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ABOUT THE JOURNAL

The TAPMI Journal of Economics and Finance is an open-access, peer-reviewed journal from T A Pai Management Institute, Manipal, published biannually. The journal aspires to be a premier platform for fostering intellectual discourse in the fields of economics and finance, creating a dialogue between academicians, practitioners, policymakers, and students. The journal embodies the principles of Thought, Judgement, Economics, and Finance, serving as a cornerstone for generating impactful knowledge and insights.

The journal welcomes original contributions exploring diverse topics within economics and finance. In economics, the journal focuses on macroeconomic and microeconomic policies, behavioral research, and development economics, with a special emphasis on emerging markets and their interplay with geopolitics, trade, and global dynamics. In finance, it covers corporate finance, portfolio management, fintech, sustainable finance, and digital transformation while encouraging interdisciplinary research linking economics and finance to broader sectors like leadership, healthcare, and energy.

The journal examines the unique characteristics of financial systems in emerging markets, including instruments like microfinance and underdeveloped debt markets, and promotes comparative studies with developed economies on market efficiency, corporate governance, and adaptability. It also addresses future-critical issues such as global capital flows, energy trading, sustainability, and ESG integration.

It publishes original conceptual studies, empirical research, modeling analyses, case studies, and perspectives on emerging challenges, fostering engagement among academics, practitioners, and policymakers. By addressing critical topics and blending theoretical insights with practical applications, TAPMI Journal of Economics and Finance strives to bridge thought leadership with actionable knowledge, positioning itself as a trusted and influential journal in economics and finance.

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As the editorial board of the TAPMI Journal of Economics and Finance, we are pleased to introduce this issue's theme: **"Evolution of India's Industrial Mix:Tracking High Potential Sectors"** India's rapid and dynamic growth story is set to be accompanied by few key high potential sectors. Alongside the establishment of appropriate policy, investment, and innovation ecosystems, experts believe that these unique sectors hold inherent capability to amplify and support India's growth aspirations. Researchers were encouraged to explore areas like media & entertainment, prefab & modern construction, renewable energy, data center infrastructure, health-tech, and more.

We received a diverse range of submissions from institutions across the country, each offering unique insights into the theme. The selection process was rigorous, with many well-researched and thought-provoking papers in contention. After careful evaluation, we have chosen the top five articles that best capture the complexities of economic slowdowns and present compelling perspectives on potential solutions. These selected articles showcase strong analytical depth, originality, and relevance to current economic challenges.

We hope these contributions provide valuable insights into the intricacies of economic downturns and the strategies that can help economies navigate periods of uncertainty. We sincerely appreciate the efforts of all contributors and look forward to fostering more intellectual discussions in future editions.

Best regards,
The Editorial Board
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EVOLUTION OF INDIA'S INDUSTRIAL MIX: TRACKING HIGH POTENTIAL SECTORS

ARTICLE ONE

THE ORANGE ECONOMY: VALUING CREATIVITY AS ECONOMIC CAPITAL

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Background

The Orange Economy is the group of linked activities through which ideas are transformed into cultural goods and services whose value is determined by intellectual property. The orange universe includes: i) The Cultural Economy and the Creative industries which share the Conventional Cultural Industries; and ii) creativity supporting activities. This economic model was first developed by John Howkins in 2001 in his book "The Creative Economy: How People Make Money from Ideas." The phrase was later used in a 2013 Inter-American Development Bank handbook written by Ivan Duque Marquez and Felipe Buitrago Restrepo. They argue that every industry talks about the connection between culture and economy in their own ways. Sometimes, these definitions overlap leading to numerous terms such as cultural industries, creative industries, leisure industries, entertainment industries, cultural economy, creative economy, etc. Thus emerged the term orange economy providing a solution to this confusion. They chose the color orange after drawing influences from India, Egypt and Native America emphasizing that orange is associated with culture, creativity and identity.

Potential

The largest and most transformative business opportunities go to those who dare to innovate and adopt early. According to McKinsey Global Institute, there are 12 technologies, which have the capability to change the way we live completely, the way we do business and the global economy entirely. Out of the twelve, the most closely related to orange economy are Mobile Internet, Internet of Things, Cloud Technologies, Energy Storage, 3D Technology and Advanced Materials.

In order to inculcate the core of Orange Revolution, the idea lies to take the risk of early adoption of business models based on "mindfactures" and build an empire of the mind.

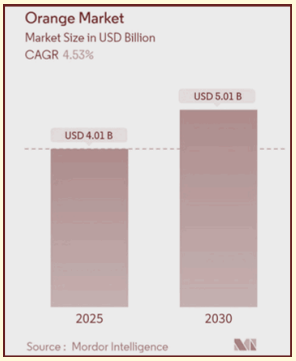

Fig 1: Orange Market Size (in USD Billion)
Source: Mordor Intelligence

Study Period	2019 - 2030
Base Year For Estimation	2024
Forecast Data Period	2025 - 2030
Historical Data Period	2019 - 2023
Market Size (2025)	USD 4.01 Billion
Market Size (2030)	USD 5.01 Billion
CAGR (2025 - 2030)	4.53 %

Table 1: Orange Market
Source: Mordor Intelligence

Mindfactures are goods and services like art, design, videogames, films, and crafts, which carry with them an intangible symbolic value that exceeds their use value. The question is not that whether, "India can produce mindfactures?" but "Can India build an opportunity that scales them globally like Korea did with K-Pop or Japan did with anime?" The short answer for now would be no, not fully yet. India does not compromise on young talent, cultural heritage or digital penetration but to scale them is what we actually need, investment in these industries, IP protection and business minded creators.

The Legal Infrastructure of Creativity

As we know, in traditional industries the resources used are land, machinery or capital. But in creative industries, the intangible assets such as creation of minds is applied. The core of the creative economy are creators, who generate and provide a variety of creative products. The Orange Economy primarily depends on the human brain and is made up of creative activities like culture, innovation, and knowledge. However, creativity in itself does not generate economic value unless it is legally recognized, protected, and enforceable. Institutions and public authorities have duties for putting in place the necessary framework to create and enforce uniform guidelines for the creative economy's operation. In this regard, intellectual property is essential to safeguarding the human ingenuity and innovation that propel society forward.

Conceptually, there are two primary categories of intellectual property: (i) copyright, which safeguards works of literature, art, music, theater, and video, and (ii) industrial property, which includes trademarks, patents, industrial designs, and geographical indications. The growth of the Orange Economy depends on both sectors, which are connected to the endeavors of innovators and entrepreneurs.

In industries including publishing, music, film, and the production of digital material, copyright transforms artistic expression into an exclusive, commercially viable property. It turns creative output into commercial activity by empowering creators to license, allocate, and profit from their creations. Creative works would continue to be susceptible to unauthorized copying in the absence of copyright protection, severely diminishing the motivation to produce. Trademarks also play a crucial part of the creations that emerge in the orange economy as trade mark law plays a crucial role in safeguarding a brand's name, logo, slogan, or any distinctive symbol that differentiates it from others. It safeguards creative output against illegal use, imitation, and counterfeiting. Producers may find it difficult to take action against infringers if they are not legally registered. Trademarks facilitate consumer trust, enable market differentiation, and allow creative enterprises to scale beyond individual works. Similar to this, design rights safeguard a product's aesthetic qualities, which are especially important in the visual arts, architecture, fashion, and product design. Design protection maintains competitiveness in creative markets by preserving visual originality, allowing innovators to profit from invention without fear of instant copying.

An Inter-American Development Bank (IDB) brochure titled "Emprender un Futuro Naranja" claims that 65% of creative entrepreneurs lacked copyright registration or intellectual property rights for their creations. These findings, which were drawn from a study of over 200 Orange Economy businesspeople and entrepreneurs, highlight the sector's biggest weakness. The reasons provided by most of these include lack of interest in the tools to provide protection for their intangible assets, not having them registered, lack of the registration process or financial issues.

Policy Challenges and Strategic Responses

India is home to over 100 million digital content creators, making it one of the largest creator ecosystems in the world — from vloggers and artists to gaming designers and storytellers. At the World Audio Visual and Entertainment Summit 2025, the Prime Minister emphasized India's growing contribution to the global creative economy by highlighting the idea of an "orange economy" that prioritizes intellectual property, innovation, and culture. The Boston Consulting Group (BCG) launched a new report called "From Content to Commerce: Mapping India's Creator Economy" at the same summit in Mumbai. The report showed that India's creators currently impact over $350 billion in consumer spending annually, with that amount predicted to rise to $1 trillion by 2030.

As India's creative economy grows, the country's digital landscape is changing dramatically. With a projected compound annual growth rate (CAGR) of 18%, India's creator economy is expected to grow from ₹19 billion in 2023 to ₹34 billion by 2026, according to Ernst & Young.

This term has come to the forefront as it was discussed in the Union Budget 2026-2027 by the Indian Finance Minister Nirmala Sitharaman. By 2030, the AVGC industry is expected to need about 2 million workers, demonstrating the breadth of opportunities in creative fields. Supporting the establishment of animation, visual effects, gaming, and comics (AVGC) and content creator labs at the Indian Institute of Creative Technologies (IICT), Mumbai, is a major proposal. These labs will be set up in 500 institutions and 15,000 secondary schools around the country. The goal is to prepare pupils for new career choices by introducing them to digital and creative abilities early on. The Economic Survey also noted that India's media and entertainment (M&E) sector has emerged as a major pillar of the services economy, covering audio-visual production, broadcasting, digital content, animation, gaming, advertising and live entertainment. The industry has seen a significant movement in the last ten years toward digital and platform-based delivery, which has changed value chains, employment, and revenue structures. Growth is fueled by expanding OTT, internet penetration, rising incomes, and AI-led innovation, with an estimated ₹2.5 trillion in 2024.

Economic Significance

Each year, the Orange Economy, which includes the cultural and creative industries (CCIs) like fashion, music, cinema, and technology creating 50 million jobs and brings in $4.3 trillion in revenue. To put this into perspective if Orange Economy would be a county in itself, it would be larger than most nations and competitive with major industrialized economies of China and USA. Moreover, the exports of creative services reached $1.4 trillion and creative goods exports reached $713 billion in recent years.

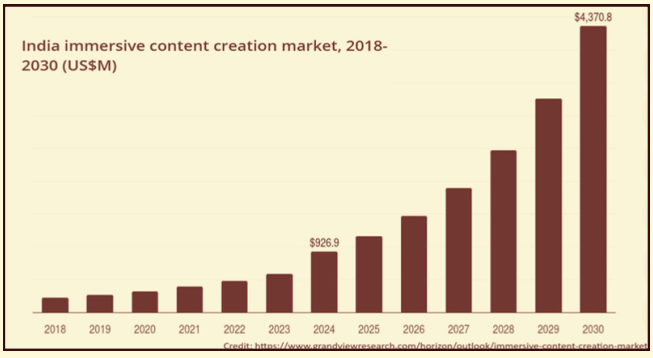

Fig 2: India's Immersive Content Creation Market (in USD Million)
Source: GrandView Research

South Korea under the leadership of the Ministry of Culture, Sports and Tourism heavily invested in K-Pop, K-Drama, gaming, and film production. Every year, Hallyu exports surpass $12 billion and BTS adds around $5 billion to the GDP. One of the top five worldwide gaming markets is Korea. The UK implemented cluster development and tax incentives through programs like the Creative Industries Sector Deal which contributed towards £125 billion in GDP, 2.3 million jobs and becoming Europe's largest exporter of creative services. Japan introduced Cool Japan Strategy to solve its stagnation problem with key focus areas: Anime, Manga, Gaming and Fashion. At present Anime industry is valued at $20 billion.

Talking of India, at present India's creative industry size of $30 Billion with an employment share of 8% India's working population. India has by far a rich cultural heritage, a large population of youth, rapid digital penetration and demand for customized niche Indian content in local languages. In light of this, Union Budget included various announcements:

- Establishment of AVGC Content Creator Labs in 15,000 schools and 500 colleges.
- Announcement of a new National Institute of Design in the eastern region.
- Support to the Indian Institute of Creative Technologies Mumbai.

India needs skills like design and graphics, AR & VR effects, digital promotion, streaming, fan engagement etc., these skills are no longer left niche but a serious job corner for our youth. By 2030, it is projected that the sector will require approximately 2 million professionals, including artists, animators, designers, editors, storytellers, and technology experts. We need to train our people early to move up from the nascent stage and cater to the future demand.

Challenges

Before the pandemic the creative economy was at a boom and it was predicted to account up to 10 per cent of Global GDP by 2030. However, the crisis somewhat contributed to its halt, exposing the sector's dependence over structural dependence on physical mobility, live events, tourism, and in-person cultural consumption.Before the pandemic the creative economy was at a boom and it was predicted to account up to 10 per cent of Global GDP by 2030. However, the crisis somewhat contributed to its halt, exposing the sector's dependence over structural dependence on physical mobility, live events, tourism, and in-person cultural consumption.

However, this is not the major threat that poses a direct challenge towards the Orange Economy. Everyone in this world has their money, talent and assets rewarded and protected. In the same way artists deserve protection for their ideas, music, films, designs, code, writing etc. Orange Economy clearly says in bold words that "Culture is Not Free". Culture is the economic livelihood and their economic value to the society. The more we are exposed digitally the easier it gets to copy and people start to assume if copying costs nothing it must be free but actually it's the opposite. If a thief steals some tangible asset he directly sees the victim as compared to when someone pirate a song they don't see the musician and the production team behind it which radically decreases the guilt. For many, culture is free and should be open for anyone but how do we ensure justified incentives in all this? The core economic challenge is creative goods have high fixed cost of production but due to copying it has nil marginal cost which stops the creator from recovering fixed costs and if creators can't earn they simply stop creating that's the sustainability crisis of the Orange Economy.

In many economies especially in developing countries copyright laws are weak, piracy rates are very high and legal action is long and expensive. This discourages investment in industry. We all think art is free and so is knowledge but the issue is how do we ensure access without killing incentives since Culture Is Not Free.

Conclusion

Just as land and capital, Orange Economy has become a core productive source. It represents far more than just art and entertainment including ideas driven by culture and identity and bring them to a worldwide scale. India with its vast young population and deep cultural heritage works as a foundation for scaling mindfactures globally. India must strengthen intellectual property protection and encourage business-oriented creators. With the recent budget it's evident that our government is also looking at this sector with future prospects and a strong government support can help India to move forward and secure a defining position.

The biggest challenge remains the sustainability of creative production in the digital age. The principle of "Culture is Not Free" is about ensuring reward, visibility, economic help and long-term innovation. Without proper protection and monetization mechanism, creators will always struggle for the economic viability of their skills and the entire ecosystem becomes fragile.

Protecting the culture is not about restricting its access but making a just mechanism for all the creators. The future of Orange Economy depends upon accessibility and incentive. If we can protect our creators while expanding global reach, invest in skills and infrastructure while treating it as a valuable capital rather than free consumption, we can actually build not just a creative economy but creative superpower empowering millions of people. For India it's not whether we can produce it or not but are we willing to accept and value it.

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ARTICLE TWO

PREFAB & MODERN CONSTRUCTION: REIMAGINING INDIA'S URBAN FUTURE THROUGH INDUSTRIALIZED BUILDING SYSTEMS

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The ongoing rapid urbanization in India has created a high demand for housing, transportation, logistics, health care, and commercial buildings. Traditional construction methods (which are fragmented, labour-intensive, and take a long time) have not been able to keep up with the rapidly increasing demand for these services. Consequently, the use of prefabrication and modern construction methods are believed to be poised for tremendous growth potential within India's construction industry.

The housing sector illustrates this point very well. According to the Ministry of Housing and Urban Affairs (MoHUA, 2024), over 1.2 Crore homes have been approved under the Pradhan Mantri Awas Yojana Urban (PMAY-U) program, with a target completion date of FY 2024-25; however, there remains a long way to go before the needs of the economically weaker sections of society are met through the development of adequate housing. Time and cost overruns remain a problem for traditional projects. The Building Materials and Technology Promotion Council (BMTPC,2025), in a review of their Technology Sub-Mission, found prefabricated construction technologies have resulted in faster completion of projects by 30-40 percent, as seen in pilot projects under the Global Housing Technology Challenge. The time saved directly equates to reduced interest costs.

From the macroeconomic perspective, the construction industry contributes significantly to the Indian economy. According to Invest India (2024), the construction industry contributes approximately USD 700 billion to the economy, making up 9% of the GDP, and provides employment for over 70 million workers. However, the productivity of the construction industry is low. According to a research-focused report created by academics at the Indian Institute of Technology Madras (2024), the Indian construction industry continues to demonstrate productivity levels 20-30% below global competitiveness; the cause is largely attributed to poor project coordination within the built environment. Many of these problems can be alleviated through various aspects of pre-fabrication using factory production.

Positive policy momentum was generated through 2024-26 to enhance growth expectations within the construction industry. On June 30, 2024, the Government of India sustained its capital investment budgeted allocation (₹11 Million crores) at a rate of approximately 3.4% of India's GDP in an effort to maintain and enhance construction sector growth opportunities. This sustained investment in infrastructure, as part of the *National Infrastructure Pipeline (NIP)*, provides a visibility of demand for faster and repeatable construction execution models. Expansions of metro rail networks, logistics hubs under PM Gati Shakti, and industrial corridors are increasingly adopting precast components to deliver projects quickly. Parliamentary submissions by the Ministry of Railways in 2025 have recognized precast segmental construction to have substantially accelerated the execution of viaduct and station works for urban metro projects.

Investment in the private sector also follows the same pattern. In its annual report for 2025, Larsen & Toubro (2025) states that the use of precast yards is increasing for metro and housing projects to improve efficiency and quality. Another company, Tata Projects (2025), has reported an increase in the use of modular construction for industrial and data centre projects. Companies like KEF Infra claim that the use of factory-built healthcare and institutional buildings can reduce project times by as much as 50% while improving the consistency of quality (KEF Infra, 2024). These examples show that the use of prefabricated buildings is moving beyond the experimental stage to the mainstream.

In addition, sustainability adds to the strength of the argument for this sector on economic grounds. The International Energy Agency (2024) states that nearly one-third of global energy use and greenhouse gas emissions occur from buildings and the construction industry and that material use is increasing, especially in developing countries like India. Prefabrication helps reduce site waste (up to 20%) and optimize how much material is used (using improved manufacturing processes). As India works towards achieving Net Zero by 2070, lifecycle efficiency in construction is no longer a secondary concern.

The cost competitiveness, which is a point of debate, is revealed when lifecycle economics are factored in. CRISIL (2025) states, "In large housing or infrastructure projects of over 500 units, prefabrication could help save up to 8-12 percent in project costs, including the benefits of shorter project completion and lower financing costs." In high interest rates, even a three to six months' reduction in project completion time adds substantially to the internal rate of return (IRR). In addition, labour market fluctuations, particularly after the pandemic, have seen a migration of labour, making a factory-driven approach to building more predictable, according to CRISIL (2025).

The introduction of technology distinguishes the 2024-26 period from earlier attempts at the implementation of the prefab concept. According to McKinsey & Company (2025), digital technologies, such as Building Information Modelling, combined with modular construction, could help increase productivity by 50 to 60 percent in capital projects in the Asian sub-continent. Indian construction companies are gradually introducing Building Information Modelling in conjunction with the production of precast construction, enabling the synchronization of the entire process, shifting from the cost perspective to the productivity perspective in the development of infrastructure in the country.

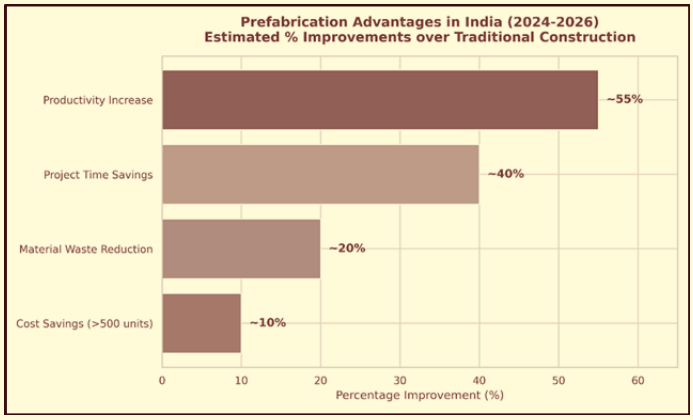

Fig 1: Visualizing the core advantages of prefabrication and modern construction methods in India

The growth in industrial real estate adds strength to the argument that the demand for prefabricated construction in the country is on the rise. According to DPIIT (2025), industrial and logistics real estate absorption exceeded 45 million square feet during FY 2024-25 due to increased demand for e-commerce and the growth of the PLI Scheme for manufacturing clusters, particularly in India. The benefits from time-to-market are greater than the cost savings from the construction of precast modular steel buildings and their use as warehouses.

However, structural impediments still exist. Academic studies done by Indian Institute of Management, Ahmedabad (2024), in their case studies, have pointed out resistances in the ecosystems of contractors who have been following traditional ways of construction. The capital cost of establishing precast plants, logistics of transporting heavy components, and general awareness of smaller contractors are some of the factors hindering the adoption of prefabricated construction. The financial model also needs to be adapted so that funds can be made available for factory infrastructure through long-term credit, possibly under a green finance model.

Another important aspect of skill transformation is also a vital dimension. The National Skill Development Corporation (2025) predicts a huge demand for skilled manpower in the Indian construction sector, estimated at over 45 million by 2030. The demand for technicians in prefabricated construction, robotics, and building information modelling will only increase. However, rather than increasing unemployment, prefabricated construction will only change the nature of employment from low-skilled, unorganized sectors of construction to higher-skilled, organized sectors of manufacturing, which is in sync with Indian Government's overall strategy of industrialization.

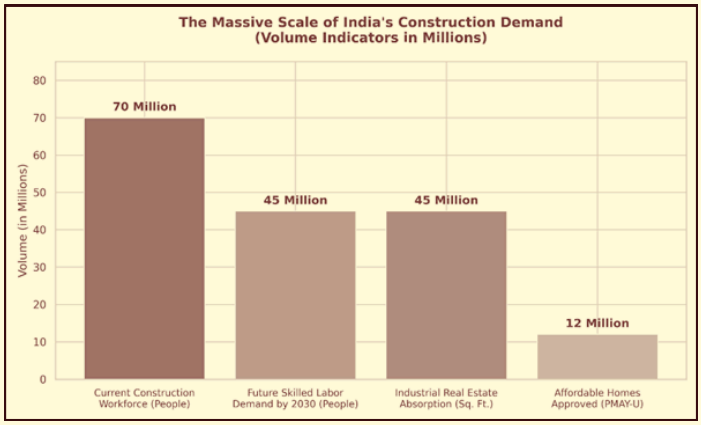

Fig 2: Visualising the massive macro-economic scale of the Indian construction industry and the volume of demand that is driving the shift towards prefabrication

From a strategic point of view, prefab construction places India in a much stronger position to compete. As India grows and develops, driven by its "Make in India" and related growth strategies, its capabilities in industrialized systems of construction have the potential to become a new export-oriented industry. Export markets for factory-built healthcare facilities, disaster-resistant housing, and educational buildings have the potential to be exported to other emerging markets, who face similar issues and growth challenges.

In conclusion, it is evident that the subject of prefabrication and modern construction is not a matter of incremental innovation; rather, it is a matter of structural industrial change. With its ongoing capital expenditure drive (Government of India, 2024), housing market growth (MoHUA, 2024), productivity drive (IIT Madras, 2024), sustainability drivers (IEA, 2024), and growth of the private sector (Larsen & Toubro, 2025), prefab construction is poised to become a new foundational pillar of India's changing industrial landscape between 2024 and 2026, and beyond, if innovation in finance, skills, and standardization is adequately addressed.

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ARTICLE THREE

MILLETS AND MAKHANA INDUSTRY: INDIA'S TRADITIONAL SUPERFOODS AS EMERGING GROWTH ENGINES

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Abstract

Over the last three decades, millets and makhana (fox nut) have gradually re-emerged as economically relevant commodities within India's agricultural system. Once marginalised by policy frameworks that prioritised irrigated rice and wheat, these traditional crops are now increasingly positioned as nutri-cereals and premium health foods. Their renewed relevance extends beyond agriculture into food processing, trade, rural industrialisation, and sustainability-oriented growth strategies.
This article examines the evolution of India's millet and makhana sectors from the 1990s to the present, focusing on policy interventions, production and productivity trends, market demand, trade performance, investment patterns, and institutional development. Using secondary data from government publications, trade databases, and industry reports, the study notes that India produced approximately 18 million tonnes of millets in 2024–25, accounting for nearly 38 percent of global output. During the same period, makhana production is estimated at around 60,000–63,000 tonnes, with India supplying close to 85–90 percent of global demand.

Despite this production dominance, millet exports remain limited, accounting for less than one percent of total output. In contrast, makhana exports expanded rapidly between 2020 and 2024. The paper argues that these divergent outcomes reflect differences in value-chain organisation, processing intensity, market positioning, and institutional coordination. It concludes that millets and makhana represent two complementary pathways of agriculture-led industrialisation in India, though realising their full potential will require sustained demand creation, productivity India's development strategy has long been shaped by a conceptual distinction between agriculture and industry. Agriculture has traditionally been viewed as a sector responsible for food security and rural livelihoods, while industry has been regarded as the primary engine of productivity growth, capital accumulation, and structural transformation. This separation has influenced policy priorities, public investment, and institutional design for several decades

Introduction

India's development strategy has long been shaped by a conceptual distinction between agriculture and industry. Agriculture has traditionally been viewed as a sector responsible for food security and rural livelihoods, while industry has been regarded as the primary engine of productivity growth, capital accumulation, and structural transformation. This separation has influenced policy priorities, public investment, and institutional design for several decades.
However, this dichotomy tends to obscure the potential of agriculture to function as a direct contributor to industrial growth when it is embedded within value-added processing, logistics, branding, and trade networks. In labor-abundant economies such as India, agriculture-based industries offer a structurally appropriate pathway for inclusive growth. These industries typically operate at lower capital intensity, generate employment at scale, and support decentralized production systems that integrate rural areas into wider economic networks.

Within this broader context, millets and makhana provide instructive examples of agriculture-led industrialization. Millets—including sorghum, pearl millet, finger millet, and several small millets—were historically central to Indian diets and farming systems. Their decline during the Green Revolution period was not driven by agronomic inferiority but by policy choices that strongly favored irrigated cereals through procurement systems, research priorities, and input subsidies.

Makhana, an aquatic crop cultivated primarily in the wetland ecosystems of Bihar, remained geographically confined and technologically stagnant for decades despite its recognized nutritional value.

In recent years, rising concerns related to nutrition, climate change, water stress, and sustainable food systems have renewed interest in both commodities. Government policy initiatives, private entrepreneurship, and global health-food trends have together contributed to their repositioning as superfoods with growing industrial relevance. This paper analyses these developments through an economic lens, situating millets and makhana within India's evolving industrial mix.

Structural Advantages in the Indian Context

Agriculture-led industrialisation refers to the process through which agricultural outputs are transformed into higher-value goods through processing, packaging, branding, and distribution. Unlike traditional industrialisation models that rely heavily on large-scale manufacturing, this approach is particularly relevant for economies characterised by surplus labour, fragmented landholdings, and uneven regional development.

From an industrial economics perspective, high-potential sectors are typically identified by their ability to generate sustained growth through scalable production, strong backward and forward linkages, and integration with domestic and global markets. Agri-processing sectors increasingly meet these criteria, particularly in developing economies where agriculture continues to employ a significant share of the workforce.

Millets and makhana represent two distinct agri-industrial pathways. Millets follow a scale-oriented pathway, supported by large production volumes and suitability for diverse processing applications such as flour, flakes, beverages, and ready-to-eat foods. Makhana follows a niche-oriented pathway, characterised by limited production geography but high unit value and strong branding potential. Examining these two crops together allows for a comparative understanding of how different agri-industrial models operate within the same macroeconomic and policy environment.

Structural Advantages in the Indian Context

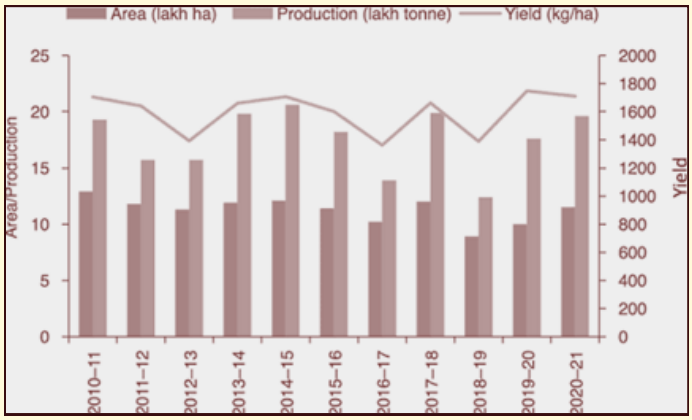
India's factor endowments provide a favourable environment for agriculture-linked industrial development. The country combines a large and relatively low-cost labour force, diverse agro-climatic zones, and an extensive network of micro, small, and medium enterprises (MSMEs). These characteristics support labour-intensive processing activities and decentralised production systems.

Millets are particularly compatible with India's rain-fed regions. They require lower water inputs and fewer chemical inputs than rice and wheat, making them suitable for semi-arid and drought-prone areas where irrigation infrastructure is limited. Makhana cultivation, concentrated in wetland ecosystems, is inherently labour-intensive and often integrated with fisheries, allowing for efficient use of local resources.

From an environmental perspective, millets' low carbon footprint and makhana's ecological compatibility further strengthen India's comparative advantage in these sectors. These characteristics align well with emerging sustainability and climate-resilience objectives at both national and global levels.

Policy Evolution and Government Interventions

India is the world's largest producer of millets, accounting for nearly 38 percent of global output. Production reached approximately 18 million tonnes in 2024–25, reflecting moderate growth following renewed policy attention after 2018. Average yields have stabilised at around 1.3–1.5 tonnes per hectare, supported by improved hybrids and agronomic practices. Nevertheless, millet productivity remains significantly lower than that of rice and wheat, indicating substantial scope for improvement through research and mechanisation.



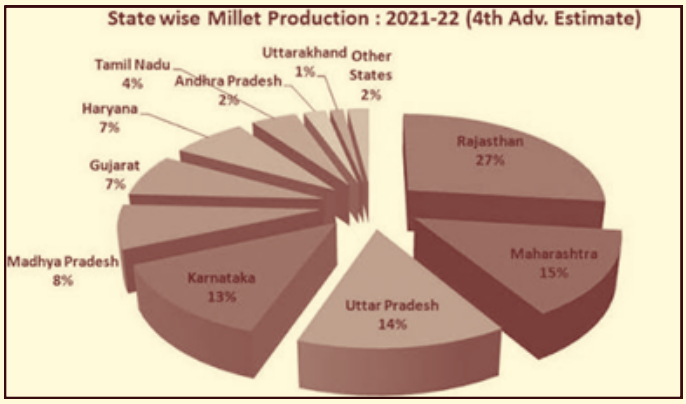
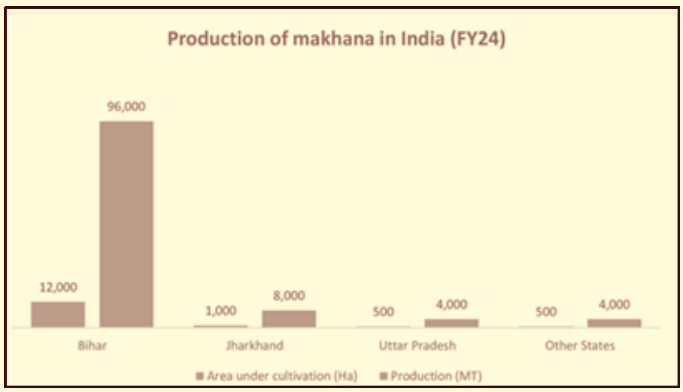


Fig 1: Trend in millet production in India, 2010–2025.

Production is geographically concentrated, with Rajasthan contributing close to 30 percent of national output, followed by Maharashtra and Karnataka. While this concentration allows for region-specific interventions, it also increases vulnerability to climatic shocks.

Makhana production presents a contrasting structure. Output is highly concentrated in Bihar, which accounts for nearly 90 percent of national production. Total output is estimated at 60,000–63,000 tonnes in 2024, nearly double the levels recorded in 2020.



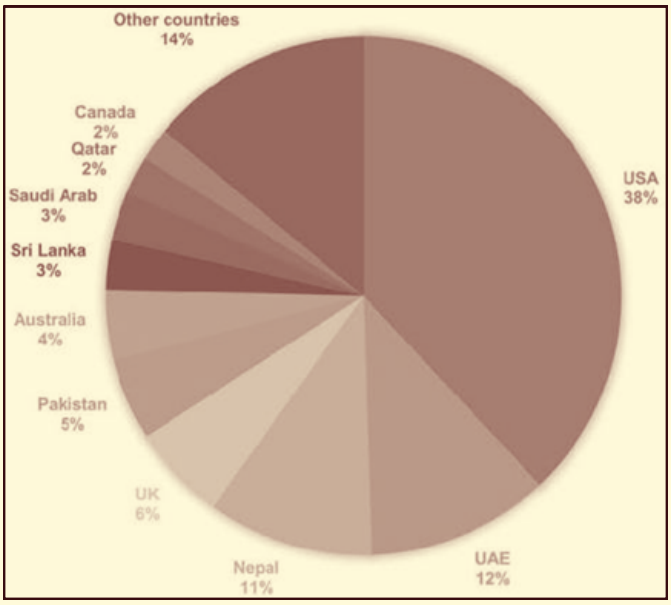


Fig 2: Growth in makhana production and exports from India.

Market Demand and Consumption Patterns

Domestic demand for millets remains modest relative to rice and wheat, particularly in urban areas where dietary habits are deeply entrenched. Per capita millet consumption has increased gradually over the past decade, reflecting slow but positive dietary diversification.

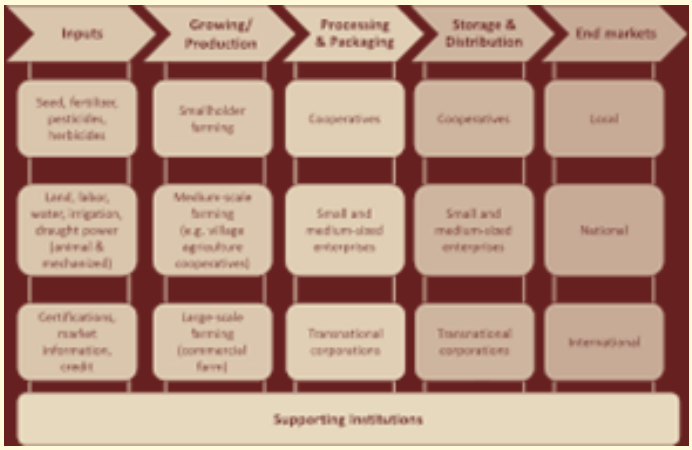
Urban demand is driven primarily by health-conscious consumers and supported by the growth of ready-to-eat and ready-to-cook millet products. However, higher prices per calorie and unfamiliar cooking practices continue to limit widespread adoption.

Makhana demand has expanded more rapidly. Its positioning as a premium, low-fat, high-protein snack has resonated strongly with urban consumers. International demand has also grown, particularly in developed markets, supported by effective branding and the superfood narrative.

Value-Chain Structure and Processing Economics

Differences in value-chain organisation help explain the divergent trajectories of millets and makhana. A large share of millet output continues to be sold as raw grain, limiting value capture. Processing remains fragmented, with many small units lacking scale, technology, and branding capacity.

Makhana's value chain, though historically informal, has evolved toward higher value capture through grading, packaging, and branding. Processing costs are higher, but margins are also significantly higher, particularly in export markets.



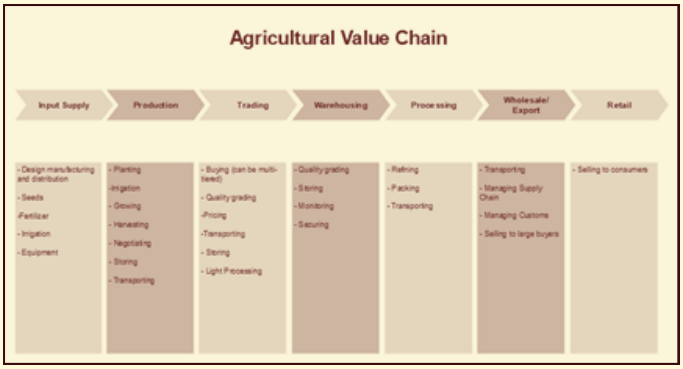
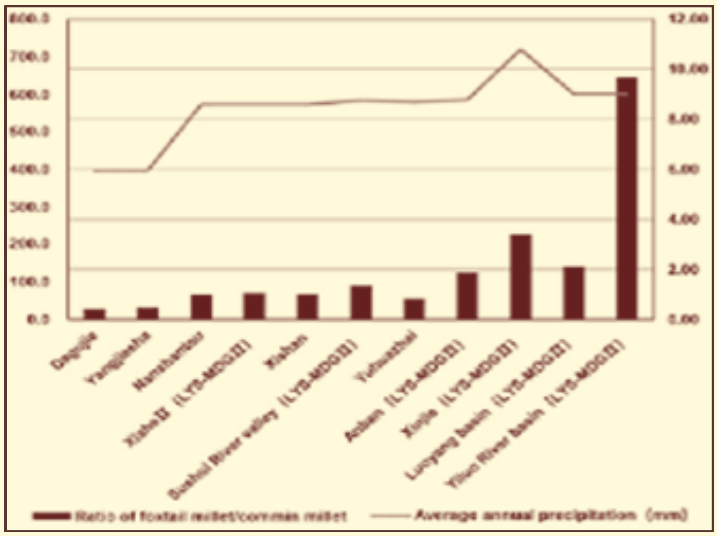


Fig 3: Conceptual framework of agriculture-led industrialization.

Trade Performance

Despite India's production dominance, millet exports remain limited. In 2024–25, exports accounted for less than one percent of total output. Non-tariff barriers, quality standards, and inconsistent supply constrain access to high-value markets.

Makhana exports present a contrasting picture. Exports increased from approximately 6,700 tonnes in 2020 to over 25,000 tonnes in 2024.



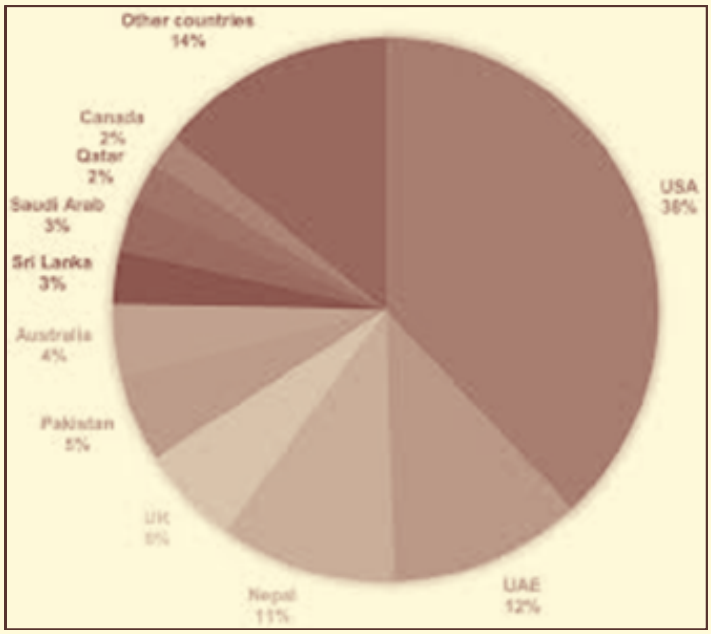


Fig 4: Comparison of export performance of millets and makhana.

Investment Patterns and Financial Flows

Public investment remains the dominant source of funding in both sectors. Private investment is emerging, particularly in millet-based startups and branded makhana products, but remains limited in scale. Long-term growth will depend on improved access to credit, risk mitigation mechanisms, and market certainty.

Institutional Economics and Coordination

From an institutional economics perspective, the National Makhana Board addresses coordination failures that have historically constrained the sector. By centralising research, standard-setting, and export promotion, the Board reduces transaction costs and improves information flows.

Policy Implications

The analysis highlights several policy priorities: stronger demand-pull mechanisms, productivity enhancement, quality standardisation, and cluster-based processing ecosystems.

Limitations

This study relies on secondary data, which may vary across sources. Production estimates for makhana remain approximate due to limited systematic data collection.

Conclusion

Millets and makhana illustrate two complementary pathways of agriculture-led industrialisation in India. With sustained policy support and private investment, these traditional crops can become durable pillars of modern industrial growth.

HONORARY MENTION-1

THE GREAT REBALANCING: CAPITAL, POLICY, AND THE CONVERGENCE OF INDIA'S HIGH-POTENTIAL INDUSTRIAL MIX

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Abstract

India is experiencing a structural shift in its economy with strong consumption-based service economy shifting to capital-high, technology-based industrial giant. The thesis of this paper is that the intersection of digital infrastructure and renewable energy and high-tech manufacturing forms a non-linear growth multiplier, unlike the linear growth of the post-1991 period. Through a study of synergistic externalities of sovereign incentive (PLI, Gati Shakti) and natural capital allocation, we show that this "Industrial Mix 2.0" will have better risk-adjusted returns than traditional sectors. Based on the analysis, the feasibility of such a transition lies in the effectiveness with which domestic savings can be recycles into fixed asset production and how sovereign balance sheets can be strategically used to de-risk deep-tech innovations. The paper assumes that the fiscal multipliers within these converging sectors are bound to be higher than 2.5x within the next ten years.

Introduction

The Indian economic rise has historically been discussed in terms of the labour arbitrage model that was developed after the liberalisation reform initiated in 1991. The services industry with IT and ITeS as its centre was the main source of foreign exchange accruals and jobs creation over the last 30 years (RBI, 2024). Yet, that dependence on services alone brings about an imbalance of structure; it breeds a risk of a middle-income trap in which the rise in wages is not matched by an equal rise in the total factor productivity (TFP) in the economy in general. We are observing the first we have to call "Industrial Mix 2.0," a paradigm shift that is neither cheap labour nor driven, but the merging of the sovereign with high-velocity capital.

This rebalancing is not just the increase in the manufacturing capacity but the qualitative jump towards the tech-infused industrial assets. The distinction is critical. The old model of manufacturing is based on linear scale; the new model of Industrial Mix 2.0, network effects, and integration of technology. The elective introduction of Production Linked Incentive (PLI) schemes in 14 sectors in addition to the promised logistical integration through PM Gati Shakti, has helped to successfully reduce asymmetric information and implementation risks that plagued Indian infrastructure projects in the past (Ministry of Commerce & Industry, 2023).

This argument is that the consistency of policy has led to a lower risk premium on Indian industrial assets. As a result, we would see a shift of capital out of consumption-based industries (FMCG, pure-play retail) into Gross Fixed Capital Formation (GFCF) in high tech industries. In this paper, we are going to discuss three areas where this convergence is at its sharpest, and which will generate fiscal multipliers that will warrant the aggressive valuation premiums that we are witnessing today in the private markets.

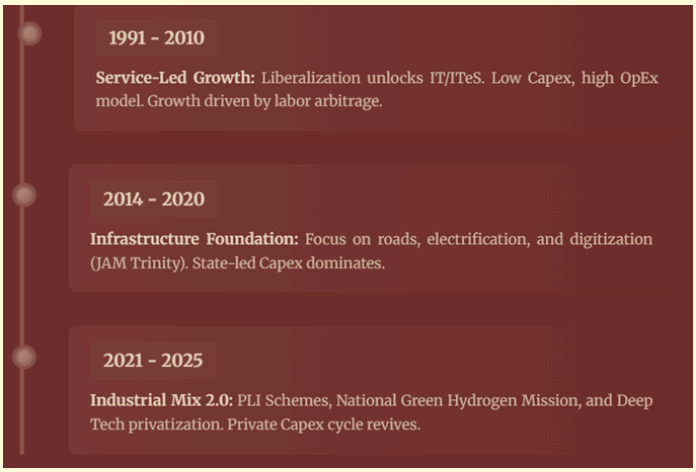

Fig 1: Evolution of India's Economic Growth drivers

Sector A: Digital Infrastructure & The Physics of Data:

The physical presence of the digital economy is the first pillar of the Great Rebalancing. Software needs very little physical capital, but the AI-enhanced economy of 2025 is insatiable in terms of physical infrastructure: data centres, fibre optics, edge computing nodes. This industry is the internet industrialization.

India is experiencing decoupling between the economics of hyperscale data centres and the overall real estate dynamics. We are seeing the introduction of REIT-like platforms specifically in digital assets, and the yield compression in mature utility assets. The rationale is simple, data localization requirements (Digital Personal Data Protection Act, 2023) force the storage to be local, whereas the spread of Generative AI raises the number of computations per user.

But the limitation is no longer bandwidth- it is power. This makes Sector B (Energy) directly dependent. A 100MW data centre campus is basically a massive power consumer in the industry. Investors will find this chain of thought critically: the ownership of the digital infrastructure will give them a call option with the use of AI, but it will be hedged with utility-like cash flows of the long-term leases with hyperscale (Microsoft, AWS, Google).

Sector B: The Green Molecule & Sovereign Energy Assets

The shift to renewable energy (RE) in India is commonly discussed in the context of the environmental lens, though in the context of a macroeconomic strategy, it is a balance of payments (BoP) hedge. The National Green Hydrogen Mission is not a climate policy, but an industrial one, aimed at replacing imported natural gas with green molecules produced domestically.

The production capacity in this industry has grown at a fast rate. We are getting out of assembly of solar modules to cells, and fabrication of electrolyzers. This intensity of capital is very high, but it has reduced the cost of capital of green projects in a structural way, as ESG-mandated sovereign wealth funds (SWFs) and pension funds have moved in (Canadian Pension Plan Investment Board, 2024).

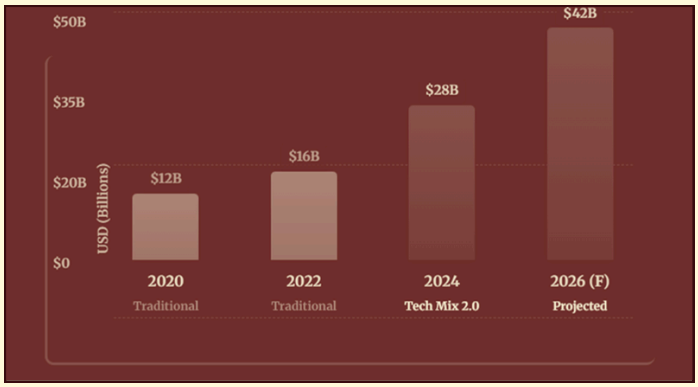

Fig 2: Private Capex Acceleration in New Energy & Advanced Manufacturing (in USD Billion)

Moreover, Green Hydrogen can also be used as an asset in hard-to-abate industries such as steel and cement. The intersection is apparent: Green Hydrogen decreases Opex with renewable energy, and in turn, decarbonizes heavy industry (Sector C). This circularity generates synergistic externalities where subsidies in one area (RE PLI) reduce the cost base of another (Green Steel) thus enhancing the competitiveness of the Indian exports in an aggregate sense in a carbon-taxed global regime (e.g., CBAM in the EU).

Sector C: Space, Defence, and the Privatization of Deep Tech

In the Space and Defence fields, perhaps the greatest change has been the shift away by the state monopoly towards an ecosystem dominated by the private sector. The introduction of the IN-SPACe and liberalization of FDI standards in the space industry (2024) have triggered a new asset market.

The economic rationale behind this is in terms of spillover effects. High-level manufacturing of space launch vehicles (LVs) and satellites needs precision engineering which raises the level of the entire MSME supply chain. As vendors become eligible to provide components to ISRO Chandrayaan or commercial LVs such as Skyroot, their quality assurance procedures enhance, and they can be utilized in global aerospace supply chains (Boeing, Airbus).

This generates high skill employment spillover. In contrast to IT services where computer engineers are used, this industry assimilates mechanical, chemical and aerospace engineers, expanding the pool of the high-income population. Multiplier Effect of defence manufacturing is historically larger than services since it requires heavy spending on R&D, which is converted into intellectual property (IP) capital of a nation.

Fig 3: The Convergence Multiplier

Financial Analysis: Funding the Transition

It is estimated that the capital necessary to accomplish this "Great Rebalancing" is 2.1 trillion in the coming decade (NIPFP, 2025). The combination of financing is changing at a very high rate. What we are witnessing is the movement of the capital stack being more diverse and not just bank-led project finance.

Sovereign Capital as a Catalyst: The National Investment and Infrastructure Fund (NIIF) serve as an anchor investor, alleviating the apparent risk among foreign limited partners (LPs). Through absorbing the first loss or equity risk in green field projects, sovereign capital crowds in the private investment as opposed to crowding out private investment.

The Role of Private Credit and InvITs: Infrastructure Investment Trusts (InvITs) have become the favourite way of monetizing operating assets because banks are subject to sectoral exposure limits. This capital recycling, through which developers create assets and stabilize cash flows before selling them to InvITs, accelerates money circulation within the infrastructure ecosystem.

Financial Metric	Traditional Infrastructure	Industrial Mix 2.0 (Tech/ Green)	Advantage
Cost of Debt	8.5% - 9.5%	7.5% - 8.5% Green Bonds Benefit	↓ 100 bps
Equity IRR Target	12% - 14%	16% - 18% Tech Premium	↑ 400 bps
Payback Period	12-15 Years	7-10 Years Tech Efficiency	↓ 40%
Govt. Incentive Impact	Low VGF Only	High PLI + Tax Breaks	3-5x Higher
Financial Metric	Traditional Infrastructure	Industrial Mix 2.0 (Tech/ Green)	Advantage

Table 1: Comparative Financing Metrics (2025 Estimates)
Source: NIPFP Analysis, 2025 | bps = basis points

Moreover, we are witnessing the emergence of OTT Financing structures, in which capital would not go through a traditional intermediary and flows instead directly between massive asset managers (BlackRock, Brookfield) onto corporate balance sheets in the form of decarbonization and automation Capex.

In the end, digital convergence with energy and space provides an avenue to the long-term growth of 7-8% GDP. This is not growth through volume, but growth through value addition, a structural redevelopment that puts India at the position of a sovereign industrial pole in the multipolar world economy.

Conclusion and Policy Imperatives

The so-called Industrial Mix 2.0 is not a speculative opinion; it is an empirical fact that can be observed in the order books of capital goods firms and the FDI inflows in non-service industries. India is successfully playing a pincer movement against development: playing on its existing dominance in services funding the Capex needed to modernize industry.

In order to make Viksit Bharat 2047 a reality, policy-makers ought to make certain that the regulatory friction on this convergence is minimal. The most pressing policy suggestion is further expansion of the corporate bond market so that low-rated (yet high growth) industrial actors can secure long-term debt. Also, the tax credit on R&D needs to be detached of simple profitability and associated with patent applications and technology uptake, to reward the D in R&D.

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HONORARY MENTION-2

EVOLUTION OF INDIA'S INDUSTRIAL MIX: TRACKING HIGH POTENTIAL SECTORS

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Abstract

India is on a huge crossroads in its economic history. It is trying to make a structural change that goes against traditional development economics. Traditionally, India has followed a "service-led" growth model, which differs from the agrarian-to-industrial path taken by the Asian Tigers. Now, the country is shifting toward a "Dual-Track" economy. This article examines the changes in India's industrial mix using Shift-Share Analysis, Revealed Comparative Advantage (RCA) indices, and Economic Complexity metrics. These tools help map the move from labor-arbitrage to value-arbitrage. We identify a "New Industrial Stack" that includes Green Hydrogen, Precision Manufacturing in Defense and Electronics, and the "Headquarters Economy" with Global Capability Centers (GCCs Instead, it is developing a hybrid Digital-Industrial Complex that can support a $5 trillion economy by 2028 and $10 trillion by 2035.

Introduction: The Great Indian Leapfrog

Economic history usually follows a clear pattern. Economies progress from low-productivity agriculture to low-skilled manufacturing, then to high-skilled manufacturing, and finally to services. The United Kingdom, the United States, and China have successfully followed this path, allowing many farm workers to transition into factories, known as the "Lewis Turning Point".

That story is evolving today. Energy transitions, domestic policies like the Production-Linked Incentive (PLI), and geopolitical shifts like "China Plus One" have all contributed to India's efforts to rebuild its industrial base.

Theoretical Framework: Decoding the Shift

To clearly identify which sectors are causing real economic change and which are just benefiting from inflation, we use two main economic models.

Shift-Share Analysis

We break down the growth of specific sectors to identify competitive advantages. The growth of sector i in India (Gi) is expressed as:

$$G_i = \underbrace{E_{i,0} \cdot g_n}_{\text{National Growth Effect}} + \underbrace{E_{i,0} \cdot (g_i - g_n)}_{\text{Industrial Mix Effect}} + \underbrace{E_{i,0} \cdot (r_i - g_i)}_{\text{Competitive Share Effect}}$$

Where:

- G_i = Change in employment/output in sector i.
- $E_{i,0}$ = Initial employment/output in sector i.
- g_n = National average growth rate.
- g_i = National growth rate of sector i.
- r_i = Regional (India's) growth rate of sector i.

Inference:

- National Growth Effect: Rising tide lifts all boats.
- Industrial Mix Effect: Captures whether India is involved in slower global industries like coal or faster ones like electronics.
- Competitive Share Effect: Measures implemented if India is overtaking competitors in terms of market share, such as Bangladesh or Vietnam.

Revealed Comparative Advantage (RCA)

To evaluate export potential, we calculate the Balassa Index for key sectors.

- RCA > 1: India has a comparative advantage.
- Current Trend: India's RCA in Telecommunications Equipment and Pharmaceuticals has increased significantly, above 1.5.

$$RCA_{ij} = \frac{\left(\frac{X_{ij}}{X_i}\right)}{\left(\frac{X_{wj}}{X_w}\right)}$$

Where X_{ij} is India's exports of sector j, and X_{wj} is world exports of sector j.

The Structural Shift: The "Make in India" Reality Check

We must establish the baseline before examining potential winners. According to data from FY 2024–2025, the economy is maturing and making an effort to address its structural imbalances.

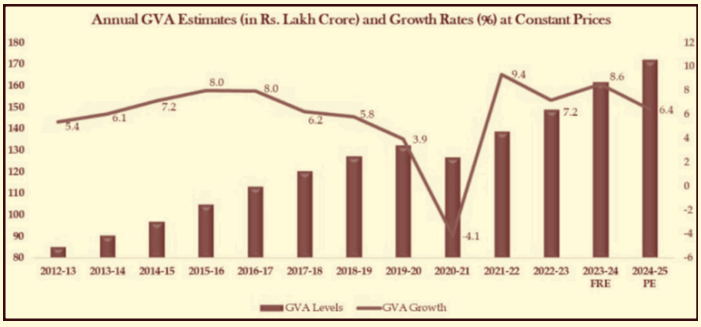

Figure 1: Sectoral Share of GVA (2024-25)
Source: Ministry of Statistics & Programme Implementation (MoSPI)

Sector	FY 2013-14 Share (%)	FY 2024-25 Share (%)	YoY Growth Trend (FY25)
Agriculture & Allied	182%	176%	↔ Stagnating (Low Productivity)
Industry (Total)	312%	281%	↑ Rebounding
-- Manufacturing	171%	158%	↑ Targeting 25% by 2030
-- Construction	85%	98%	↑ High (Infra-led)
Services	506%	543%	↑ Dominant
-- Financial/Real Estate	208%	224%	↑ Robust
-- Public Admin/Defense	135%	149%	↔ Moderate

Table 1: Sectoral Share of Gross Value Added (GVA) - The Pivot

The graph shows ten years of steady economic growth. The total Gross Value Added (GVA) has almost doubled from 2012-13 to 2024-25, even with changes in growth rate. A clear "V-shaped" recovery appears, highlighted by a sharp drop of -4.1% during the pandemic year of 2020-21, followed right after by a surge to a high of 9.4%.

High Potential Sectors: The "New Industrial Stack"

Based on Foreign Direct Investment (FDI) inflows, PLI payments, and global demand trends, three different groups of high-potential sectors have appeared.

Cluster A: Manufacturing 4.0 (The Tangible Pivot)
This group shows India's boldest effort to join the global supply chain for complex products.

1. Electronics & Semiconductors:

- The Direction: The replacement of Assemble in India (SKD/CKD kits) by Make in India (Component fabrication). Performance: Domestic production of mobile phones has increased 28 times in the year 2016 (₹5.45 Lakh Cr) as compared to 2014 (₹18,000 Cr).
- Semiconductor Mission: India will establish ATMP (Assembly, Testing, Marking, and Packaging) units with spending 10B. It is not aimed at winning in 3nm chips immediately, but lead in the 28nm+ legacy node required by automotive and internet of things devices.

2. Defense Manufacturing:

- The Narrative: India had many years of being the largest importer of arms in the world. India registered a record production in terms of defense in FY25 at an amount of ₹1.54 Lakh Cr and an export of 23,622 Cr.
- Key Drivers Liberalization of defense licensing, corporatization of Ordnance Factory Boards (OFBs), and export of missiles (BrahMos) and artillery (ATAGS) to such countries as Philippines and Armenia.
- Role of the Private Sector: The present role of the defense production by the private sector is approximately 23% of the total. This transformation puts an end to the monopoly of inefficient units of the public sector.

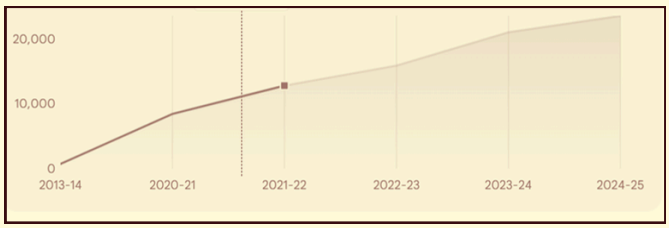

Figure 2: India's Defense Exports Growth (₹ Crore) FY 2013-14 to FY 2024-25
Source: Ministry of Defence, Govt of India

Resting on the graph, it is possible to observe the drastic and gradual increase in the Indian defense exports. The growth of these exports is over 20,000 Crore since in 2013-14 it was nearly nothing. The steep rise, particularly since 2020-21, is a sign of successful policy adjustments that have enhanced manufacturing in the country and competitiveness around the world.

Cluster B: The Green Industrial Complex
India's target for net-zero emissions is 2070. The economic opportunity, however, is closer, at 2030. The "Energy Transition" is actually the "Commodity Transition" from imported oil to home-grown electricity and hydrogen.

1. Green Hydrogen (GH2):
- The Arbitrage: India has some of the lowest costs for generating renewable energy globally, at about ₹2.5 per kWh.
- Cost Equation: The Levelized Cost of Hydrogen (LCOH) is defined as:

$$LCOH = \frac{I_0 + \sum_{t=1}^{n} \frac{M_t + E_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{H_t}{(1+r)^t}}$$

Where Et (Electricity cost) is 60-70% of the total. India's low solar tariffs provide a structural advantage.
- Current Status:LCOH in India is currently $3.5 to $5 per kilogram. The National Green Hydrogen Mission targets $2 per kilogram by 2030. This would make GH2 competitive with Grey Hydrogen, which is produced from gas.'
- Market Size: Projected to reach $12.98 billion by 2032.

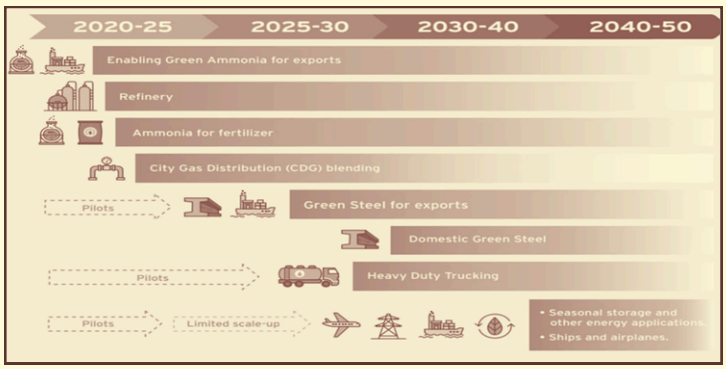

Figure 3: Green Hydrogen Value Chain
Source: NITI Aayog Report on Green Hydrogen

The roadmap has a clear plan for the reduction of carbon emissions. The plan begins with established industries such as refineries and fertilizers from 2020 to 2025. The plan will then extend to include green ammonia and steel exports by 2030. The industries are expected to be widely adopted after 2040 due to the technology involved.

2. Electric Vehicle (EV) Ecosystem:
- Beyond Cars: The revolution is led by two-wheelers and three-wheelers. They offer last-mile connectivity.
- Supply Chain: The discovery of lithium reserves in J&K and the PLI for Advanced Chemistry Cell (ACC) Battery Storage, which has a budget of ₹18,100 Cr, aims to bring more of the value chain in-house.

Cluster C: The "Headquarters Economy" (Services 2.0)
Moving beyond calls centers to Capability Centers. his shows how the service sector is moving up the value chain.

1.Global Capability Centers (GCCs):
- The Phenomenon: MNCs are moving their R&D and operations to India. They are steering clear of third-party vendors.
- Scale: In fiscal year 2025, the number of GCCs exceeded 1,760. They employed 1.9 million people.
- Economic Impact: These are not cost centers. They are value centers. GCCs now drive global product ownership, AI/ML development, and digital transformation.
- Growth: GCC leasing volume in cities like Kolkata rose by 239% year over year in 2025. This indicates growth beyond Bangalore and Hyderabad.

2.Fintech & Digital Public Infrastructure (DPI):
- India has the highest fintech adoption rate in the world at 87%. This is based on the "India Stack," which includes UPI and Aadhaar.

Exporting the Stack: Countries such as Singapore, the UAE, and France are taking on Indian payment systems

Statistical Validation: Following the Money

Capital flows are the main sign of changes in industrial mix. Where the money goes today, the industry will grow tomorrow.

Rank	Sector	Share of Total Inflows (%)	Insight
1	Services Sector (Fin., Banking, Ins.)	19%	The backbone of the economy remains services.
2	Computer Software & Hardware	16%	Shift towards deep-tech and SaaS products.
3	Trading	8%	Driven by e-commerce proliferation.
4	Telecommunications	6%	5G rollout and telecom equipment mfg.
5	Automobile Industry	5%	EV transition attracting global OEMs.
6	Chemicals (excl. Fertilizers)	4%	Benefiting from environmental shutdowns in China.
Total	FDI Inflow	$81.04 Billion	14% YoY Growth

Table 2: FDI Equity Inflows by Top Sectors (FY 2024-25 Provisional)
Source: Department for Promotion of Industry and Internal Trade (DPIIT), Govt of India

Based on the chart, we can see that foreign investors strongly prefer India's knowledge and technology economy. Services Sector stands at 9.35, and Computer Software and Hardware stand at 7.87, attract much more capital than Trading, with a score of 3.94. This indicates a clear favour on high value, scalable sectors such as finance, technology and outsourcing.

Analysis: The data highlights a "Barbell Strategy" by investors. They are betting on high-tech services like software and finance while also funding the revival of tangible manufacturing, such as auto and chemicals. The "Missing Middle" is finally drawing in capital.

The Complexity Equation: Moving Up the Ladder

The Economic Complexity Index (ECI) measures how much knowledge an economy uses. Development involves not just producing more items but creating more complex ones. The ECI is calculated using the eigenvector of the matrix that connects countries to the products they export:

$$ECI = \frac{K - \mu}{\sigma}$$

(Where K represents the knowledge intensity embedded in the productive structure.)

Evidence of Rising Complexity:

- Mobile Phones: From being a net importer to exporting over $10 billion worth of smartphones.
2. Chemicals: India is becoming the global center for "Custom Synthesis and Manufacturing" (CRAMS). This field requires a high number of Ph.D. professionals.
3. Engineering Goods: Now, the largest export category is surpassing gems and jewelry. This shows a change from exporting resources to exporting skills.

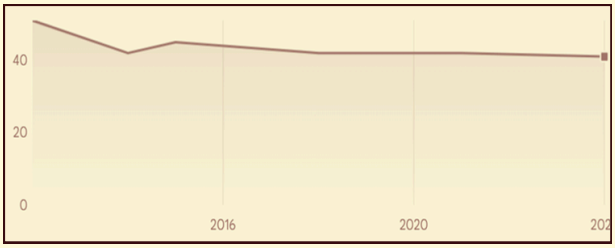

Figure 5: Evolution of India's Economic Complexity Index Ranking (2012-2024)
Source: The Atlas of Economic Complexity, Harvard Growth Lab

The graph shows that India's economic complexity has improved over the past decade. Its position shifted to an estimated 50 in the year 2012 to an estimated 42 in the year 2024, a lower figure shows a better position. The tendency line stabilized in 2017 after certain positive and negative changes between 2012 and 2016.

Policy Efficacy: The PLI Effect

The Production Linked Incentive (PLI) scheme is the main industrial policy tool. Unlike past capital subsidies, PLI focuses on results; you receive payment only if you produce.

Metric	Value
Total Actual Investment	₹2.00 Lakh Crore (approx.)
Incremental Production/Sales	₹18.7 Lakh Crore
Employment Generation	12.6 Lakh (Direct & Indirect)
Key Success Sectors	Mobile Mfg, Pharma, Medical Devices
Lagging Sectors	Textile, Specialty Steel (Slower offtake)

Table 3: PLI Scheme Performance (FY 2024-25 Snapshot)
Source: Table 3: PLI Scheme Performance (FY 2024-25 Snapshot)

Critical Insight: The PLI has been very successful in low-complexity assembly, like mobile devices. However, it encounters challenges in high-capital process industries, such as steel and batteries, where the development periods are longer.

Regional Dynamics: The Industrial Corridors

The industrial mix varies by location. A "Southern and Western Wall" of industrialization can be seen.

- Maharashtra: As its leader with 31 percent foreign direct investment, the company is turning into a Data Center and FinTech hub, though it continues to specialize in the traditional auto manufacturing.
- Gujarat: The Petro-Capital is moving to the production of green hydrogen and semiconductor at Dholera SIR.
- Tamil Nadu: The Asian Detroit is currently competing intensely in the production of electric cars. These are such companies as Ola, Ather and Hyundai.
- Karnataka & Telangana: The two main forces of the "Headquarters Economy" are GCCs and biotech.

Comparative Analysis: India vs. The World

Metric	India	Vietnam	China	Indonesia
Corporate Tax Rate	15% (New Mfg.)	20%	25%	22%
Avg. Factory Wage ($/mo)	$200 - $250	$280 - $320	$650 - $700	$250 - $300
Logistics Cost (% of GDP)	~13%	~10%	~8%	~23%
Free Trade Agreements	UAE, Aus, EFTA	EU, UK, CPTPP	RCEP	RCEP

Table 4: Comparative Corporate Tax & Labor Cost
Source: Table 3: PLI Scheme Performance (FY 2024-25 Snapshot)

Key Takeaway: India's 15% corporate tax rate for new manufacturing units is the most competitive in Asia. However, Vietnam leads in trade integration with its free trade agreements with the EU and the UK.

Challenges: The Friction Coefficients

In the standard Cobb-Douglas production function $Y=A \cdot K\alpha \cdot L\beta$, structural issues restrict India's growth by affecting Total Factor Productivity (A).

1. Logistics Cost: Currently, logistics costs account for about 13% of GDP. The PM Gati Shakti master plan aims to reduce this to single digits.
2. Energy Pricing: Indian industry supports agriculture through cross-subsidization. Industrial power tariffs are high compared to global standards.

The AI Threat: The "Service-Led" model is at risk from Generative AI. If AI can write code and manage BPO tasks, India’s cost advantage in services may decline.

Future Scenarios (2030-2047)

We model three possible paths for India's industrial mix:

- Scenario A: The Middle-Income Trap (Bear Case)
  - Premise: Manufacturing is stuck at 18% of GDP. AI is changing service exports.
  - Outcome: Growth slows to 4-5%. India struggles to make the most of its demographic dividend.

- Scenario B: The Service Superpower (Base Case)
  - Premise: Services evolve into high-value consulting and intellectual property. Manufacturing grows at a moderate pace.
  - Outcome: Growth is projected at 6 to 7 percent. India will reach a $7 trillion economy by 2032.

- Scenario C: The Dual-Engine Rocket (Bull Case)
  - Premise: PLI is doing well in semiconductors and green energy. Service exports have doubled through GCCs.
  - Outcome: Growth is at 8-9%. Manufacturing makes up 25% of GDP. India is becoming a global hub for innovation.

Conclusion: Viksit Bharat 2047

The evolution of India's industrial mix tells a story of convergence. We now see high-end services and high-tech manufacturing growing at the same time. The "Best Case" scenario for 2047 envisions India as a Global Innovation Hub, not merely the "next China" (a manufacturing powerhouse) or just a "back office" for services. The high-potential sectors, such as Green Hydrogen, Semiconductors, and GCCs, have one thing in common: they rely heavily on technology and are closely linked to Global Value Chains (GVCs).

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