ruba-Kari paper (This variety was made in four or five different grades) and Balapuri paper (four or five varieties of different colours).

Indian Technique of Paper Making

Rahman describes the old Indian technique of papermaking and its tools. According to Rahman, the main tools used for papermaking were: dhegi (hammer), chhapri (screen), and sacha (teakwood frame), kunchawas (soft date-palm brush), and polishing stone.

The techniques of papermaking were essentially the same throughout the country, differing only in the preparation of pulp from different materials.

According to Rahman, "the process of making paper from waste paper was not very difficult. The waste paper was torn to pieces, sorted according to colour, moistened with water, taken to the river and pounded with stones, and washed for three days. It was then taken to a cistern about 7ft x 4ftx 4ft deep, half - filled with water. The pulp was thrown into this cistern. When it was thoroughly dissolved, the workman sitting on the edge of the pit, bending over the water, took in both hands the square frame which held the screen serving as a sieve, passed it underwater and drew it slowly and evenly to the surface; such that, as the water passed through, a uniform film of pulp was left on the screen. The screen was then lifted up and turned over, and the film of paper was spread on a rag cushion. When sufficient layers had been heaped on this cushion, about 9-14 inches high, a rag was spread over them and a plank weighted with heavy stones was laid over it. When this pressure had drained the water and some of the moisture out of the stock of paper, the stones were taken away and two men, one standing at each end of the plank, see-sawed over the bundle of paper by hand. When it was well pressed the paper was peeled off, layer after layer, and spread to dry either on the walls of the building or on rags laid in the sun. When dried, each sheet was laid on the polished wooden board and rubbed with a shell till it shone".
The above process was used for making rough paper.

Rahman describes another process of glazed papermaking. According to Rahman, firstly the material was cut into small pieces, moistened with water and pounded by a heavy fixed hammer, the dhegi. Then washed with clean water and moistened with slaked lime and left in a heap on the floor for seven or eight days, then pounded again, heaped and left to lie for four days more. Again washed this material (rag) with plane water and washed material mixed with khar (impure carbonate of soda, 1 khar : 38 pulp) overnight. This rag was again washed and again mixed with khar (1 khar : 40 pulp) and dried in the sun. And again kept in water overnight and again washed. Washed rags were mixed with country soap (1 soap : 27 rags) and pounded and dried. Then this pulp was washed again. Then placed into a cement-lined cistern, about 7ft x 4ft x 4ft deep. The rest of the process was similar to the above described technique.

Ray describes other processes of papermaking. According to Ray, the old clothes, old tents, the bark of certain shrubs and trees were washed well and soaked in water for few days; these materials were beaten with wooden hammer (dhegi). The pulp was mixed with a little water in a lime-lined (cunam) reservoir, where the beating operation was also carried out. The workman dipped their moulds into the reservoir, and the mixture, when lifted out, would become paper. It was then removed, and each sheet drawn through a second reservoir of water and then hung up to dry in sun. A quantity of gum Arabic was dissolved in water and then the beaten pulp was placed. The water in the second reservoir, through which the sheets were drawn, also contained gum in the form of mucilage, as well as some alum dissolved in it. The moulds or forms used by the workmen were generally made of bamboo. The gum Arabic was obtained as an exudation from the babool tree.

**Modern Period**

Gondhalekar has also described the process of making handmade paper, which involved cutting, dusting and washing of the tat (discarded hessian sacks) then beating the tat under a treadmill, followed by washing. This washed mass was mixed with saji matti (naturally occurring sodium carbonate) and lime and exposed the mass to the sun in an open verandah for several days for sun bleaching. And this dried material was subjected to rewashing. And if necessary, the saji and lime treatment was repeated.

Then thoroughly stirring the pulp in a masonry vat sunk in the ground and lifting the sheet on a grass mat. After this sticking the wet sheets on lime plastered walls for drying and applying starch-paste on both sides of the dried sheet and glazing the dry sheet on a concave wooden board, with a smooth agate burnisher. And finally cutting to required sizes.
The above process could produce a fairly strong paper. Such paper was mainly used by the Government for state records, by priests for religious books, and by moneylenders and traders for account books.

Consistent with their policy of dismantling Indian industries, like iron, copper, textile etc, they also disbanded the native handmade paper industry. According to Bansal and Kumar (2001), "the handmade paper industry was in full bloom until the early part of the 19th century and enjoyed a very special status under state patronage. The British who were now ruling India completely banned the use of hand-made paper in all government offices and they started the import of machine-made paper from Britain. A few paper mills were established in India by the end of the 19th century, as a result of which a lot of cheap machine made paper appeared in the market for public use. This further caused a severe blow to the industry and made it difficult to survive. Many people engaged in it lost their jobs. This was a rough time for the Indian hand-made paper industry. Swadeshi movement under the leadership of Mahatma Gandhi played a positive role in reviving the handmade paper industry. For the success of the movement, Gandhi ji drew the support of the manufacturers of consumer articles in the country and formed the All India Village Industries Association (AIVIA). Hand-made paper was also included in the list of village industries, which needed financial support and patronage for its products. Since there was a competitive market of cheap machine made paper of almost all varieties, it was imperative to improve the quality of indigenous products. For this purpose, in 1935, All-India Village Industries Association started a training centre at Maganwadi in Wardha (Maharashtra) under the guidance of Sri Kumarappa, a devout Gandhian and economist. This training centre was later renamed as Jamna Lal Bajaj Research Institute".

In 1924, more and more paper mills of India began to use bamboo as main raw material.

**Paper Production in India**

In 1925, Bamboo Paper Industry (Protection) Act and in 1931, Indian Finance (Supplementary and Extending) Act came into existence which provided the protection, and some more mills appeared on the scene. Rohtas Industries Ltd., Dalmianagar; Orient Paper Mills, Brajraj Nagar; Mysore Paper Mills Ltd., Bhadravati; Star Paper Mills Ltd., Saharanpur; and Sirpur Paper Mills, Kagajnagar, Sirpur; were set up just before the outbreak of the Second World War. Indian paper Industry made remarkable progress during the war period.

In 1925, Punjab Paper Mills was started with an annual capacity of 6000 tons. By 1930-1931, the total capacity of paper production in India was increased to 45,600 tons as against 33,000 tons in 1925. The share of indigenous production in national consumption was now 71 % as against 54% in 1925.
Bansal and Kumar describe the net production of paper in India during the 1911-1950:

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (thousand tons)</th>
<th>Year</th>
<th>Production (thousand tons)</th>
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<tbody>
<tr>
<td>1911</td>
<td>27.2</td>
<td>1945</td>
<td>110.1</td>
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<tr>
<td>1921</td>
<td>24.7</td>
<td>1946</td>
<td>105.1</td>
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<tr>
<td>1931</td>
<td>40.0</td>
<td>1948</td>
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<tr>
<td>1941</td>
<td>95.0</td>
<td>1949</td>
<td>106.1</td>
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<tr>
<td>1942</td>
<td>92.5</td>
<td>1950</td>
<td>109.3</td>
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<tr>
<td>1943</td>
<td>102.6</td>
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</tbody>
</table>


Production of individual paper Mills in 1947:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Year</th>
<th>Name and location</th>
<th>Production (Tons)</th>
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<tbody>
<tr>
<td>1</td>
<td>1881</td>
<td>Upper India Cooper Paper Mills, Lucknow</td>
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<td>2</td>
<td>1882</td>
<td>Titagarh Paper Mills Titagarh and Kankinara</td>
<td>38,550</td>
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<tr>
<td>3</td>
<td>1887</td>
<td>Bengal Paper Mills, Raniganj</td>
<td>11,760</td>
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<td>4</td>
<td>1887</td>
<td>Deccan Paper Mills, Hadaspur</td>
<td>3,090</td>
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<td>5</td>
<td>1918</td>
<td>India Paper Pulp, Naihati</td>
<td>6,040</td>
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<td>6</td>
<td>1925</td>
<td>Andhra Paper Mills; Rajahmundry</td>
<td>1,630</td>
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<tr>
<td>7</td>
<td>1925</td>
<td>Shree Gopal Paper Mills, Yamunanagar</td>
<td>10,360</td>
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<td>8</td>
<td>1931</td>
<td>Punalur Paper Mills, Punalur</td>
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<td>9</td>
<td>1933</td>
<td>Gujarat Paper Mills, Barejadi</td>
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<tr>
<td>10</td>
<td>1935</td>
<td>F. Pudumjee, Bombay</td>
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<tr>
<td>11</td>
<td>1936</td>
<td>Star Paper Mills, Saharanpur</td>
<td>4,250</td>
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<td>1936</td>
<td>Orient Paper Mills, Brajrajnagar</td>
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<td>13</td>
<td>1937</td>
<td>Mysore Paper Mills, Bhadravati</td>
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<td>14</td>
<td>1938</td>
<td>Sirpur Paper Mills, Sirpur-Kaghaznagar</td>
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<td>15</td>
<td>1939</td>
<td>Rohtas Industries, Dalmianagar</td>
<td>12,860</td>
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</tbody>
</table>


**The First Printing of Indian Characters**

The 16 pages of *Doctrina Christina* were translated into Tamil language by Fr Henriques and Fr Manoel de Sao Pedro. This was printed in the Malabar Coast in 1578. This little work known only from this one copy becomes the earliest example of printing in the characters of one of the language of India. The 16 pages are printed on a single sheet, in conventional octavo format, the pages measuring approximately 14x10 cm.

**Conclusion**

The handmade glazed paper was a remarkable product of medieval India. Bark and leaves of trees, silk or cotton clothes, planks, leather and parchment formed this paper. This paper was not only used in India but also exported to other countries. But nowadays the handmade paper industry is declining rapidly. Only a few areas are still there which produce handmade quality paper.

**Sources:**


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We always talk about money, but the demonetisation drive and the introduction of new Rs 500 and Rs 2,000 notes has got us talking a lot about currency these days. Also read: India's chaiwalas and paanwalas go cashless, rock demonetisation with e-banking. In this light, here's a quick look at how the paper currency came into being in India. THE FIRST NOTE. It was the establishment of European trading companies that brought paper currency in India around the 18th century. Back then, however, the notes used were text-based, and was issued by the banks set up by these private companies. Indian History is a very vast subject, and it is important to prioritize certain areas for UPSC Civil Services Prelims and Mains. This article is written with a view of providing an overall guidance/study plan for Indian History for IAS exam. Analyzing previous years questions papers, one can reach a conclusion that UPSC asks a major chunk of questions from Modern India, followed by Ancient India. Questions from Medieval India are limited. Even if they come, they mostly touch areas of culture like Mughal art/architecture.