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Hampi

Splendours of a World Heritage Site



Department of Science & Technology
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Hampi: Splendours of a World Heritage Site

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The note on the back cover is written by Prof Sundar Sarukkai. The main essay is written by Prof Sharada Srinivasan on behalf of the NIAS Heritage, Science and Society Programme and Department of Science and Technology– India Digital Heritage Hampi team (DST-IDH Hampi): NIAS, IIT-D, NID, IIT-B, IIT-M, IIACD, KU-Hampi, IIT-KGP, KSCST, IIIT-H, CCK, ISI-Kolkata, IIT-M, BVBCET, DAIICT and IGCAR.

Sources: DST-IDH project, www.digitalhampi.in with NIAS as a coordinating institution, www.nias.res.in.

The DST-IDH Hampi project is a multi-institutional collaboration bringing together technologists and cultural practitioners across leading institutions for exploring the use of digital technologies in the representation of art and architecture of the UNESCO World Heritage site of Hampi. NIAS is a major coordinating institution and is also working towards a Hampi Knowledge Bank.

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Vijayanagara: The City of Victory

The World Heritage Site of Hampi in Karnataka, India encompasses the spectacular ruins of the medieval metropolis of the Vijayanagara Empire which flourished from the 14th to 16th century AD in southern India. Ruled by powerful Hindu kings etc. such as Krishnadeva Raya (early 16th century), Vijayanagara (City of Victory) was compared in beauty and size to Rome by the Portuguese traveller Domingo Paes. Abdul Razzak, the Persian ambassador wrote that 'the eye had never seen a place like it'. Sacked and abandoned in 1565 after its fall in the battle of Talikota to the Deccan Sultanates, it was 're-discovered' by Colin Mackenzie around 1800. In 1986, Hampi with its ruins sprawling over an area of 4187.24 hectares was declared a UNESCO World Heritage Site of 'universal value'.

Set within a dramatic landscape of granite hillocks snaked by the Tungabhadra river, its ruins comprise an array of built edifices,



Achutaraya complex, Hampi from Matanga hill

spanning temples, forts, tanks, irrigation networks, palatial complexes and mausoleums. Apart from this tangible heritage, the site boasts of a vibrant intangible heritage of crafts traditions, performing arts, rituals and festivals. While taking the reader through the rich panorama of Vijayanagara art and architecture, this essay also attempts to highlight and contextualise new facets brought to light through the use of digital technologies in the study, documentation and representation of art and architecture.

Highlights of Vijayanagara Art and Architecture

A captivating feature of Hampi for the visitor is the sheer variety that the site offers, representing not just one or two monuments but a wide array of architectural and cultural remains from the sacred to the secular, from the royal to the everyday, and set within a pristine natural landscape of haunting beauty. These include urban, royal and sacred ensembles such as

forts, riverside features and shrines, royal and sacred complexes, temples, shrines, pillared halls or mandapas, pavilions, monumental and memorial structures, gateways, defense check posts, stables, tanks and water structures.

The rich repertoire of architecture in the southern Indian Dravidian style includes the Virupaksha temple with



its imposing temple tower, the Vittala temple, the Krishna temple, the Hajara Rama temple, Achyuta Raya temple, the Hemakuta group of temples and others. The typical Dravidian style of temple architecture inspired by the Tamil Chola country included a central sanctum where a stone image of the deity to be worshipped would have been kept, surrounding subsidiary mandapas or pavilions, and an outer walled and colonnaded enclosure with four entrance towers or gopuras at the cardinal points. Many of these temples were also flanked with long colonnaded passageways which may have served as places for vendors in much the same way as in modern bazaars and shop fronts lining temples where flowers and ritual accessories for worship are sold amongst other things.

Though a staunchly Hindu dynasty, the catholic Vijayanagara court employed Muslim officers in the court and military, whose mausoleums and tombs are also seen. In the secular and courtly architecture, influences from the northern Deccan Muslim Sultanate provinces of Bijapur and Golconda can be seen. These include the defense and military architecture such as the expansive elephant stables with Islam-

ic style domes, the watch towers and the charming space of the Queen's bath with Islamic arches. The Queen's bath is thought to date to Achutaraya's time and seems to have been the private bathing chamber of the royals. The Hajara Rama, is a stately temple dedicated to the worship of Rama, exiled prince of Ayodhya and one of the incarnations of Vishnu.

Pre-Vijayanagara heritage of Hemakuta Hill

The Hemakuta Hill in the northern part of the City of Vijayanagara has some of the earliest structures of the site, dating back to pre-Vijayanagara times. We know from inscriptional records that this spot on the banks of the River Tungabhadra had gained status as a pilgrimage spot at least by the 8th century CE. One of the earliest temples that came up on the spot is the shrine to Goddess Pampa, another name for Tungabhadra. This was followed by a clutch of monuments that appeared on the flanks of the Hemakuta Hill, mostly memorial temples commemorating dead members of the royal families of Kampili. Later, when the city of Vijayanagara was established, Hemakuta formed the nucle-



Fortification around Mahanavami Dibba, Hampi



View of banks of Tungabhadra river

The riverine setting amidst the splendor of the Tungabhadra

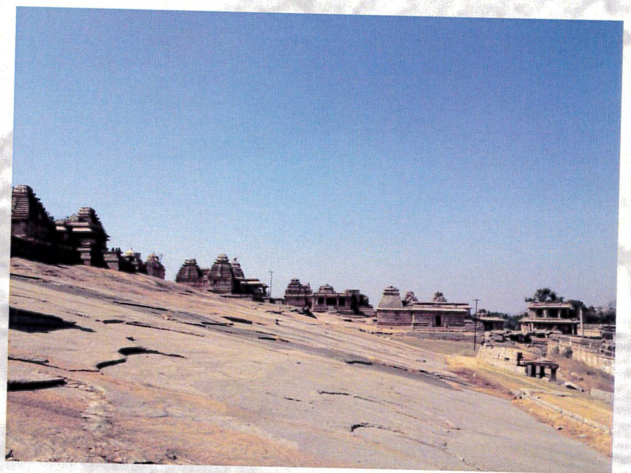
The spectacular natural heritage of Hampi, where its several monuments are dotted along the expanse of the meandering Tungabhadra river, is one of its major attractions. The name Hampi is thought to derive from Pampa, the old name for the river Tungabhadra.

us of the sacred centre of the city. A grand temple to Virupaksha, a form of the god Shiva and the tutelary deity of the Kingdom, was erected near this place. In course of time, Pampa was established in a sub-shrine within the precincts of the Virupaksha Temple and her former shrine is a Durga Devi temple. The Virupaksha temple with its imposing entrance tower or gopuram has remained a living temple where annual chariot festivals are still held with images of the god Virupaksha and his consort, the goddess Pampa, being taken out in procession.

Major Hampi landmarks and sacred geography

The landscape surrounding Hampi has been replete with folklore and myths, imbuing it with a very special sacred geography. The Tungabhadra weaves its way

around the Kishkinda mountains which are said to be connected with the mythology of the Ramayana, the popular Hindu epic about the victory of the valorous prince Rama over the demon Ravana. Kishkinda is said to be the kingdom of the vanara (i.e. half-human, half-monkey beings) ruled by, Sugriva, with the help of the venerated Hanuman, who is said to have helped Rama to vanquish Ravana who had abducted his wife Sita. Founded by the chieftains, Hakka and Bukka around 1336 AD, four dynasties ruled Hampi (1336 – 1565 AD). Several temples and monuments came up along the expanse of the Tungabhadra river, which separates the old capital of Anegondi from the later metropolis of Vijayanagara. Emperor Krishnadeva Raya (1509-1530 AD), poet and great patron of several edifices such as the Krishna temple, won wars against the Deccan Muslim Sultanates and the Hindu Raja of Orissa. The Tungabhadra river along with the rocky and hilly terrain, served to make the Vijayanagara dominions relatively impregnable to northern incursions, until the decisive battle of Tali-



Hemakuta hill with some pre-Vijayanagara era monuments



kota in 1565 to the north of Hampi won by the Bijapur and Golconda Sultans.

Range of Architectural Styles and Edifices

Hampi boasts of a range of utilitarian, courtly and military architecture. The Mahanavami Dibba is an impressive granite platform in many courses, some with carvings. It was used as a stage for the king to watch the performance of the nine-day Mahanavami or Dussera festival, which included war games, royal processions and dance performances. The Dussera festival is still celebrated in Mysore commemorating the victory of the God king Rama over the demon Ravana. The Hajara Rama temple has panels depicting the ep-

ic of the Ramayana, where Rama is depicted as the archer with a bow and Ravana as the ten-headed demon. Another splendid feature of Hampi is the range of tanks including a stepped tank and octagonal tank, while the pushkarni is a lovely tank near the Vittala complex which has been more recently unearthed. The intriguing Elephant Stables represents a series of Islamic styled domed constructions in an elongated row which are said to have housed elephants who were used in the army, for festival processions and other such activities.

Digital Technology in the Study of Culture

Robert Sewell in 1900 as district collector

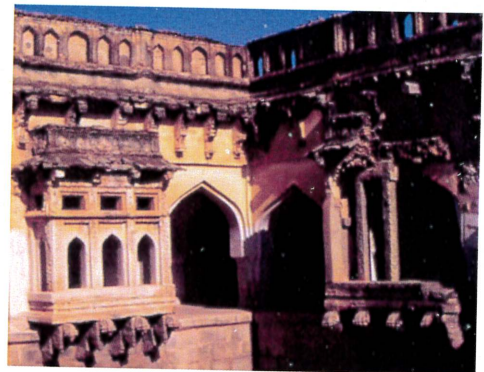
Vignettes of Vijayanagara Art and Architecture



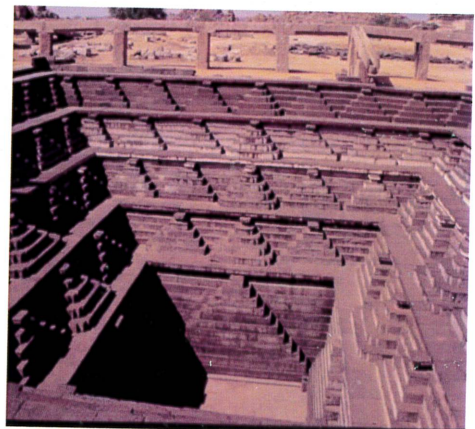
Virupaksha Temple Tower



Archer, Vittala temple

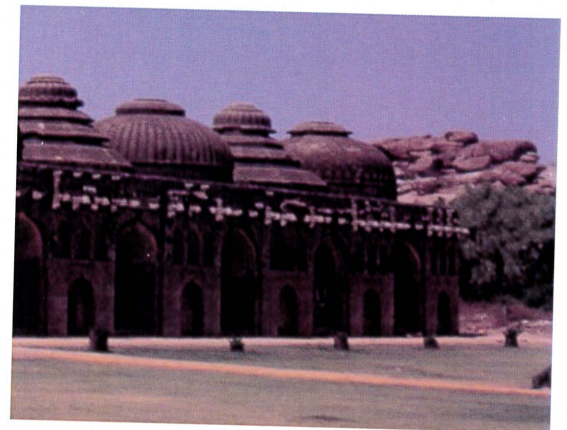
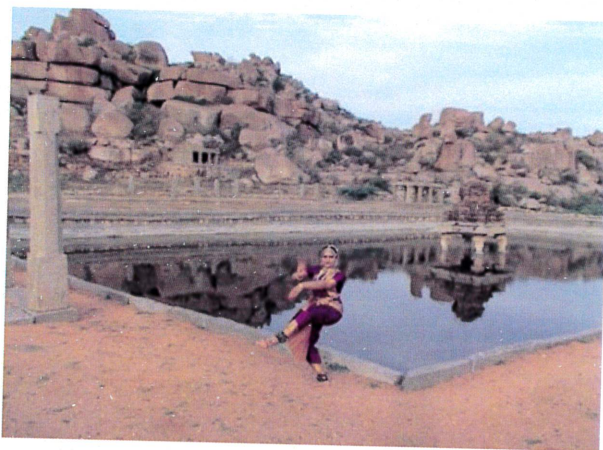
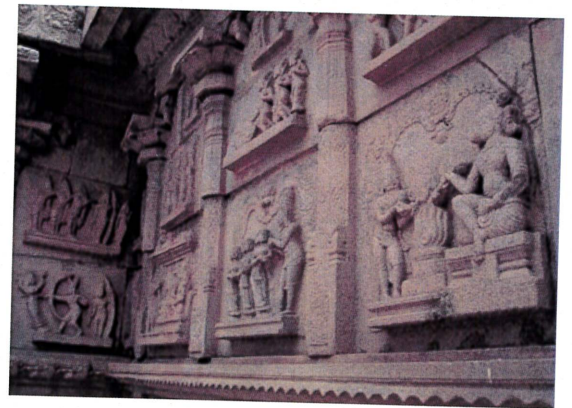
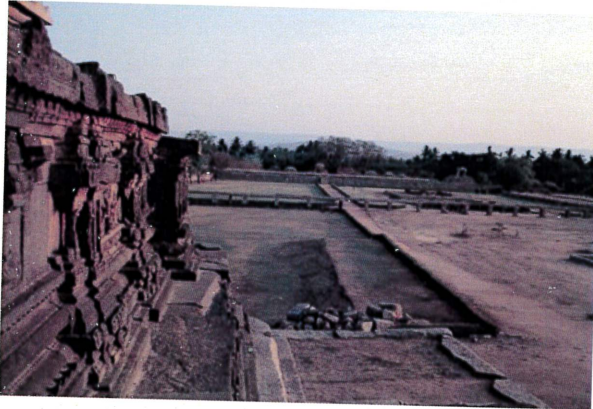


Queen's Bath (Right Above)



Stepped Tank (Right)

Mahanavami Dibba platform & Hajara Rama temple with reliefs depicting the Ramayana



Pushkarni tank near Vittala temple & Elephant Stables

of Bellary district surveyed Hampi to write the oft quoted 'A Forgotten Empire'. The 19th century photographs of Colonel Alexander Greenlaw who took over 60 images in 1856 have been important in gaining earlier visual perspectives of the site. Hampi came under the Archaeological Survey of India in 1904 and gained importance as a major heritage site and cultural landscape in independent India.

The Indian Digital Heritage project has been a unique endeavour of DST (Department of Science and Technology, Government of India) bringing together researchers in the areas of technology and humanities and arts for the digital documentation, representation and interpreta-

tion of tangible and intangible heritage. The IDH-Hampi project with numerous participating institutions (see www.digitalhampi.in), has imaginatively elucidated aspects of the rich architectural, artistic and cultural legacy of the World Heritage Site of Hampi. Emerging technologies in computer vision, graphics, audio and video technologies and user interface design offer exciting prospects of creating vivid experiences of heritage. At the same time, scientific studies can also have implications for enhancing our understanding of art history, archaeology and history of technology by providing diagnostic tools. While on the one hand, techniques of materials characterization are increasingly

used in archaeology to understand the manufacturing techniques of artefacts ranging from metals to pottery and pigments, the use of space-based applications in archaeological reconnaissance is also becoming very important, including geospatial techniques, satellite imagery, remote sensing, GIS and GPS recordings. The Hampi master plan uses satellite information to document the site in terms of monuments, settlements, land cover, irrigation networks etc.

The Lotus Mahal

The Lotus Mahal is one of the finest and most intact of monuments at Hampi. It was part of the Zenana enclosure, a secluded area for royal women of the Vijayanagara court. In its architectural vision, the Lotus Mahal is quite unique, an innovative fusion of architectural elements

drawn from Hindu and Islamic traditions, of pyramidal superstructures, akin to Hindu temples, converging with Islamic-style arches. 3-D Laser scanning reveals the complex arrangement of the superstructure not readily visible to the visitor.

The Vittala temple

The Vittala temple complex is one of the architectural marvels of Hampi which is dedicated to the Vittala, a form of Vishnu. Amongst the interesting shrines is the 'stone chariot' at the entrance to the main sanctum. However, this was not intended as a chariot but is in fact a shrine thought to have housed an image of Garuda, the eagle, and vahana or vehicle of Vishnu. British explorer and photographer Alexander Greenlaw's 19th century photograph indicated the presence of a domical super-



Google earth view of sites of Hampi

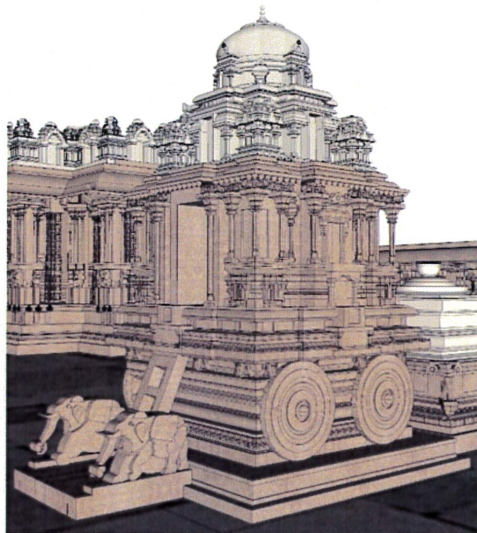
structure on top of the stone chariot. Digital conjectural reconstructions have been attempted for the damaged and missing portions such as the brick tower or gopuram at the entrance and the stone chariot.

Vijayanagara Murals

A delightful aspect of the Vijayanagara artistic legacy is the wealth of mural painting. It represents one of the few surviving medieval traces of a rich Indian mural painting tradition going back to the great mural art of the Buddhist Ajanta caves. At the Veerabhadra temple at Lepakshi in Anantapur district of Andhra Pradesh, su-

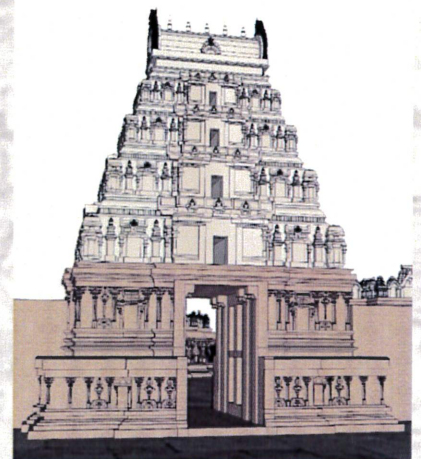
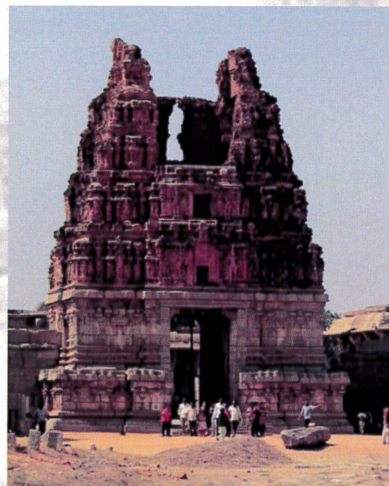
perb murals of the earlier part of the 16th century Vijayanagara period are seen of themes from the epics of the Ramayana and Mahabharata. The 16th century Virupaksha temple at Hampi has fine murals of the theme of Girija Kalyanam, the marriage of Siva and Parvati. To get a better visual sense of what the original mural might have looked like, the digital restoration of damaged murals can be attempted using techniques like patch-based texture synthesis.

A fascinating Vijayanagara feature is the 'bazaars' or colonnaded structures or arcades which lined the streets leading to temples. These would once have formed



Vittala temple, stone chariot with reconstruction based on Greenlaw's 19th century photograph

Gopuram or temple tower with conjectural reconstruction



the emporia which are described in accounts of European travelers. The Virupaksha and Vittala temples have had an impressive legacy of bazaars stretching along the approaches to these temples. The experience of meandering through medieval bazaars can still be savoured to some extent in the hustle and bustle leading up to the Virupaksha temple. The Hampi Jatre represents one of the lively aspects of the intangible heritage of Hampi. The Virupaksha temple has an interesting feature in the inverted gopura due to a pinhole camera effect.

Narasimha Sculpture

A most imposing sculptural marvel at Hampi is the granite colossus of Narasimha, one of the ten incarnations of the Lord Vishnu as man-lion, seated below the serpent vasuki with seven hoods. 3-D laser scanning revealed the modeling of this sculpture towering over 6 metres.



Vittala temple 'Musical pillars' and acoustic studies

The Vittala temple, an iconic architectural masterpiece of Hampi, consists of a sprawling compound with four gateway towers and several mandapas or pillared



halls. The Mahamandapa is the main central pillared hall is built on a sculptured ornate plinth. The numerous monolithic composite pillars are amazingly designed, which although they are hewn out of massive granite blocks, are nevertheless incredibly delicately crafted as a series of clusters of slender pillars. The Vittala temple, Hampi, is famed for its fifty six colonnades, some carved with sculpture. Some of these have yielded musical effects, which is also partly due to the resonant properties of the particular granite stone of the region. However no inscriptional evidence has yet come to light to confirm that these pillars were intentionally made that way to be musical. Tonalities akin to sounds of bells and drums have been reported, although the unmindful damage to the pillars over the years has led to the banning of the tampering with the pillars. Studies are exploring ways of replicating the musical effects by virtual and digital means using haptic renderings.

Investigations on nearly a dozen pillars using vibration analysis suggest that sound may have been produced in a set of colonnades by collective vibrations, whereby the vibration in one colonnade also generated vibrations in other colonnades in a composite pillar set.

Digital conjectural reconstruction and 3-D model generation

In the IDH-Hampi project, the use of a range of technologies was made in attempting digital restoration of architecture and art, such as inpainting and 3-D conjectural reconstructions, using a range of softwares and approaches including AutoCAD, kinect-based models and Google sketch up, while laser scanning was also employed. 3-D data acquisition and generation of point clouds were undertaken which could be digitally rendered. Physical models were also attempted to be printed. An interactive 'walk-through' was attempted in the physical model of the Vittala temple complex.



Digital Restoration
3-D print of Hampi Vittala temple complex

Laser scanned image of Lotus Mahal



Hampi in the Imagination...

Beyond the timeless tales of the rise and fall of empires that lie behind its sprawling ruins, there is something truly inspirational in the extraordinary cultural landscape of Hampi that could ignite young minds. At one level it represents a triumph of human endeavour, in the mastery over the crafting and sculpting of one of the least tractable of rocks, granite. We could just step back in time to consider the skills of the sculptors of yore, who created poetry into stone by generating an array of intricate shapes, that ranged from the highly geometric to the most fantastical of figurative forms that throb with life. These range from the ordinary musician to an exalted deity, from anthropomorphic to zoomorphic representations, from the abode of gods to those of animals such as elephants...

These provide an extraordinary testament to humankind's ability to create an aesthetic environment even in the most desolate and inhospitable of locations, whereby the barren rockiness of Hampi has instead been transformed into a backdrop of surreal and Daliesque beauty for its art and architecture. At the same time, an extraordinary feature of Hampi is its rich intangible heritage which also needs to be savoured and preserved, the serene riverine life of the Tungabhadra where the circular coracle boat has been used for generations as a means of transport, the rich festivals and customs and throbbing bazaars full of the flower sellers and bangle sellers, and the street performers who have made this a timeless living heritage site, rather than merely a lovely, but derelict relic, from the past...

Photographic and textual inputs are by Sharada Srinivasan with Krupa Rajangam, Uma Krithika, Srikumar Menon, Meera Natampally and MB Rajani



Vijayanagara Empire: Intellectual Movements to Technological Innovations

Vijayanagara empire was one of the most important empires in the Indian subcontinent. It was also a representative of great cultural and intellectual movements in South India at that time. The Southern part of India was home to many important intellectual movements. The three great *Acharyas* of the *Vedantic* tradition, Sankara, Ramanuja and Madhva, came from the South. The influence of these thinkers on the socio-political systems of South India was deep. Karnataka, where Hampi is situated, was also home to one of the greatest *Bhakti* movements, the *Veerasaiva* movement. This movement was one of the foremost social reform movements with its radical interpretation of religion and critique of social hierarchy.

Karnataka was also home to a flourishing *Jaina* community. These *Jaina* scholars not only were pioneering philosophers who, among other things, created a new system of logic, but were also scholars in other traditions such as grammar and literature. They were also extremely influential in promoting non-violence and principles of tolerance both in the social as well as in the political domain. Thus, the time of the Vijayanagar empire had already seen the presence of influential philosophical, mathematical and scientific schools.

The Deccan plateau was also home to some of the earliest technological innovations including production of very high quality steel and alloys. Many pioneering technological and artistic contributions in early India came from innovative artisans, craftsmen, artists and thinkers who came from many diverse castes and communities. These practices contributed to a flourishing trade and led to vibrant economic exchange between India and Arabic countries as well as those in Asia. It is within this larger world of philosophical, scientific and political excellence that one can imagine the world of Hampi in its heyday.

