

INDIAN ECONOMIC INNOVATIONS

Stuart Blackburn, Ph.D.

Overview

The major economic innovations across the centuries of Indian history pertain to a mixture of objects and systems. They include smaller, more sophisticated tools, a system of weights, writing, manufacture of iron tools, uniform coinage, new banking methods and the expansion of maritime trade. The significant contribution of Indians to contemporary digital technologies is also well-known.

Prehistory

Tool factories Stones used for tools appear to have been quarried at certain ‘factory’ sites, especially in the Deccan during the Palaeolithic period (c.1,000,000-40,000 BCE). At Isampur (c. 500,000 BCE) in modern-day Karnataka, for example, archaeologists have identified four adjacent sites (each about 300-400 sq miles), where a large cache of these early stone tools were found. The tools were probably made from the large limestone slabs and blocks in the area.

Smaller tools The gradual transition from the Palaeolithic to the Mesolithic Age (c. 40,000-7000 BCE) in India is marked by the slow diminution in the size of stone tools. The unwieldy ‘core-tools’ (such as hand-axes and cleavers) of the Palaeolithic were gradually replaced by smaller ‘flake-tools’. From the widespread presence of stone fragments (about 5 cm in width), scientists conclude that the larger stones were chipped and shaped by smaller stones. Most of these new, smaller tools were made of flint and quartzite, which were harder and more easily worked than other types of stone. The new technology of reducing large stones to these smaller, more efficient tools, such as knives and sickles, then enabled hunter-gatherers to forage more effectively.

Indus Valley Civilisation

Plough The earliest evidence of a ploughed field was discovered at Kalingan, an Indus Valley civilisation (c. 3000-1500 BCE) in modern-day Rajasthan. The field is dated to about 2800 BCE. The use of a wooden plough increased agricultural production, which enabled the larger populations and spread of urbanism that defined the IVC.

Weights Economic transactions in the Indus Valley civilisation were facilitated by the use of standardised system of weights. At Harappa, six differently sized cubes have been found that conform to the binary weight system used in all excavated settlements. The smallest weight less than 1 gram and the most common weight is approximately 13.7 grams, which is in the 16th ratio. In the heavier weights, there is a decimal increase where the largest is 100 times the weight of the 16th ratio in the binary system. These weights may have been used for trade and taxation collection.

Dockyard Another innovation during this early period was building a large dockyard at Lothal, on the west coast of India, which would have facilitated maritime trade to the Near East. At Lothal, burnt bricks were used to construct a basin with walls over 200 meters long on the east and west sides, and about 35 meters long on the north and south sides. A sluice-gate and a spill channel were used to regulate the water level.

Indo-Aryan Civilisation

Iron-making Early Indo-Aryans may have possessed iron objects, but they did not introduce this critical technology to India. Instead, as part of their assimilation, they learned to make iron from the indigenous populations. By about 800 BCE, iron was used to make a variety of objects, including needles, nails, hooks, heavy axes, knives, arrow heads, tongs and clamps. The discovery of clay furnaces at many sites in north India indicates the spread of the ability to make iron objects. Most furnaces are of the open type that used bellows. Some of them are large-scale and capable of making heavy tools, such as axes. Very little research has been done to identify the source of the iron ore, but most scholars believe that it came from the Himalayan foothills.

Influence of iron The emergence of iron technology, especially heavy axes, literally changed the face of India by enabling large-scale forest clearance in the Gangetic plain. This clearance, in turn, facilitated the production of considerable food production, which sustained the large populations that led to a shift from tribe to chiefdom.

For this reason, it is no exaggeration to say that iron-making was the most important development in ancient India.

Coinage Another innovation in the field of metallurgy during this period was the appearance of India's first minted coins (as opposed to shells or beads used as barter). These early coins, which were first used in the Gangetic plain around 500 BCE, were made from silver bars. They were then punched and stamped with a symbol, such as an animal or the swastika. By the end of the period, coinage and increased political centralisation enabled a more complex economy.

Classical Period

Guilds An innovation that stimulated the economy in this period was the appearance of mercantile guilds. Various texts and inscriptions (dating from about 200 BCE-200 CE) mention 75 different occupations that could form guilds, including potters, metal-workers, goldsmiths, weavers and carpenters. Operating as early banks, these associations of merchants pioneered the use of money (silver and copper coins), some of which they issued themselves. They also established early banking methods, such as investments and endowments.

Currency and trade The modernising urban economy that flourished under the Mauryas (c. 321-185 BCE) developed even further under the Guptas (320-c. 550 CE). The Mauryan state instituted a single currency across India to facilitate trade, while the Gupta rulers improved roads and extended trade routes so that even interior areas had access to commercial centres and seaports. This sophisticated transport system enabled the Gupta rulers to collect land tax and import duties.

Writing The key factors contributing to the success of the Mauryan Empire—expanding urbanism, rise of mercantile classes, guilds, improved trade networks and improved banking methods—were themselves largely due to the appearance of writing. The earlier Indus script disappeared about 1500 BCE, and more than a millennium passed before writing once again appeared in India. Archaeologists working in Sri Lanka have found Brahmi inscriptions (in the Prakrit language) on pottery dated to 450-350 BCE. However, these are single letters only. A more extensive use of the Brahmi script was to write the edicts of King Ashoka, inscribed on rocks and stone pillars between 250-232 BCE. A few of these imperial proclamations were written in another script (Kharosthi), but it was used only in northwest India and died out about 200 CE. Brahmi, however, went on to become the parent of all other Indian scripts (except the Persian-Arabic script used to write Urdu). Brahmi itself is probably derived from a Semitic or Mesopotamian script, although that history is still debated.

Early Postclassical Period

Maritime Trade Chola rulers set up a string of fortified trading towns along the east coast to facilitate growing maritime trade. Much of the Indian influence in Southeast Asia, evident in the Buddhist and Hindu temples in Thailand, Cambodia, Indonesia (especially Bali and Java), and in the names of kings, can be attributed to South India and largely to the Cholas. The Chola maritime campaigns to Sri Lanka and Indonesia were probably intended to control trade routes as much as to conquer territory. Maritime merchants became wealthy on the back of this trade and formed powerful associations that rivalled kings. One guild based in the Deccan (The Five Hundred Lords of Ayyavole) spread over the whole of South India and left inscriptions in their name in Southeast Asia.

Temples A distinctive feature of the Indian economy that developed in this period was the temple as mini-commercial centre. With kings, landowners and merchants as patrons, and artisans, ritual specialists and accountants as employees, temples became major centres of economic activity. Landowners and merchants asserted their status by making donations of land to the temple, the revenue from which was earmarked for the performance of a ritual or maintenance of a shrine. A copper-plate from about 850 CE records the gift of 90 sheep by a merchant to a temple. Another copper-plate mentions a donation of 30 copper coins by a merchant's wife for the maintenance of a temple lamp.

Production New technologies improved production in various sectors. For example, the earlier hand mill for pressing oil from seeds was replaced by a bullock-driven mill, which was far more efficient. Larger and more easily worked looms were built, which produced goods for the increasing domestic and foreign markets in woven silk, linen, calico, wool and cotton. The same is true for pearls, ivory, sandalwood, gold and semi-precious stones. The spice trade, primarily in pepper, developed as well.

Late Postclassical Period

Revised grant system Like virtually all previous rulers of India, the Delhi Sultanate used the land-grant system as a means to create allies in the provinces. However, they also revised this system in an effort to prevent local elites from becoming too powerful. The revision was to introduce a money-grant. In this revised system, a Muslim official in the province was permitted to collect and keep a portion of the land tax due from Hindu landowners to the state. Over time, however, these money-grants evolved into hereditary emoluments, providing the officers with considerable land and power in the countryside. The result was that the office-holders became financially independent from Delhi, reproducing the very problem the system was intended to solve.

Currency Although bills of exchange were used to transfer debt and make land sales in the countryside, the main currency was coinage. The amount of coins minted during the Sultanate was considerably greater than during any previous period. Metal coins (mostly gold, silver and silver-alloyed) were issued by the various rulers of the Sultanate. The most common coin was the silver-based *tanka*, which had 14 different denominations, determined by the weight of silver. Over the course of the Sultanate, the amount of silver decreased from about 30% in the beginning to only 5% by the end. In effect, the economy became demonetised.

Early Modern Period

A nascent form of capitalism under the Mughal Empire was stimulated by the cash economy favoured by the emperors, the modern banking practices of the Mahrattas and the commercial practices of European traders. The most significant element in this evolving capitalist system was the growth in foreign trade enabled by the arrival of European ships. This expanded foreign trade contributed to the wealth of the Mughals and their allies. Spices, indigo, sugar, salt, turmeric, textiles and opium were exported, in return for guns, horses, amber, precious stones, drugs, perfume and certain types of luxury fabric, such as velvet. But the main import was gold and silver, primarily from the Spanish colonies in the New World. Trade increased considerably in the 17th century. For example, in the 1620s, the English East Indian Company was selling a quarter of a million pieces of cotton cloth at auction in London. By the end of the 17th century, the number of pieces has soared to nearly two million. Indian traders, merchants and artisans, especially silk and cotton weavers, benefitted from this lucrative trade. The emperor Akbar made a vital contribution to this sector of the economy by opening silk weaving workshops in several cities.

19th Century

One economic innovation introduced by the colonial state was a new form of tax collection known as *ryotwari*. In the old *zamindari* system a landowner-cum-official (*zamindar*) collected tax from a number of villages or other landowners. In this new system, thousands of small cultivators (*ryots*) were issued with a title to the land and expected to remit tax on their own. The idea was to create a modern peasantry, modelled on the free yeoman of England, without middlemen and money-lenders. In practice, it led to the impoverishment of many cultivators. First, the tax was not levied on actual crops but on an estimate of the potential yield. Second, it had to be paid in cash. However, estimates were often too high, due to unpredictable weather, and the need for ready-cash threw the peasants back into the hands of the money-lenders.

20th Century

Neo-liberalism India's economy was transformed, at least at the upper end, during the last decade of the 20th century by a set of new policies. While state planning, 5-year plans, protectionist policies and the lack of foreign competition had a beneficial effect on growth in the first decades after Independence, by the 1980s, the lack of innovation and creeping stagnation were all too evident. In the early 1990s, after 50 years of isolation, India accepted an IMF loan of \$1.4 billion, which required it to embrace global capitalism. In return, India enacted a slew of radical reforms, selling off nationalised industries and utilities, removing currency and banking regulations, abolishing import tariffs, encouraging foreign investment and relaunching the Bombay Stock Exchange as an electronic trading system. Almost immediately the annual growth rate rose from around 2% to 7%, a level it has maintained up to the present (2017). A redistribution of economic growth also occurred, shifting away from the old centres in north India, such as Calcutta, Bombay and Ahmedabad, to southern cities, such as Bangalore, Hyderabad and Madras, especially in software and other high-tech industries.

IT technology India entered the digital age in 1955, when an early computer (designed in the UK with Indian input) arrived in Calcutta. India-based computer science took off in the 1960s, when Tata partnered with

Burroughs. Since then, Indian computer experts have made significant innovations in computer programming and communication protocols. These discoveries can be attributed, at least in part, to the science of language description, a field of linguistics in which Indians have excelled, starting with Panini and his grammar in about 500 BCE. In 1999, scientists at the Indian Institute of Science, in Bangalore, designed an open hardware and handheld computer. Since then Indian specialists abroad have led the way in many IT fields, such as Krishna Bharat at Google.

Discussion/questions

1. The manufacture and use of metal coins was an obvious stimulus to the economy of India, ever since their first appearance around 500 BCE. In addition to 'Indian' coins, currency minted abroad was also circulating in India from an early date. Archaeologists have found a large cache of Roman coins, at ancient South Indian ports, which date from about 100 BCE through to 500 CE. These mostly gold coins bear the image of Roman emperors. Several locally-made imitations of these Roman coins have also been found, which suggests that this innovation was not entirely positive.
2. Since the 1990s, India has rejected the socialism and state planning of Nehru. A series of regulations and legislation has opened up the economy to foreign investment, eliminated state monopolies and reduced bureaucratic red-tape. Assess the impact of this liberalisation on the lives of ordinary Indians. Be sure to consider urban and rural populations in your assessment, and to place your analysis in the context of global economic developments.

Reading

Barbara Metcalf and Thomas Metcalf, *A Concise History of Modern India* (Cambridge, 2012)

Sugata Bose and Ayesha Jaylal (eds.), *Modern South Asia: History, Culture, Political Economy* (Routledge, 2011)

B. R. Tomlinson, *The Economy of Modern India* (Cambridge, 2013)