

ENVISIONING A PLACE-BASED UNDERSTANDING OF VACCINE PRODUCTION: A CASE STUDY OF HYDERABAD, INDIA

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INTRODUCTION:

During the months of March to May 2021, as the number of persons that are COVID-19 positive was rising in India, many argued that the citizens of India should be vaccinated before exporting vaccines to other countries. Advocates of vaccinating the Indians first believe that India has sovereign right in deciding on use of vaccines that are manufactured within its boundaries; and therefore, the argument to vaccinate its citizens first. There was a gap in the demand for vaccines and the numbers that were being produced by the manufacturers. Proponents of vaccinating "Indians first" unconsciously revived the idea of place- a bounded entity. More broadly, the significance of Place cannot be understated. For example, equity considerations are better achieved when Place is categorical in the design and distribution of vaccines. Place, as an idea, concept, or term is relevant in the age of digitalization. An explicit theorizing of Place, in other words, is essential.

OBJECTIVE:

The objective of this paper is to advance theory of Place by asking, why vaccine manufacturing is undertaken at few places in India? This question is undertheorized in the literature. By casting spotlight on spatial connections for production of vaccine, a discourse is fashioned- to recognize interconnections and even interdependence of places.

A theory of Place lends itself to determine how four of the six manufacturers of the vaccine are located in the city of Hyderabad, India. The trajectory of developing vaccines in Hyderabad demonstrates that besides being bounded, there is an openness; akin to what Doreen Massey was emphasizing- a welcoming influence from the outside (Massey, 1995). Unbounded places realize what Kevin Cox (1998) terms "spaces of engagement," and by spaces of engagement the author meant "spaces in which social actors construct association(s) with actors located elsewhere."

DATA SOURCES AND ANALYSES:

To draw the conclusion on how Hyderabad is the "vaccine capital of India," a review

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and analysis is undertaken of the place through secondary sources. Particular attention is on two private vaccine manufacturers, namely, Biological E. Limited (BE) and Bharat Biotech International Limited (BBIL), besides incorporating information of Shanta Biotech, a pioneering biotech company that is presently owned by Sanofi Pasteur, a French multinational company. Therefore, the gathered information includes information on companies given as interviews in newspapers, television channels, magazines and YouTube channels; information given at the website of the companies, legal documents, published research reports, academic works of historians of public health and geographers.

The materials gathered were analysed to understand and identify positive macroeconomic climate that promotes establishment of organizations at Hyderabad. This maybe in the form of tax concessions, provisioning infrastructural facilities, and facilitation with federal and regulatory authorities and such to advance establishments of enterprises. Additionally, we examined "life stories" of the three entrepreneurs that established vaccine manufacturing companies at Hyderabad, namely, BE, BBIL and Shanta Biotech. This is to better understand the role played by "sense of place" or place attachment in the development of vaccine manufacturing hub at Hyderabad. And, our appraisal sought to identify clues that vaccine-entrepreneurs seek unbounded places to manufacture vaccines.

REVIEW OF LITERATURE:

Geographers have long exhorted to recognize that places are inextricably interconnected. For instance, starting nearly four decades ago, Indian government instituted policies that render its boundaries porous- thereby allowing places such as Hyderabad, Pune, Gurugram, Bengaluru, among others, to become hubs with flow of capital, ideas, technology, labor, and so on. Hyderabad therefore for decades has been known as the pharmaceutical hub or "bulk drugs" capital of India. Similarly, Hyderabad is "plugged" into circuits of capital through its special economic zones for High Technology industries (Ramachandraiah, Van Westen, and Prasad, 2008); and Hyderabad is an exemplar of a regional cluster of institutions. It has already been shown that through innovative governance mechanisms, social innovations can be forged in regional clusters (see Aoyama and Parthasarathy, 2016).

We know from theories of social networks that interacting members of a network are influenced (Scott, 2001); and the forms and direction of influence can be multiple (see Gibson-Graham, 2002). Therefore, there is a need for fresh perspective on the workings of social networks; rather than agreeing with the notion of "end of place" (see Manuel Castells in his thesis on network society), "flat earth" (see New York Times-columnist Thomas L. Friedman interpreting the rise of Bengaluru). There is promise in alternative theorisations of

place, such as, relational place-making, that is, "understanding place as relational and politics as both networked and placed" (see Pierce, Martin, and Murphy, 2010). More broadly, there is renewed interest in 'place' (see Cresswell, 1999, for example) leading to proliferation in the use of the term and its meaning.

John Agnew (1987) has suggested that there are three principal ways of understanding Place, namely, place as location, sense of place, and place as locale. These varied meanings of place in most analyses and interpretation are independent of each other. A place analysis of Hyderabad as vaccine manufacturing hub however reveals that there is overlap in the three meanings of place. In sections below there is an elaboration on the application of the three meanings of place to Hyderabad, and to conclude that place theorisation is once again at the cusp of a revision. We begin with conventional understanding of Place- as location or bounded entity.

BOUNDED PLACE- HYDERABAD:

The world is a mosaic of places argues Richard Hartshorne in his book titled *The Nature of Geography* written in 1939(cited by Castree 2003:165), which is an early and prominent characterization of place. Hartshorne in the book emphasizes the need for describing and explaining the "variable character," both human and physical dimensions; or to study areal differentiation(cited by Castree 2003: 164-165). When we applied this theorization of place to focus on vaccine manufacturing at Hyderabad, we find that Genome Valley of Excellence (GVE) at Hyderabad, a place present in material terms, was established in the year 1999 as an exclusive cluster for activities of R&D in Life Sciences comprising of dry- and wet-labs, incubation facilities, knowledge parks, special economic zones, and so on. Such places came about due to positive macroeconomic climate that promotes establishment of organizations at Hyderabad. Tax concessions, provisioning infrastructural facilities, and facilitation with federal and regulatory authorities are some of the incentives provided to advance establishments of enterprises.

The vision of the governments (state and federal) is to support activities of vaccine manufacturers by creating a nucleus of organizations at a location or place. Hyderabad's multitude of institutions include: manufacturing, educational, R&D, skill-based organizations. Notable organizations, among others, include: Centre for Cellular and Molecular Biology (CCMB), National Institute of Pharmaceutical Education and Research (NIPER), Indian Institute of Chemical Technology (IICT), Defence Research and Development Organisation (DRDO), Defence Research and Development Laboratory (DRDL), University of Hyderabad (UoH), Indian Institute of Technology, Hyderabad (IIT-H). Together, these organizations are an ecosystem that envisions "openness" to allow interactions among themselves, exchange

ideas and knowledge, build relations, and so on.

This brief idiographic account of place as a singular and bounded space shows that vaccine manufacturing thrives at Hyderabad. Further, this characterization of place reveals only partially as to why vaccine-entrepreneurs selected Hyderabad; and this conclusion is drawn by observing that though several places replicate the conditions and ecosystem of organizations, however attracting vaccine-entrepreneurs eluded such places. This may be because, for vaccine-entrepreneurs, Hyderabad (Place) evokes sense of place or place attachment, which is the second definition of place and is discussed next.

SENSE OF PLACE- HYDERABAD:

In previous section when place is defined as singular and bounded, the place itself is undertheorized and downplays properties of place that have emotional connect for people. The work of geographers such as Yi-Fu Tuan, D. Ley, Edward Soja, Entrikin, D. Gregory, N. Thrift, Edward Relph, David Harvey critique the idea of bounded places. Humanistic geographers signify local experiences and local attachments, or "sense of place."

Place is an emotional anchor for much of the human activities. Some locations are distinctive to us or to others, which is to say place has identity. In this section a spotlight is cast on how place is a pride and draw for people, irrespective of whether one has visited the place or not. A varying sense of place results from interpreting and giving meaningful attachments to specific areas- be it a neighborhood, village, city, country, and so on.

To better understand the role played by "sense of place" or place attachment in the development of vaccine manufacturing hub at Hyderabad, we examine "life stories" of the three entrepreneurs that established vaccine manufacturing companies at Hyderabad, namely, BE, BBIL and Shanta Biotech. The evidence suggests that all the three entrepreneurs hold advanced degrees in science (engineering to doctorate). They were inspired by episode(s) of personal experience to become a vaccine-entrepreneur. For example, in a one-on-one interview conducted in Telugu-language by a senior media journalist, the erstwhile owner of Shanta Biotech states that he was offended at the demeaning caricature of India and Indians by speakers at an international conference, and that none in the audience, including his compatriots, contested the assertion by speakers. A nationalistic fervor stemming from this episode spurred him and ultimately led to the establishment of Shantha Biotech, a pioneering Biotechnology company in Hyderabad. Shantha Biotech is presently owned by Sanofi Pasteur, a French multinational company. In fact, scientific-nationalism (science in the aid of India) accounts for the establishment of BE in the early 1950s, and three decades later of BBIL. The sense of place or love for the country is apparent when the founders and entrepreneurs of both BE and BBIL return to India on

obtaining their doctoral degree from Cambridge University, UK and University of Wisconsin-Madison, USA, respectively.

Notwithstanding motivation of the entrepreneurs, stories of the entrepreneur's attachment to the country is better grasped when the initiative is contextualized. The then prevailing context is put succinctly by Achin Vanaik (2015)-Indian state embarked, soon after independence from colonial role, in developing a "big vision" on India's future global role, which was accomplished by a nation-building vision that was grand and associated with "Big Science," Big Development, Big Projects, and Big Goals (pp.25). The swadeshi movement or self-sufficiency movement of that time is one of the reasons for establishing BE states Managing Director and owner of the BE. For Dr. Krishna Ella establishing BBIL is an aspiration- to make "international quality vaccines for the country but not at international prices." These instances are a reminder of Professor Shiv Visvanathan's (2016) observation- the history of science is in the history of nationalism of India. Thus far, the analyses reveal that "country" is the place attachment level, and evokes strong emotional reaction. Particularly, nationalism best captures the sense of place of vaccine-entrepreneurs.

The second finding in this strand of research is that cosmopolitanism of Hyderabad, and that the city is a node among network of places appeals to the vaccine-entrepreneurs. These two qualitative properties of Hyderabad strengthen our understanding on place attachment for the vaccine-entrepreneurs. Cosmopolitan Hyderabad is a process with a history spanning several centuries. According to Karen Isaken Leonard, "Hyderabad has always been a destination for migrants from both inside and outside South Asia, Hindus from the subcontinent, Persians from Iran, Turks and Uzbeks from Central Asia, and smaller increments of Arabs, Africans, Anglo-Indians, Frenchmen, Sikhs and Parsis" (Leonard, 2007). This connectivity to other places is present for over 400 years and is manifest in the city's cuisines, architecture, religious persuasions, and other walks of life. The messages Hyderabad conveys is: parochial but simultaneously allows outside influences; home-bound yet cosmopolitan in outlook. Hyderabad continues to offer material resources, practical and mundane, such as an affordable city and relatively low rental for stay, which appealed to Suchitra Ella of BBIL. For vaccine-entrepreneurs the latent and not so scuttle message is that -at Hyderabad, entrepreneurs can bring together professional expertise and the freedom to take risks. Others saw opportunities that can surmount challenges- be it organizational or the mindsets. The vaccine-entrepreneurs recall numerous obstacles in their journey to establish vaccine facilities. For example, unwillingness of graduates to work in private sector research and development because they believe their freedom to research will be curtailed. Similarly, commonly held perceptions include: low-cost equals to low quality, venture capitalists held a view that scientists cannot be good entrepreneurs, and

if it is not done in Western countries and Japan then it cannot be done in India. However, Hyderabad gives a sense of adventure- to try and risk, to fail and succeed. Perhaps what accounts for these developments at a place is what Karen I. Leonard (2007) states in conclusion of research on Hyderabad diaspora, which she finds similar to South Asians, that they attach "as much, if not greater, importance to the relationship between humans as an aspect of belonging and attachment rather than to fixed places, the ancestral village, or one's 'native place'"(pp.6). In sum, when examining people-place bonds we find place scales- country and city, together, reveal the strong place attachment of vaccine entrepreneurs. To arrive at this finding there was simultaneous attention on multiple place scales of place attachment. Usually, in examining place attachment, the focus of researchers is on one place scale only, and avoid comparison of attachments to different place scales (Lewicka, 2011).

Thus far, two definitions of place when considered independently provide partial explanation on the appeal of Hyderabad for vaccine-entrepreneurs. However, the two definitions of place cannot be mutually exclusive. This is apparent when one recognizes that to produce vaccine- an investment of several million dollars and efforts by very many organizations for about 10-20 years is required (Yadav, 2022). Therefore, places that are open to influence from outside- of ideas, knowledge and capital, fostering collaborative culture, and so on is better positioned to establish a facility to produce vaccines. It is the significance of influence from outside of the place or "extra-local" influence is the third definition of place- place as locale. Place in this definition is viewed as unbounded place. To this end, the dynamics between macro- or global level structures of "public health" and people's agency at places is addressed next.

UNBOUNDED PLACE-HYDERABAD:

The idea of vaccines arrived to India when vaccination for small pox was brought to Mumbai (Bombay then), India in 1892 from abroad because it offered "significant benefits" over inoculation. For example, chances of an infected person's death due to vaccination are relatively low or negligible when compared to inoculation (Lahariya, 2014). From Bombay, through human chain of vaccines, the smallpox vaccine as lymph was sent to Madras, Surat, Hyderabad and Pune (D. Wujastyk 2001 cited in Lahariya, 2014). Vaccination was advanced during colonial times to reduce mortality to various diseases, to limit medical-absenteeism, and to reduce costs to the authorities, especially by sending them for treatment as far as Paris. In the post-colonial period, Government of India prioritized a desire to eradicate diseases in India, which then brings in a role for the vaccines as they are a preventive measure of public health. Subsequently, private companies manufacturing vaccines were

established, starting in 1952 with Zydus Cadilla (ZC), BE in Hyderabad, Serum Institute of India (SII) at Pune and so on.

Our appraisal suggests that vaccine-entrepreneurs seek unbounded places to manufacture vaccines. This is because, firstly, production of vaccine is a complicated technology that requires high financial investments, besides time. Developing a vaccine is, metaphorically, a funnel-shaped endeavor because discovering a vaccine begins with numerous potential vaccines but with research whittles down to one candidate vaccine in a time-period of over a decade. The technology for developing human vaccine from concept to licensure is hard to reverse engineer. Unless places are open to accepting investments, knowledge, skills, collaboration, and other forms of relevant influences, manufacturing of vaccines is a tall order. Further, given the high risk in developing a vaccine, relying on a single funder, say the government, is fraught with high risk and a failure maybe catastrophic, which is the second reason for veering towards unbounded places to manufacture vaccines.

To address risk associated with development of vaccines, multiple institutions engage and bear the risk of vaccine development. For instance, initial stages of vaccine development are undertaken at research institutions and universities, and subsequent developments come about at the site(s) of manufacturers of vaccine. "Table.1" list vaccine manufacturers of Hyderabad (besides Cipla, ZC, Wockhardt, Haffkeine Institute, SII- all outside of Hyderabad) that have forged collaborations by 30th Aug. 2021 to produce vaccines for SARS-CoV-2 virus.

TABLE 1. VACCINES APPROVED FOR USE IN INDIA FOR SARS-CoV-2 VIRUS

S. No.	Name of the Company	Actual or Potential Collaborator(s)	Location of Production	Name of the Vaccine
1	BBIL	ICMR-National Institute of Virology	Hyderabad	COVAXIN
2	BBIL	Univ. of Wisconsin-Madison & FlueGen	Hyderabad	CoroFlu
3	BE	Baylor College of Medicine, Univ. of Houston & Dynavax Tech. Corp., USA	Hyderabad	
4	BE	Janssen Pharmaceutical NV, a unit of Johnson & Johnson	Hyderabad	
5	Dr.Reddy's Laboratories	Russian Direct Investment Fund (RFID) & Russian Sovereign Fund	Hyderabad	Sputnik V
6	Indian Immunologicals Limited	Institute of Medical Technologies, Chandigarh, & Indian Institute of Chemical Biology, Kolkata	Hyderabad	
7	Aurobindo Pharma	Covaxx, USA	Hyderabad	
8	Hetero Drugs	Russian Direct Investment Fund (RFID) & Russian Sovereign Fund	Hyderabad	Sputnik V

Hyderabad as an unbounded place is crucial to its development as vaccine manufacturing hub for SARS-CoV-2 virus. However, the evidence shows that the definition of bounded

places as well as place attachment is equally significant. In section below attention is shifted to this point, which is also the concluding section of this paper.

CONCLUSION - AN ASSERTION OF PLACE

Vaccine production at Hyderabad compels us to think of the City that is rich in networks of social relations that stretch over vast spaces. Equally, Hyderabad is an example that bypasses the notion of nested hierarchy of places (village, district, state, country) embedded within each other. At once, we are reminded of Agnew's definition of place as absolute location, and sense of place that seeks to capture peoples' attachments to locations with personal significance and signify affective attachment to a place. The findings of this research suggests that there are multiple meanings of Place and their synergistic understanding provides a better theorization of Place as well as allows to break the impasse of bounded, unbounded, and sense of place.

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