Report on VFX Industry in India

August 2024

Disclaimer

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India Macroeconomic Analysis

GDP Growth Scenario

India's economy showed resilience with GDP growing at an estimated 7.8% in CY 2023. The GDP growth in CY 2023 represents a return to pre-pandemic-era growth path. Even amid geopolitical uncertainties, particularly those affecting global energy and commodity markets, India continues to remain one of the fastest-growing economies in the world.

Country	Real GDP Growth (CY 2023)	Projected GDP Growth (CY 2024)
India	7.8%	6.8%
China	5.2%	4.6%
Russia	3.6%	3.2%
Brazil	2.9%	2.2%
United States	2.5%	2.7%
Japan	1.9%	0.9%
Canada	1.1%	1.2%
Italy	0.9%	0.7%
France [1]	0.7%	0.7%
South Africa	0.6%	0.9%
United Kingdom	0.1%	0.5%
Germany	-0.3%	0.2%

Source: The International Monetary Fund

Countries considered include - Largest Developed Economies and BRICS (Brazil, Russia, India, China, and South) Countries have been arranged in descending order of GDP growth in 2023).

There are few factors aiding India's economic recovery – notably its resilience to external shocks and rebound in private consumption. This rebound in private consumption is bringing back the focus on improvements in domestic demand, which together with revival in export demand is a precursor to higher industrial activity. Already the capacity utilization rates in Indian manufacturing sector are recovering as industries have stepped up their production volumes. As this momentum sustains, the country may enter a new capex (capital expenditure) cycle. The universal vaccination program by the Government has played a big part in reinstating confidence among the population, in turn helped to revive private consumption.
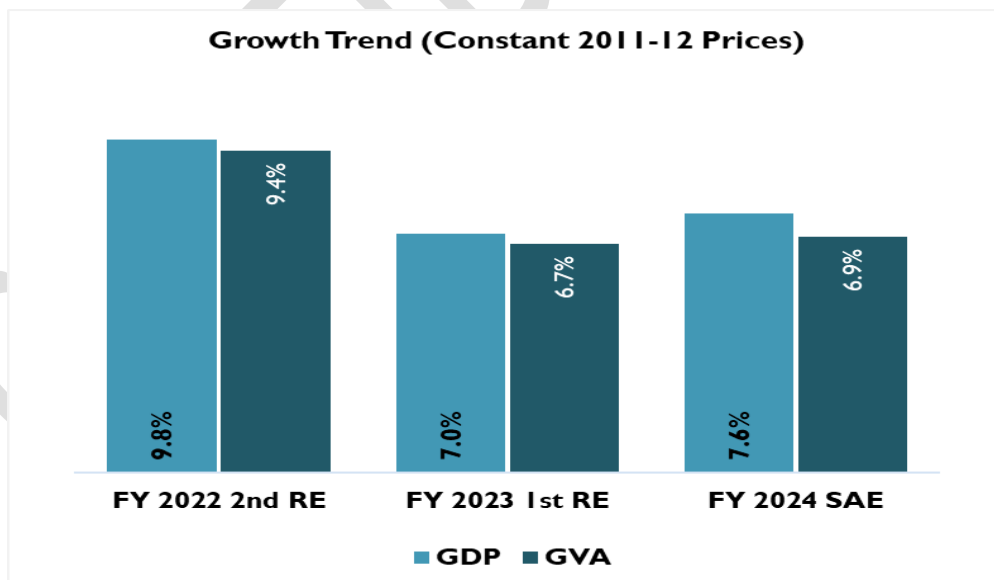
Realizing the need to impart external stimuli, the Government stepped up its spending on infrastructure projects which in turn had a positive impact on economic growth. The capital

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[1] European Commission.

expenditure of central government increased by 37.4% increase in capital expenditure (budget estimates), to the tune of INR 10 trillion in the Union Budget 2023-2024. The announcement also included 30% increase in financial assistance to states at INR 1.3 trillion for capex. The improvement was accentuated further as the Interim Budget 2024-2025 announced an 11.1% increase in the capital expenditure outlay at INR 11.11 trillion, constituting 3.4% of the GDP. This has provided the much-needed confidence to private sector, and in turn attracted private investment.

On the lending side, the financial health of major banks has witnessed an improvement which has helped in improving the credit supply. With capacity utilization improving, there would be demand for credit from corporate sector to fund the next round of expansion plans. Banking industry is well poised to address that demand. Underlining the improving credit scenario is the credit growth to the micro, small, and medium enterprise (MSME) sector as the credit outstanding to the MSME sector by scheduled commercial banks in the fiscal year 2024[2] grew by 14% to INR 10.31 trillion compared to INR 9.02 trillion as on 24 March 2023. The extended Emergency Credit Linked Guarantee Scheme (ECLGS) by the Union Government has played a major role in improving this credit supply.

As per the second advance estimates 2023-24, India's GDP in FY 2024 grew by 7.6% compared to 7.0% in the previous fiscal on the back of solid performances in manufacturing, mining, and construction sectors. The year-on-year increase in growth rate is also partly due to by a strong growth in investment demand led by public capital expenditure.

Growth Trend (Constant 2011-12 Prices)

FY 2022 2nd RE: GDP 9.8%, GVA 9.4%; FY 2023 1st RE: GDP 7.0%, GVA 6.7%; FY 2024 SAE: GDP 7.6%, GVA 6.9%

Source: Ministry of Statistics & Programme Implementation (MOSPI), National Account Statistics, 2023-24
RE stands for Revised Estimates, SAE stands for Second Advance Estimates

[2] https://www.rbi.org.in/Scripts/Data_Sectoral_Deployment.aspx as on 22nd March 2024.

Sectoral Contribution to GVA and annual growth trend
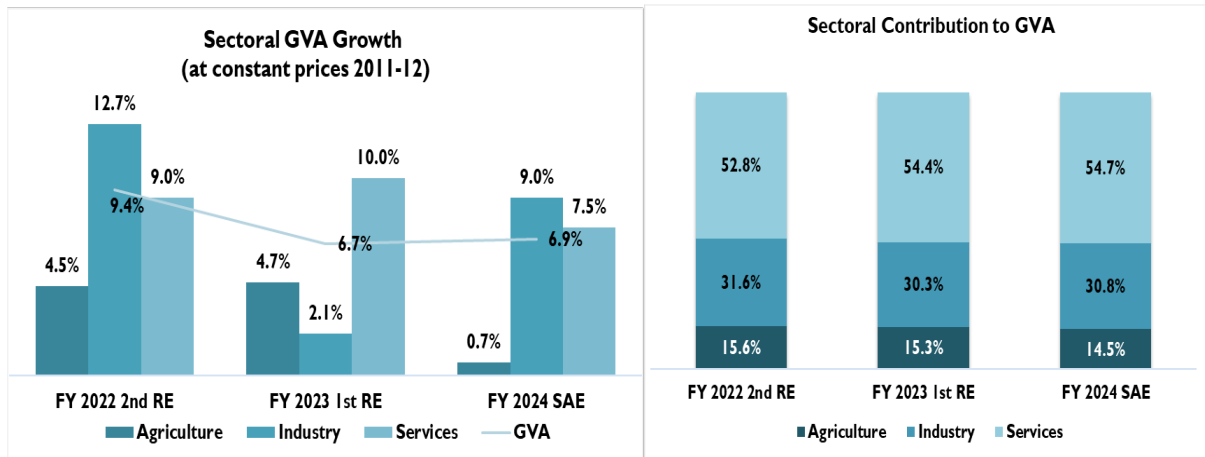
Sectoral analysis of GVA reveals industrial sector recovered sharply registering 9% y-o-y increase in FY 2024 against 2.1% in the previous fiscal. In the industrial sector, growth across major economic activity such as mining, manufacturing, construction sector rose significantly and it registered a growth of 8.1%, 8.5% and 10.7% in FY 2024 against a growth of 1.9%, -2.20%, and 9.44% in FY 2023, respectively. Utilities sector observed a marginal moderation in y-o-y growth to 7.5% against a 9.5% in the previous years.

Talking about the services sectors performance, with major relaxation in covid restriction, progress on covid vaccination and living with virus attitude, business in service sector gradually returned to normalcy in FY 2023. Economic recovery was supported by the service sector as individual mobility returned to pre-pandemic level. The trade, hotel, transport, communication, and broadcasting segment continued to grow by 12% in FY 2023. However, second advance estimates for FY 2024 revealed a decelerated growth in the largest component of the GDP, i.e., the service sector. In FY 2024, the sector registered a growth of 7.5%, as compared to the 10% growth recorded in FY 2023. This slowdown is primarily attributed to a pronounced deceleration in the Trade, Hotel, Transport, Communication, and Broadcasting services. The growth rate in this subsector nearly halved, decreasing from 12% in FY 2023 to 6.5% in FY 2024. This slowdown is influenced by the normalization of the base effect and potentially some dilution in discretionary demand. Financial services, real estate and professional services sector recorded 8.21% in FY 2024 y-o-y growth against 9.05% y-o-y growth in the previous year (in FY 2023), while public administration and defence services sector recorded 7.75% yearly increase (in FY 2024) against 8.92% increase in the previous year (in FY 2023).

Index of Industrial Production

Industrial sector performance as measured by IIP (Index of Industrial Production) index exhibited mild improvement in FY 2024 by growing at 5.8% (against 5.2% in FY 2023). Manufacturing index, with 77.6% weightage in overall index, grew by 5.5% in FY 2024 against 4.7% in FY 2023 while mining sector

index too grew exhibited healthy improvement by growing at 7.5% in FY 2024 against 5.8% in FY 2023. Electricity sector index witnessed improvement of 7.15% in FY 2024 against 8.9% y-o-y growth in FY 2023.

Annual IIP Growth

Source: Ministry of Statistics & Programme Implementation (MOSPI)
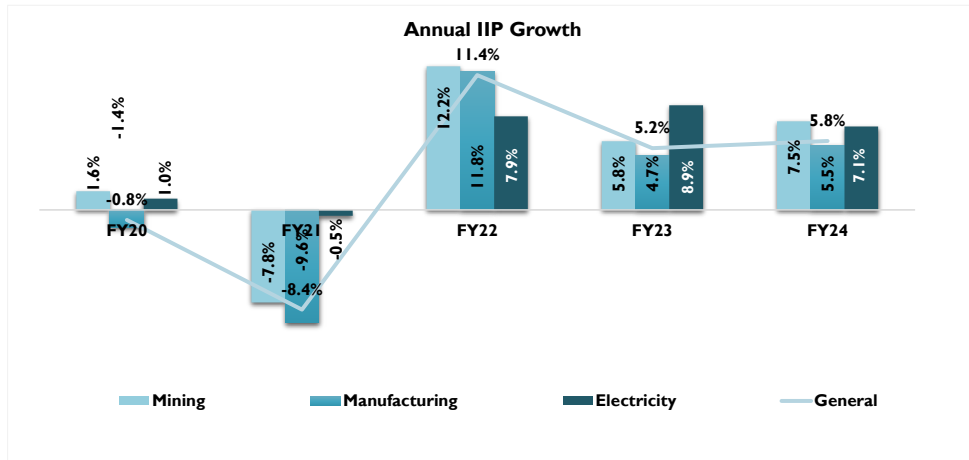
Use-Based Classification: IIP (Y-o-Y Growth)
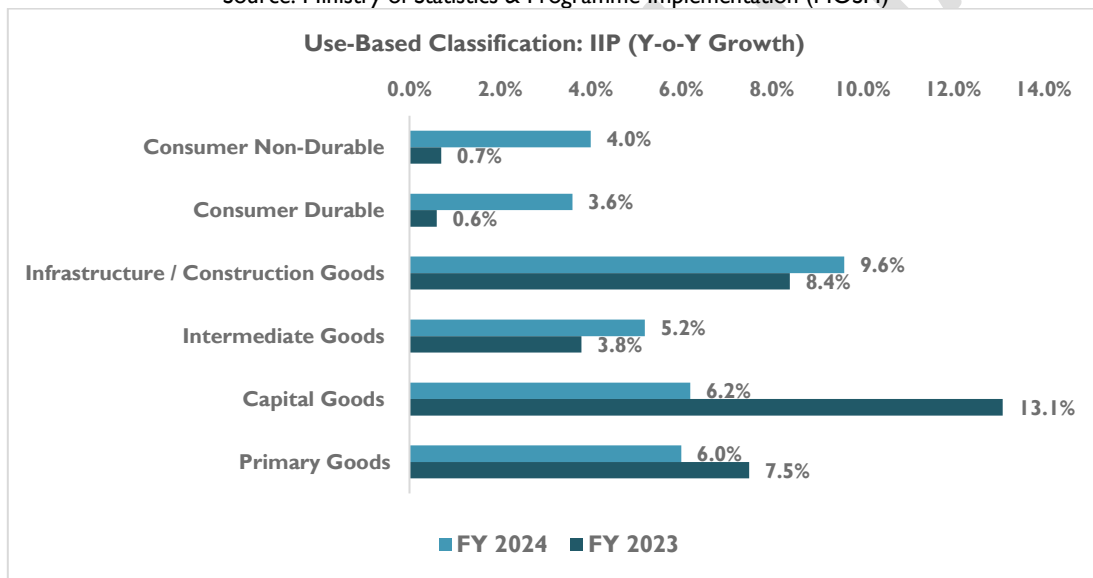
Sources: MOSPI

As per the use-based classification, excluding capital goods and primary goods, other segments observed healthy y-o-y growth against the previous year. Infrastructure / construction goods followed by intermediate goods were the bright spot while consumer non-durable and consumer durable both observed sharp growth over the previous year. However, the mild growth in IIP indicates towards challenging operating business climate as global headwinds, high inflation, and monetary tightening cumulatively impacted the broader industrial sector performance.

Expansion in Service Sector

Services sector is a major contributor to the country's overall economic growth. Since FY 2012, its contribution to India's GVA has increased from 49% to nearly 55% currently (in FY 2024) as per Second Advance Estimates.

Services Sector Contribution in India's Overall GVA

FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019 RE	FY2020 3rd RE	FY2021 2nd RE	FY 2022 2nd RE	FY 2023 1st RE	FY 2024 SAE
49.0%	50.3%	51.1%	52.4%	53.0%	53.3%	53.3%	54.0%	55.3%	53.0%	52.8%	54.4%	54.7%
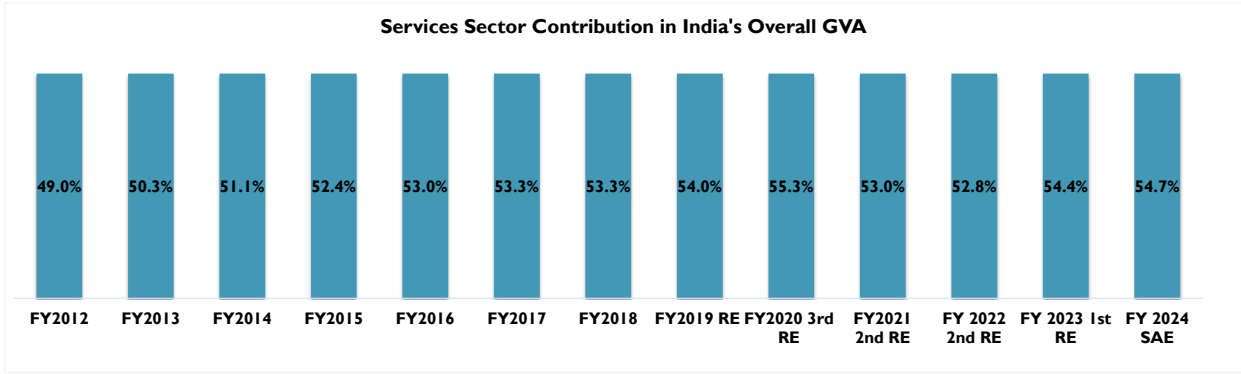
Source: Ministry of Statistics & Programme Implementation (MOSPI)

In absolute terms, services sector GVA has increased from INR 68.78 trillion in FY 2019 to INR 86.6 trillion in FY 2024 (as per the second advance estimates), registering a CAGR of nearly 5%. While excluding 8.1% decline in FY 2021, the services sector GVA has observed 7.7% average increase in the post pandemic period (FY 2022-24). Within Services sector, the GVA by financial, real estate and professional services-the largest contributing segment observed 6.3% CAGR while Public Administration, defence and other services observed 4.4% CAGR and Trade, hotels, transport, communication, and services related to broadcasting witnessed 3.1% CAGR between FY 2019-24. The expansion of the service sector has spurred the development of multiple industries, including IT (Information Technology), healthcare, tourism, transport, median & entertainment, and finance, among others. ***VFX (Visual Effects) is part of media & entertainment which falls under the broader service segment as services related to broadcasting segment.***

Total Services Sector GVA, (INR Trillion)

FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024 SAE
68.8	73.1	67.2	73.2	80.6	86.6

GVA Contribution Break-up Of Services Sector, FY 2024

- Public Administration, defence and other services, 23%
- Financial, real estate & prof servs, 43%
- Trade, hotels, transport, communication and services related to broadcasting, 34%
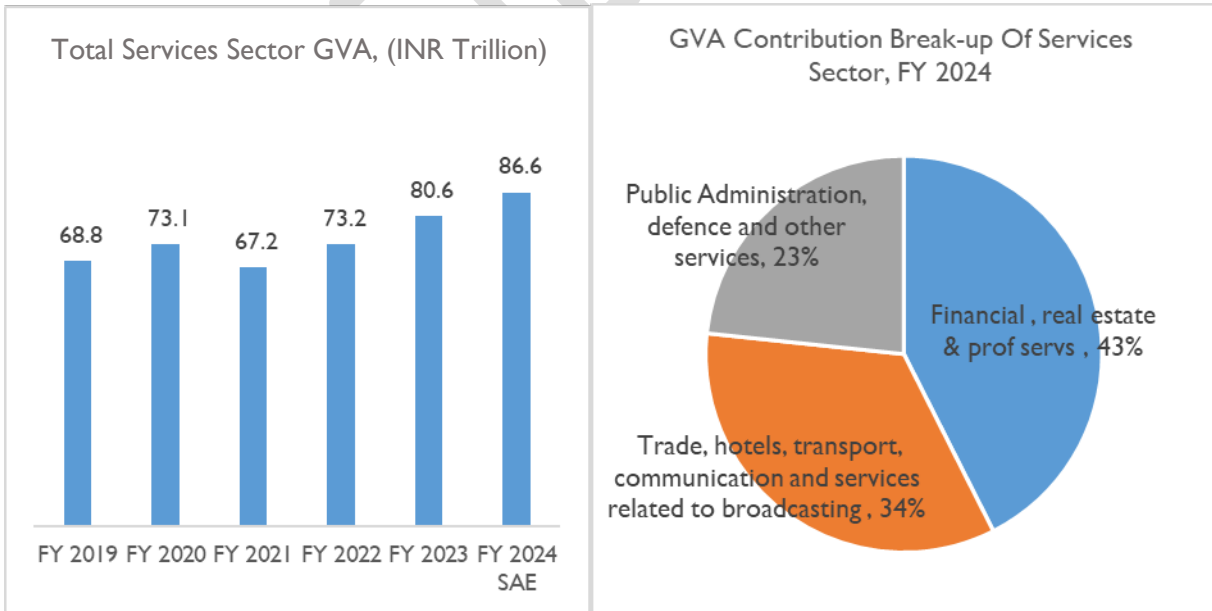
Sources: Ministry of Statistics & Programme Implementation (MOSPI)

India's HSBC[3] Services Purchasing Managers' Index**,** an important indicator to track service sector performance, increased to 61.4 in May 2024 from 60.8 in the previous month. Since August 2021, the services sector has consistently remained above the threshold of 50, which distinguishes growth from contraction.

Investment & Consumption Scenario

Other major indicators such as Gross fixed capital formation (GFCF), a measure of investments, gained strength during FY 2024 as it grew by 10% on a y-o-y basis against 7% yearly growth in the previous fiscal, while GFCF to GDP ratio measured all-time high settled higher at 34%.

Capital Investment Trend in India

Private Final Consumption Expenditure Trend in India (PFCE Growth)
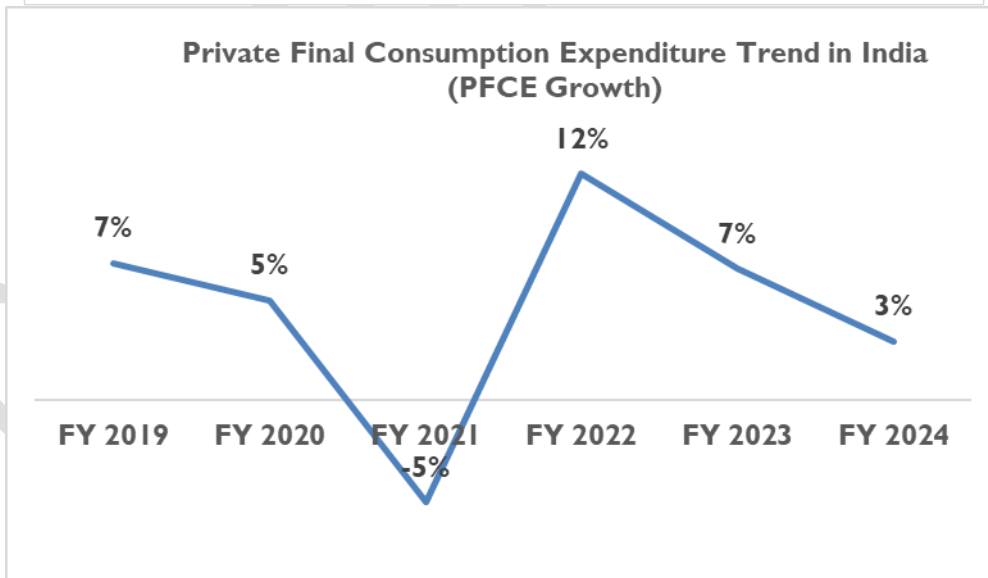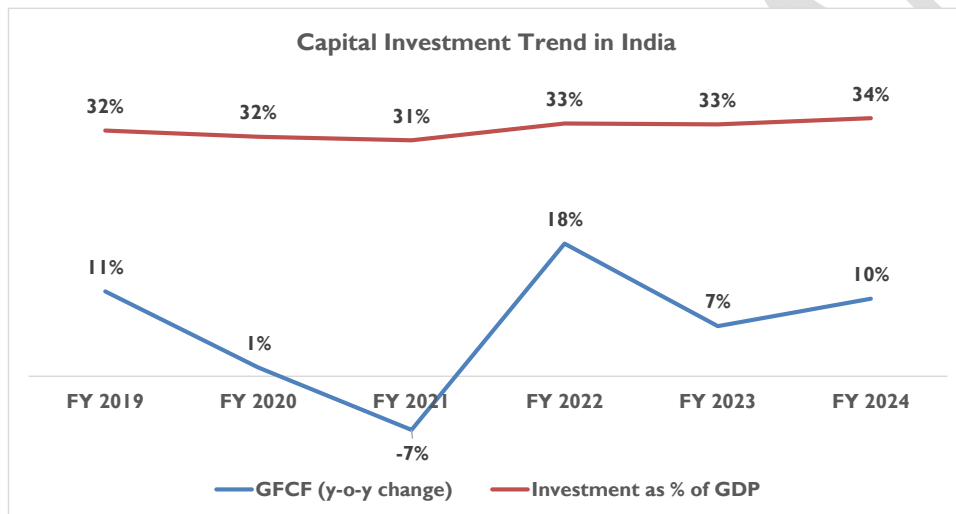
Sources: MOSPI

Private Final Consumption Expenditure (PFCE) a realistic proxy to gauge household spending, observed decelerated and registered 3.1% y-o-y growth in FY 2024 which is less than half of the previous year indicating sustained weakness in consumer spending.

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[3] Hongkong and Shanghai Banking Corporation.

Inflation Scenario

The inflation rate based on Wholesale Price Index (WPI) exhibited rose to 1.3% in the month of April 2024 on the back of steady growth in the prices of primary article which grew by 5% in April 2024 on y-o-y bases. Increasing prices of food articles and energy prices contributed to increasing inflation.

Monthly (Y-oY) Change in WPI , (2011-12)

Source: MOSPI, Office of Economic Advisor.

Y-o-Y Growth in Monthly Consumer Price Indices (2011-12 Series)
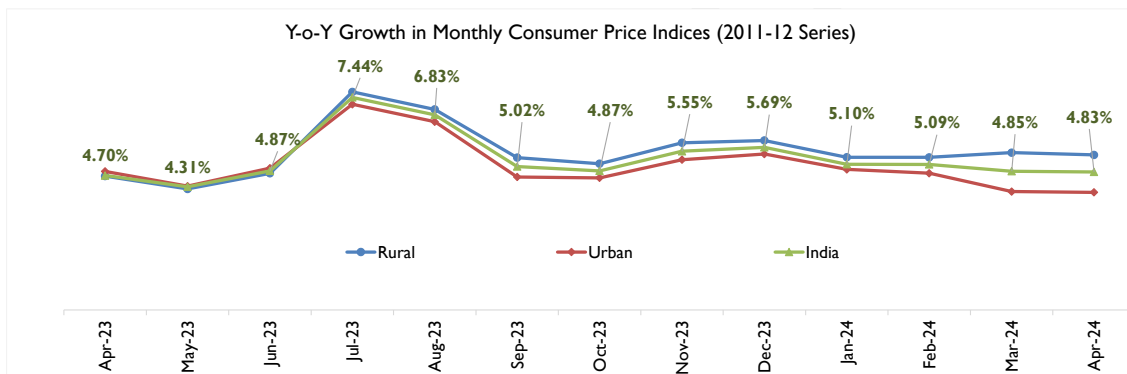
Source: CMIE[4] Economic Outlook

Retail inflation rate (as measured by Consumer Price Index) eased to 4.83% in April 2024 as compared to 4.85% in March 2024. The CPI[5] inflation for rural and urban for 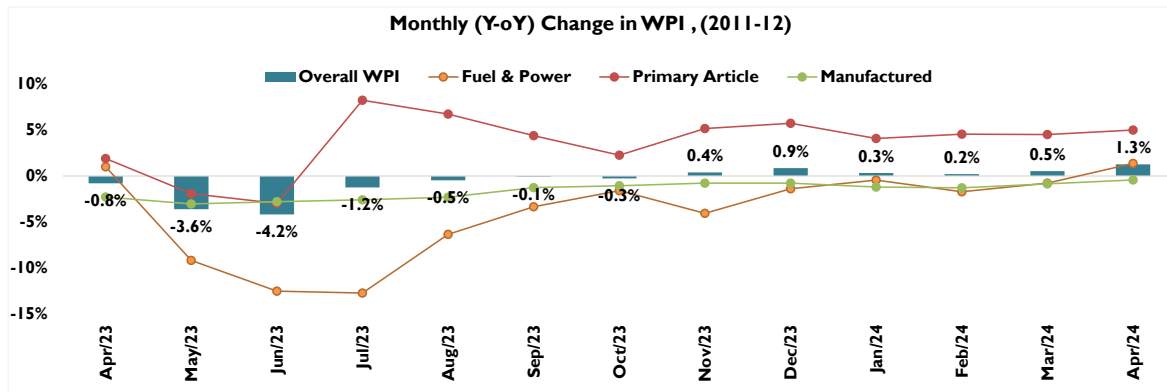the month of April 2024 was 5.43% and 4.11% against 5.51% and 4.14% respectively in March 2024. Retail inflation moderated during FY 2024 after the peak of 7.4% in July 2023 and it fluctuated between 4.85%-6.83%. CPI measured below 6% tolerance limit of the central bank since September 2023. As a part of anti-inflationary measure, the RBI has hiked the repo rate by 250 bps (basis points) since May 2022 to current 6.5% while it has been holding the rate at 6.5% since 8 Feb 2023.

India's Economic Growth Outlook

Looking ahead to CY 2024, India's projected GDP growth of 6.8% in CY 2024 stands out as the fastest among major emerging markets, significantly outpacing China's 4.6% and Brazil's 2.2%. This robust growth trajectory is expected to sustain at 6.5% annually from CY 2025 to CY 2029, reflecting strong economic fundamentals and continued momentum.

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[4] Centre for Monitoring Indian Economy.
[5] Consumer Price Index.

India's Real GDP Projected Growth (%)

	CY 2023	CY 2024F	CY 2025F	CY 2026F	CY 2027F	CY 2028F	CY 2029F
Growth (%)	7.8	6.8	6.5	6.5	6.5	6.5	6.5
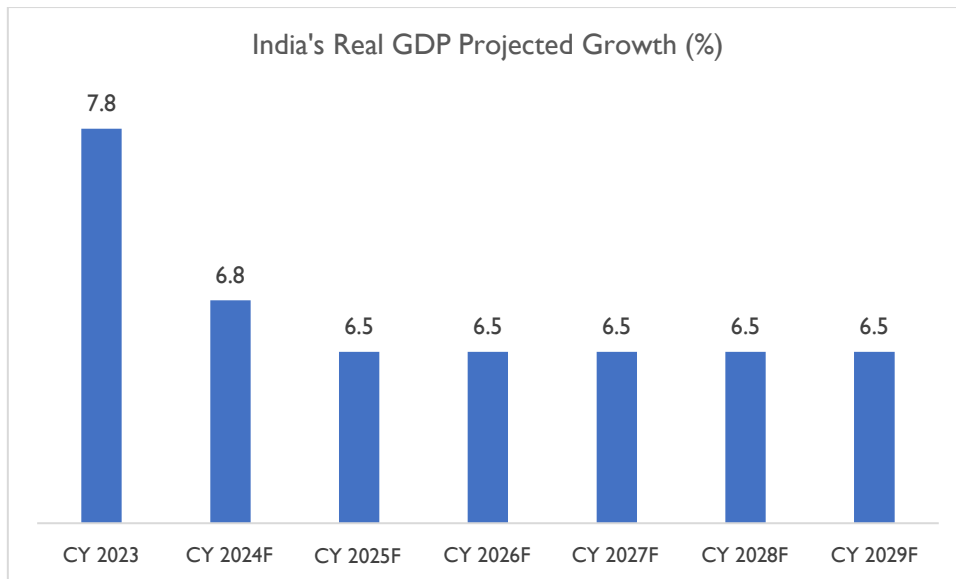
Source: IMF[6]

This decent growth momentum in near term (CY 2024) is accompanied by a slowdown in inflation, as well as various other factors in the medium to long term that will support the economy. These include enhancements in physical infrastructure, advancements in digital and payment technology, improvements in the ease of doing business and a higher quality of fiscal expenditure to foster sustained growth.

On the demand side, improving employment conditions and moderating inflation are expected to stimulate household consumption. Further, the investment cycle is gaining traction, propelled by sustained government capital expenditure, increased capacity utilization and rising credit flow. Additionally, there are positive signs of improvement in net external demand, as reflected in the narrowing merchandise trade deficit. Despite the supply disruptions, exports clocked positive y-o-y growth in December 2023 and January 2024.

From uplifting the underprivileged to energizing the nation's infrastructure development, the Government has outlined its vision to propel India's advancement and achieve a 'Viksit Bharat' by 2047 in the interim budget announced on 1st Feb 2024. Noteworthy positives in the budget include achieving a lower-than-targeted fiscal deficit for FY 2024 and setting a lower-than expected fiscal deficit target for FY 2025, proposing dedicated commodity corridors and port connectivity corridors, providing long-term financing at low or nil interest rates to the private sector to step up Research & Development (R&D) in the sunrise sectors.

Achieving a reduced fiscal deficit of 5.8% in FY 2024 and projecting a lower than-anticipated fiscal deficit of 5.1% are positive credit outcomes for India. This showcases the country's capability to pursue a high-growth trajectory while adhering to the fiscal glide path. There has been a significant

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[6] International Monetary Fund.

boost to capital expenditure for two consecutive years; capital expenditure – which is budgeted at 3.4% of GDP (INR 11.1 trillion/USD 134 billion) for 2024/25 – is at a 21-year high (3.3% of GDP in 2023/24). The enhancement of port connectivity, coupled with the establishment of dedicated commodity corridors (energy, mineral and cement), is poised to enhance manufacturing competitiveness. This strategic move aims to fulfil India's export targets and reduce logistics costs.

However, headwinds to external demand emanate from recession in key exporting partners - the UK and Germany (which collectively account for over 5% of India's export portfolio) - and the spiralling effect it will have on other European countries. Supply disruptions posed by the conflict in the Red Sea, leading to rerouting of shipments through Africa, are impacting sectors exposed to exports to Europe, running on thin margins, especially small businesses. Although headline inflation moderated to 5.1% in January 2024, a three-month low, volatility in crude prices and uncertainties about food inflation are likely to keep the central bank cautious in the near term.

India's optimistic economic outlook is underpinned by its demographic dividend, which brings a substantial workforce that boosts labor participation and productivity. The burgeoning middle class and urbanization contribute to increased domestic consumption, driven by rising incomes and purchasing power. Extensive investments in infrastructure, encompassing roads, railways, ports, and digital connectivity, are enhancing productivity and efficiency, with government initiatives like the Smart Cities Mission and PM[7] Gati Shakti creating a conducive growth environment. This digital transformation, catalyzed by initiatives such as Digital India, is fostering a tech-driven economy marked by enhanced internet penetration, digital payments, and e-governance, thereby fueling growth in sectors like fintech, e-commerce, and digital services. The push to position India as a global manufacturing hub through Make in India and Production Linked Incentive (PLI) schemes is further boosting industrial output, exports, and domestic production capabilities. Compared to other major emerging markets facing demographic and economic challenges, India's combination of demographic strengths, policy reforms, and strategic initiatives positions it as a standout performer and a significant driver of global economic growth in the foreseeable future.

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[7] Prime Minister.

Animation Industry

Global Scenario

As of 2024, the animation industry is experiencing impressive growth, fuelled by technological advancements and increasing global demand. Innovations in 3D (Three Dimensional) modelling, virtual reality, augmented reality, and artificial intelligence are enhancing animation quality and expanding its applications across various sectors, including entertainment, advertising, education, life sciences, and healthcare. The global animation market is growing significantly, with North America recognized as the largest market. Computer-generated animation dominates the industry, making up a substantial portion of the global animation market composition. The market has seen remarkable expansion from 2018 to 2021, driven by increasing demand and technological progress. The global 3D animation and visual effects markets are expected to grow significantly, with the Asia Pacific region, led by Japan and India, standing out as the fastest-growing market for VFX.

Top animation studios like Disney, Sony Pictures Animation, and Netflix continue to lead the industry, with Disney being the world's largest animation studio, known for its iconic films and series that have captivated audiences for decades. Sony Pictures Animation is celebrated for its innovative storytelling and visual creativity, while Netflix has rapidly expanded its animated content library and original productions. The industry has experienced substantial growth trends. This growth is mirrored in the 3D animation market, which is expected to see significant adoption across industries such as entertainment, advertising, gaming, augmented reality, and virtual reality. The global gaming market is also poised for remarkable growth, further driving demand for animation.

Regionally, Asia Pacific is the fastest-growing VFX market, with Japan boasting the largest animation industry in the region, supported by significant revenue from international markets. China's animation industry has also grown substantially in recent years, while the European Union's industry contributes significantly to the region's economy. South Korea's animation industry is experiencing rapid growth, primarily through exports, and Canada's industry is expected to grow further in the upcoming year. Latin America is also seeing a rise in investments, expanding local production capabilities, and gaining international recognition.

The demand for skilled animation professionals has surged globally, driven by the rising popularity of 3D mobile games and applications. In the United States, the animation industry employs a large workforce. Japan's industry supports a significant workforce, underscoring its status as the largest animation market in the Asia Pacific region. The United Kingdom's industry has also employed a substantial number of individuals, reflecting the industry's contribution to the economy. Canada's job market within the industry experienced rapid growth, and the European Union has seen robust annual job growth, reflecting the expanding demand for skilled professionals.

Production within the animation industry has also seen significant developments. Computer-generated animation emerged as a predominant force within the global market. Animated films, known for their lengthy production timelines, often span many years from conception to completion. A significant portion of animated content is distributed through television and streaming platforms, with North America being a major player in the industry. Disney commands a substantial share of the global market for animation consumption, contributing to the industry's overall growth.

Overall, the animation industry is growing rapidly and making a significant impact globally. It offers numerous job opportunities and continues to expand each year, driven by increasing demand for animated content on platforms like Netflix and in theatres. The industry continues to evolve with new technologies and storytelling methods, making it an integral part of the global entertainment landscape.

Indian Scenario

In 2023, the Indian animation sector faced a challenging year, marked by a contraction in growth due to delays in project timelines and a slowdown in mergers and acquisitions. The decline in the industry was largely influenced by disruptions in the global entertainment sector, including a significant impact from the writers' strike in Hollywood and structural changes within major industry players like Warner Bros.[8], Discovery, Zee, Sony, and Viacom18. These factors contributed to a noticeable reduction in the number of new Indian animated projects, with fewer releases compared to the previous year. Additionally, major broadcasters experienced a downturn in advertising revenue, further impacting the industry's overall performance.

Despite these challenges, industry leaders are optimistic about a recovery in the upcoming fiscal year. They anticipate a rebound driven by evolving demand and shifting consumption patterns, which are expected to breathe new life into the animation sector. This positive outlook is supported by the growing interest in international markets, as Indian studios increasingly participate in global events and form collaborations in regions such as Russia, Spain, Italy, and the Middle East. This strategic move aims to counteract the slowdown in domestic demand by tapping into new and diverse markets.

Cost-reduction measures implemented by major OTT (over-the-top) platforms also had a significant impact on the volume of animation work outsourced to India. Platforms like Disney+ Hotstar[9] and Netflix undertook efficiency initiatives, leading to a reduction in animation projects, with Netflix undergoing restructuring that resulted in job cuts and the cancellation of several animated series.

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[8] Warner Bros. also known as Warner Bros. Entertainment Incorporated is an American film and entertainment studio and a subsidiary of Warner Bros. Discovery (WBD).
[9] Disney+ Hotstar (pronounced "Disney Plus Hotstar") is an Indian subscription video-on-demand over-the-top streaming service owned by Disney India, a subsidiary of Disney Company.

YouTube continues to dominate as the leading digital platform for animated content in India, accounting for a large portion of children's content consumption. Despite challenges from regulatory changes, studios remain invested in YouTube due to its advanced data analytics capabilities. The trend of urban children favouring digital platforms over television, which remains more popular in rural areas, persisted in 2023. New entrants like JioCinema are expected to further boost digital viewership with a diverse range of content offerings.

The anime segment in India experienced significant growth, with the country emerging as the second-largest anime fan base globally. This rise in popularity has led to increased opportunities in merchandising and licensing, as well as expanded offerings from platforms like JioTV and Prime Video.

The industry is also evolving in terms of content distribution, with new partnerships and multi-platform launches broadening the reach of Indian animated content. Technological advancements, particularly in AI (Artificial Intelligence), Unreal Engine, and cloud computing, are expected to drive efficiency and profitability in animation production. However, the industry faces a talent shortage that has limited the full potential of these technologies.

There are emerging opportunities in the adult animation market, particularly in regions like the US (United States), where demand has surged significantly. Indian studios are also increasingly collaborating with universities and educational institutions to address the talent gap and prepare for the growing complexity of animation work outsourced to the country. The development of cloud-based infrastructure is expected to further support global collaborations, while the creation of globally resonant intellectual properties remains a key focus for the industry.

Overall, while the past year presented significant challenges, the Indian animation sector is poised for recovery and growth soon, with numerous opportunities for innovation and expansion across various segments of the industry.

An Overview: VFX industry

Visual Effects, or VFX, is the behind-the-scenes wizardry that breathes life into the fantastical worlds and impossible scenarios which is seen on the screen. VFX encompasses the creation or manipulation of any imagery that isn't filmed during live-action shooting. This can range from adding a fantastical creature like a dragon to meticulously erasing stunt wires from an action sequence. VFX artists use a combination of techniques, including computer-generated imagery (CGI), compositing (seamlessly blending live-action footage with VFX elements), and green screens (which allow for the replacement of a background with a digital environment). The goal of VFX is to seamlessly integrate these elements with the live-action footage, creating a realistic and believable final product. Whether it's making a superhero soar through the sky or transforming a city into a futuristic landscape, VFX is the secret sauce that allows filmmakers to bring their wildest visions to life.

The Visual Effects (VFX) industry has undergone a phenomenal transformation in recent years. Driven by factors like the surge of streaming services, the ever-growing demand for high-quality content, and the constant technology innovation, VFX has become an indispensable part of filmmaking, television, video games, and even immersive media formats. Market research predicts a significant rise in the global VFX market, with estimates suggesting a growth rate exceeding 10-13% in the coming years. This translates to a booming industry valued in the tens of billions. This global VFX landscape is fuelled by several key trends. Firstly, the rise of streaming giants like Netflix and Disney+[10] has created a constant demand for fresh, visually captivating content. Secondly, advancements in CGI (Computer-Generated Imagery) and other VFX tools allow for the creation of increasingly realistic and awe-inspiring visuals. Finally, the rise of virtual production techniques is blurring the lines between filmmaking and post-production, allowing for even more efficient and innovative workflows.

The Indian VFX industry has emerged as a major player on the global stage. With its pool of talented artists, competitive pricing, and growing technological expertise, India is attracting a significant chunk of VFX work for Hollywood blockbusters and international productions. This trend is being driven by several factors. Firstly, Indian studios offer high-quality VFX services at a more affordable cost compared to traditional VFX hubs like Los Angeles. Secondly, the Indian government's initiatives to promote the media and entertainment sector have created a supportive environment for VFX companies to thrive. Finally, a large pool of skilled artists, coupled with a strong educational system focused on VFX training, ensures a steady stream of talent for the industry.

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[10] Disney+ (pronounced "Disney Plus") is a global streaming service created and owned by The Walt Disney Company's Streaming and Entertainment units.

This growth in the Indian VFX industry not only benefits the domestic film scene but also positions India as a major force in shaping the future of visual effects on a global scale. The collaborative efforts between international studios and Indian VFX houses are pushing the boundaries of what's possible on screen, making movie magic more real than ever before.

Business Model and Flow of Operation

The Indian Visual Effects (VFX) industry has witnessed remarkable growth over the past few years, establishing itself as a key player in the global entertainment landscape. Driven by the increasing demand from film, television, advertising, and digital content sectors, India's VFX industry has carved out a niche by offering high-quality services at competitive prices. This thriving industry is characterized by a dynamic business model and a streamlined flow of operations, enabling it to cater to a diverse clientele while maintaining efficiency and innovation.

Business Model

- *Client Segments:* The Indian VFX industry serves a wide array of clients, including film production houses from both Bollywood and regional industries, television networks seeking VFX for shows, promos, and advertisements, and advertising agencies leveraging VFX for engaging commercials. Streaming platforms are also significant clients due to their growing need for high-quality VFX in original content. Furthermore, the gaming industry shares similar skill sets and software needs, adding another layer of clientele for VFX services.

- *Value Proposition*: Indian VFX studios offer a compelling value proposition centred around cost efficiency, providing high-quality services at a fraction of the cost compared to Western markets. With access to a vast pool of skilled artists and technicians, these studios ensure a steady supply of talent for various projects. Additionally, the scalability of Indian studios, facilitated by their sizeable workforce, allows them to handle large volumes of work, making them appealing to both domestic and international clients.

- *Revenue Streams:* The revenue streams for Indian VFX studios primarily include project-based contracts, where fees are charged for specific projects, and retainer agreements involving long-term contracts with consistent monthly payments. Some studios also engage in co-production agreements, sharing revenue from projects they have invested in, thus diversifying their income sources and aligning their interests with clients.

- *Key Partnerships:* Strategic partnerships are crucial for the Indian VFX industry. Studios often collaborate with software and technology providers such as Autodesk, Adobe, and Foundry to access advanced tools and solutions. They also partner with training institutes to ensure a steady supply of trained professionals. Collaborations with international studios facilitate global project execution and knowledge exchange, enhancing the industry's competitive edge.

- ***Cost Structure***: The cost structure of Indian VFX studios is largely defined by personnel costs, including salaries for artists, technicians, and administrative staff. Investment in technology and infrastructure, such as software, hardware, and studio facilities, represents another significant expense. Continuous training and development are essential for keeping the workforce skilled and competitive, while marketing and sales efforts are necessary for acquiring and maintaining clients.

Flow of Operations

Pre-Production: Pre-production involves concept development, where VFX teams collaborate with clients to understand their creative vision and requirements. This phase includes storyboarding to visually represent scenes and outline VFX needs. Budgeting and scheduling are also crucial, as they involve estimating costs and timelines for project completion.

Production: During production, VFX teams focus on asset creation, which involves designing characters, environments, and other digital elements. On-set supervision is critical to ensure that VFX requirements are met during live-action shooting, maintaining consistency with the project's creative vision.

Post-Production: Post-production is a multi-step process that includes compositing, where digital assets are integrated with live-action footage. Animation and motion capture bring characters and environments to life, while rendering finalizes the visual quality of scenes. Editing and review involve continuous feedback loops with clients to refine the output and ensure satisfaction.

Quality Control: Quality control is a vital aspect of the VFX process, involving internal reviews to ensure the output meets high standards. Regular client approvals are conducted to incorporate feedback and make necessary revisions, ensuring the final product aligns with client expectations.

Delivery: The final stage of operations involves delivering the completed project in the required formats, ready for distribution. Archiving is also an important part of the process, as it involves storing project files for future reference or potential alterations.

Components of the VFX Ecosystem

The VFX industry thrives on a well-coordinated interplay of three key components: software, services, and hardware. Each plays a crucial role in transforming ideas into the dazzling visuals seen on the screen.

Software

VFX relies on a vast array of specialized software programs. 3D modelling software like Maya and ZBrush[11] allows artists to sculpt digital characters and environments. Animation software like Houdini and Adobe After Effects brings these models to life with movement and special effects. Compositing software like Nuke and Fusion seamlessly merges live-action footage with VFX elements. These programs require significant technical expertise and are constantly evolving, pushing the boundaries of what can be achieved visually.

Services

The VFX industry is a collaborative effort. VFX studios offer a wide range of services, from concept art and pre-visualization (creating a visual roadmap for the VFX) to modeling, animation, simulation (creating realistic effects like fire or explosions), and compositing. VFX studios also employ rotoscopers who meticulously isolate objects from backgrounds using specialized software, and matchmove artists who ensure that CGI elements interact realistically with live-action footage. VFX supervisors oversee the entire process, ensuring all the components come together seamlessly.

Hardware

Running this creative powerhouse requires high-performance hardware. VFX studios rely on powerful workstations with multiple graphics processing units (GPUs) to handle the intensive calculations needed for rendering complex 3D scenes and simulations. Additionally, vast amounts of data storage are needed to house all the digital assets created during the VFX process. Cloud computing is also playing an increasingly important role, allowing studios to access even greater processing power and storage capacity on demand.

Technologies used in the VFX industry.

The VFX industry relies on complex and ever-evolving arsenal of technologies to bring imagination to life on screen.

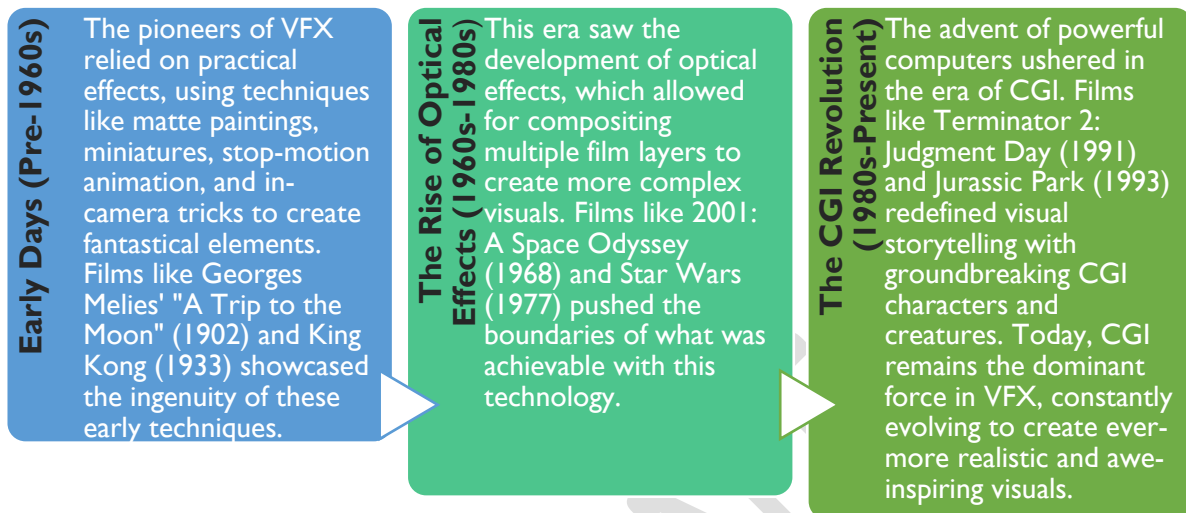| Technology	Brief and its applications
Computer Generated Imagery (CGI)	This is the cornerstone of modern VFX. CGI allows artists to create entirely digital characters, creatures, environments, and objects. From the awe-inspiring dinosaurs in Jurassic Park to the fantastical landscapes of Avatar, CGI is used to bring the impossible to life with stunning realism.

[11] ZBrush is a digital sculpting tool by Maxon.

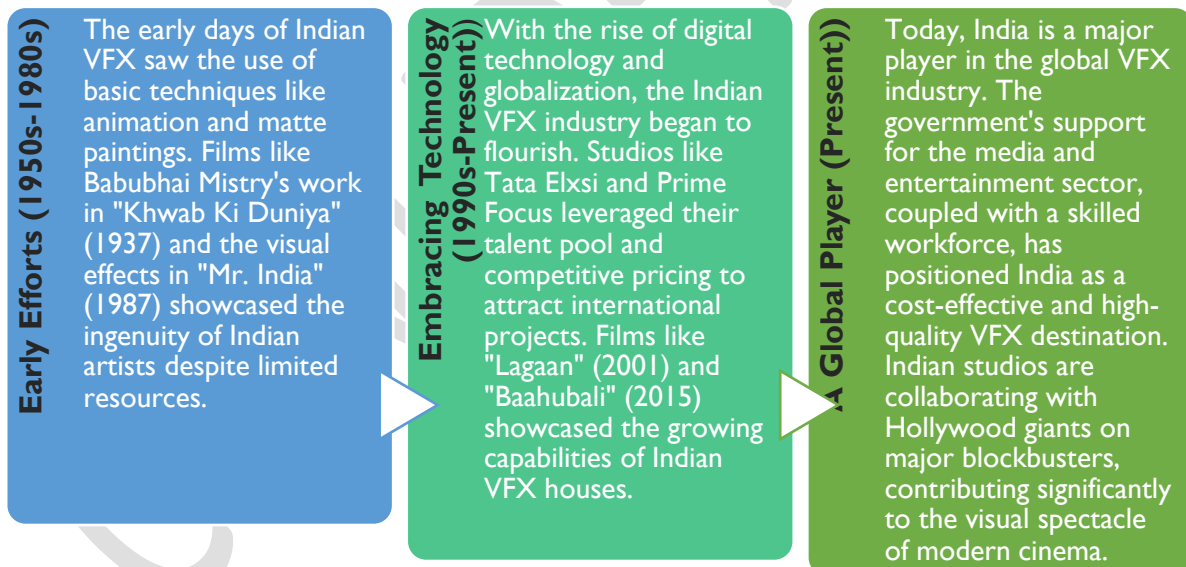|	
Compositing	This is the magic that seamlessly blends live-action footage with VFX elements. Compositing artists use sophisticated software to match lighting, color, and motion, ensuring a believable and cohesive final image. From adding explosions to cityscapes to integrating dragons into battle scenes, compositing is essential for creating a unified visual experience.
Motion Capture (Mocap)	This technology records the movements of actors or objects, which can then be used to animate digital characters. Mocap allows for incredibly realistic and nuanced character animation, as seen in films like Gollum in Lord of the Rings or the Hulk in the Marvel Cinematic Universe.
3D Modeling & Animation	3D modeling software allows artists to create digital representations of objects, characters, and environments. These models can then be animated to create movement and lifelike interactions within the virtual world. 3D animation is used for everything from creating realistic cars for chase sequences to animating fantastical creatures for fantasy films.
Green Screen & Virtual Production	Green screens (also known as chroma key) replace the background behind actors with a digital environment. This allows filmmakers to create scenes in fantastical locations or even outer space without ever leaving the studio. Virtual production takes this a step further by using real-time rendering technology to display the virtual environment on set, allowing actors and directors to see the final scene as they film. This technique is revolutionizing filmmaking by offering greater flexibility and creative control.

Application of VFX in Motion Picture Industry

Evolution of VFX usage in motion picture industry

Global VFX Evolution

Early Days (Pre-1960s)
The pioneers of VFX relied on practical effects, using techniques like matte paintings, miniatures, stop-motion animation, and in-camera tricks to create fantastical elements. Films like Georges Melies' "A Trip to the Moon" (1902) and King Kong (1933) showcased the ingenuity of these early techniques.

The Rise of Optical Effects (1960s-1980s)
This era saw the development of optical effects, which allowed for compositing multiple film layers to create more complex visuals. Films like 2001: A Space Odyssey (1968) and Star Wars (1977) pushed the boundaries of what was achievable with this technology.

The CGI Revolution (1980s-Present)
The advent of powerful computers ushered in the era of CGI. Films like Terminator 2: Judgment Day (1991) and Jurassic Park (1993) redefined visual storytelling with groundbreaking CGI characters and creatures. Today, CGI remains the dominant force in VFX, constantly evolving to create ever-more realistic and awe-inspiring visuals.

The Rise of the Indian VFX Powerhouse

Early Efforts (1950s-1980s)
The early days of Indian VFX saw the use of basic techniques like animation and matte paintings. Films like Babubhai Mistry's work in "Khwab Ki Duniya" (1937) and the visual effects in "Mr. India" (1987) showcased the ingenuity of Indian artists despite limited resources.

Embracing Technology (1990s-Present)
With the rise of digital technology and globalization, the Indian VFX industry began to flourish. Studios like Tata Elxsi and Prime Focus leveraged their talent pool and competitive pricing to attract international projects. Films like "Lagaan" (2001) and "Baahubali" (2015) showcased the growing capabilities of Indian VFX houses.

A Global Player (Present)
Today, India is a major player in the global VFX industry. The government's support for the media and entertainment sector, coupled with a skilled workforce, has positioned India as a cost-effective and high-quality VFX destination. Indian studios are collaborating with Hollywood giants on major blockbusters, contributing significantly to the visual spectacle of modern cinema.

VFX spending pattern in motion picture industry

Globally

- *Blockbuster Dominance:* Hollywood blockbusters typically lead the pack in VFX spending. Studios invest heavily in creating visually stunning spectacles, often allocating a significant portion (20-50% or more) of their production budgets to VFX. Films like "Avatar" and

"Avengers: Endgame" serve as prime examples, showcasing the incredible possibilities and high costs associated with cutting-edge VFX.

- *Genre-Specific Spending:* VFX spending varies depending on the genre. Films in the sci-fi[12], fantasy, and superhero genres typically have higher VFX budgets compared to dramas or comedies. This reflects the need for elaborate creature creation, futuristic environments, and fantastical elements.

- *The Rise of Streaming Services:* The rise of streaming giants like Netflix and Disney+ has significantly impacted VFX spending patterns. These platforms compete for viewers by offering visually spectacular content. Studios working with streaming services are increasingly allocating larger budgets to VFX, creating high-quality shows that rival Hollywood blockbusters.

India

Strategic Investment: Indian filmmakers are increasingly recognizing the power of VFX to enhance storytelling and create visually spectacular experiences. While budgets may not yet rival Hollywood blockbusters, there's a strategic shift towards allocating a larger share of production costs to VFX. Big-budget Indian films like "RRR"[13] and "Brahmastra" are testaments to this trend, with VFX budgets reaching 25-30% of their total production costs.

Focus on ROI: Indian filmmakers are often budget conscious. VFX spending tends to be more targeted, focusing on key scenes or elements that will have the most significant impact on viewers. This approach ensures a strong return on investment (ROI) for VFX-heavy sequences.

Government Incentives: The Indian government's support for the VFX industry plays a role in spending patterns. Initiatives like tax breaks and financial reimbursements incentivize filmmakers to utilize VFX in their projects, potentially leading to increased spending in this area.
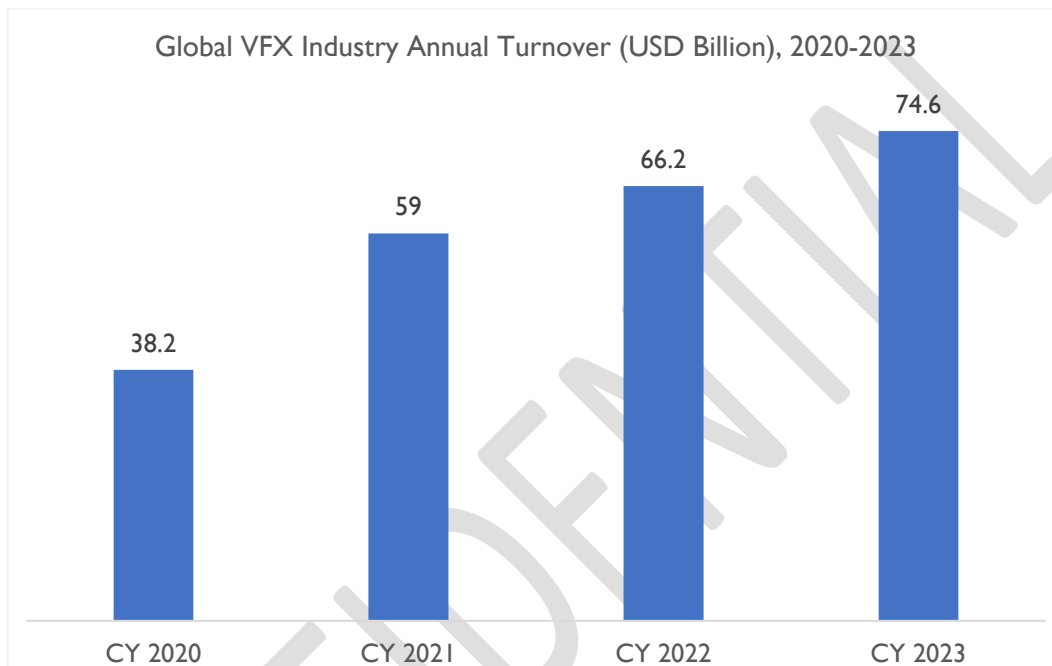
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[12] Science fiction.
[13] RRR is an Indian epic period action-drama film released in 2022.

Global VFX industry Outlook

Market Scenario

The global VFX industry is experiencing a period of significant growth, with market revenue steadily climbing in recent years. The market revenue has grown from USD 38.2 billion in CY 2020 to USD 74.6 billion in CY 2023, representing a CAGR of approximately 25%. This substantial growth indicates a thriving industry fuelled by several key factors.

Global VFX Industry Annual Turnover (USD Billion), 2020-2023

	CY 2020	CY 2021	CY 2022	CY 2023
Value	38.2	59	66.2	74.6

Source: Dun and Bradstreet Research and Estimates

The rise of streaming services like Netflix and Disney+ has created a constant demand for fresh, visually captivating content. Studios are increasingly relying on VFX to enhance their productions and differentiate themselves in a competitive market. Additionally, advancements in VFX technology, such as more powerful computers and innovative software, allow for the creation of ever-more realistic and awe-inspiring visuals. This, in turn, fuels audience demand for immersive and visually spectacular experiences, further propelling the VFX market.

The global box office is experiencing a welcome rebound alongside the booming VFX industry. According to the Motion Picture Association's report, movie ticket sales jumped to USD 21.3 billion in CY 2021, an 81% increase from the pandemic-stricken year of 2020. This resurgence in moviegoing is fueling the demand for VFX-laden films.

This trend aligns perfectly with the impressive growth of the VFX market, as highlighted previously which showed a jump from USD 38.2 billion in CY 2020 to USD 74.6 billion in CY 2023. This increased demand for VFX can be further attributed to the significant rise in film production in CY 2023. Countries like India (347 films), Japan (323 films), China (441 films), United Kingdom (315 films), Italy

(272 films) and Spain (263 films) all saw major increases in output in CY 2023. With more movies being made, particularly in VFX-friendly locations like India, the demand for skilled VFX artists and cutting-edge visual effects is surging, propelling the VFX market even further.

Market Segmentation

The dominance of the movie segment is evident, contributing a significant USD 27.4 billion, or 36.7% of the total global VFX market revenue in CY 2023. This dominance reflects the ever-increasing demand for visually spectacular experiences in the film industry. Studios are heavily reliant on VFX to create fantastical worlds, enhance action sequences, and bring stories to life in a captivating way. The blockbuster success of VFX-heavy films further fuels this demand, creating a positive feedback loop.
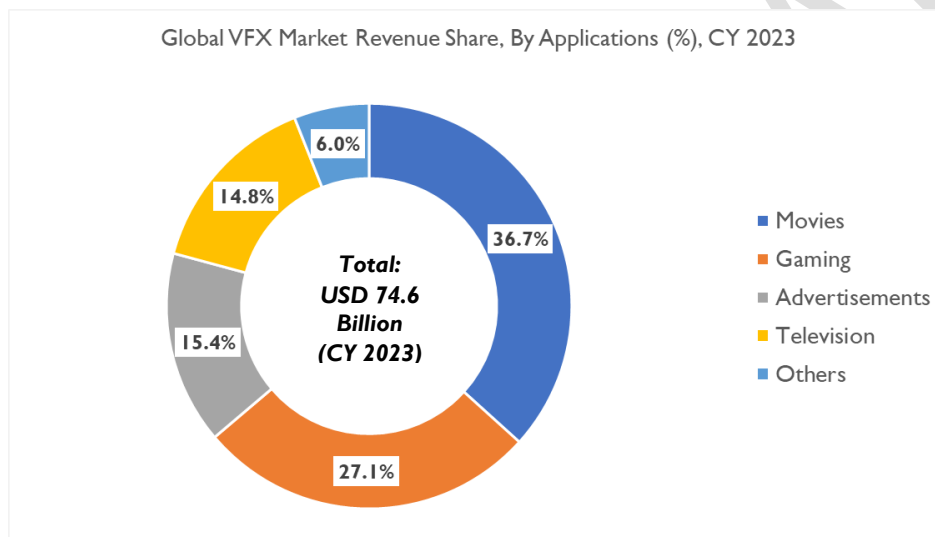
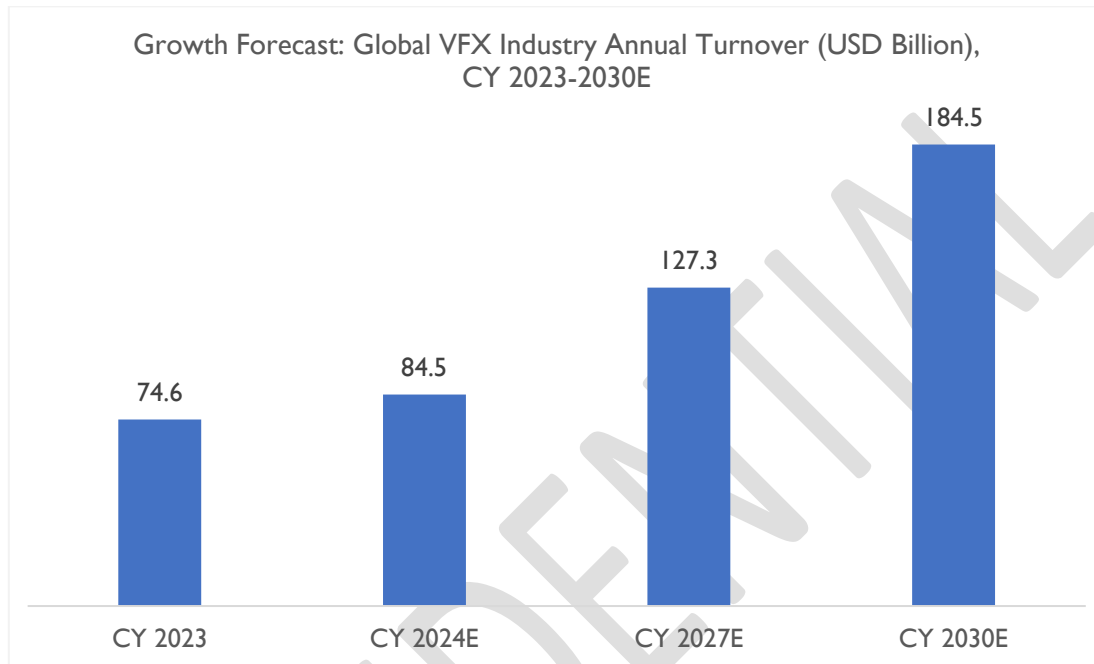Source: Dun and Bradstreet Research and Estimates

Following closely behind is the gaming segment, with a revenue contribution of USD 20.2 billion, translating to 27.1% of the total market share. The rise of high-fidelity video games with expansive worlds and immersive experiences is driving the demand for cutting-edge VFX. Game developers are increasingly utilizing VFX techniques to create realistic characters, environments, and visual effects, blurring the lines between games and cinematic experiences.

Coming in at USD 11.5 billion and USD 11 billion respectively, the advertisement and television segments hold a respectable share of the market, contributing 15.4% and 14.8% in CY 2023. Advertisers are leveraging VFX to create visually stunning commercials that grab viewers' attention and leave a lasting impression. Television shows, particularly in the sci-fi, fantasy, and action genres, are increasingly relying on VFX to enhance their production value and compete in a crowded entertainment landscape.

Finally, the "Others" segment, encompassing a diverse range of applications such as virtual reality experiences and architectural visualizations, contributed USD 4.5 billion, representing 6.0% of the total market share.

Growth Forecast

The global VFX industry is on a trajectory for impressive growth, with market revenue expected to surge in the coming years. The market revenue is projected to jump from USD 74.6 billion in CY 2023 to a staggering USD 184.5 billion by CY 2030, reflecting a CAGR exceeding 13.5%. This upward trend signifies a thriving industry fuelled by several key factors.

Growth Forecast: Global VFX Industry Annual Turnover (USD Billion), CY 2023-2030E

CY 2023	CY 2024E	CY 2027E	CY 2030E
74.6	84.5	127.3	184.5

Source: Dun and Bradstreet Research and Estimates

One major driver is the insatiable demand for high-quality, visually captivating content. Streaming services like Netflix and Disney+ are constantly churning out new shows and movies, each vying for viewers' attention. VFX plays a pivotal role in creating visually stunning experiences that differentiate these offerings and keep audiences glued to their screens.

AI (Artificial Intelligence) and ML (Machine Learning) are poised to revolutionize the VFX workflow. AI has the potential to revolutionize the VFX industry by automating repetitive tasks and assisting with complex simulations. Machine learning algorithms can analyse vast amounts of data to create realistic textures, lighting effects, and even automate character animation processes. While AI won't replace VFX artists entirely, it will undoubtedly become a powerful tool, allowing artists to focus on higher-level creative tasks, ultimately leading to faster production cycles and a potential cost reduction.

The concept of the Metaverse, a persistent, shared virtual world, holds immense potential for the future of entertainment. VFX studios will be at the forefront of crafting visually stunning experiences within the Metaverse, shaping how people interact and consume entertainment in this new digital space. Similarly, VR (Virtual Reality) experiences are becoming increasingly sophisticated, demanding high-quality VFX to create realistic and believable virtual worlds.

Furthermore, advancements in VFX technology are continuously pushing the boundaries of what's possible. Powerful computers and cutting-edge software allow artists to create hyper-realistic creatures, environments, and effects, further captivating audiences and driving demand for VFX-heavy productions. This creates a positive feedback loop - as audiences crave more immersive visuals, studios invest heavily in VFX, leading to even more innovation and market growth.

Looking beyond the immediate factors, the rise of virtual production techniques is poised to revolutionize filmmaking. Virtual production allows for real-time rendering of VFX elements on set, streamlining workflows and offering directors greater creative control. This technology is expected to become more widely adopted in the coming years, further propelling the VFX market.

Indian Broadcasting and Entertainment Sector[14]

In 2023, the Indian media and entertainment (M&E) sector saw substantial growth, with annual addition of INR 180 billion, the industry size grew to INR 2.32 trillion (USD 27.9 billion), reflecting an 8.4% rise. This growth has propelled the sector to expand at a CAGR of ~6% from INR 1.91 trillion in CY 2019 to INR 2.55 trillion in CY 2024 surpassing pre-pandemic levels, although traditional segments like television, print, and radio are yet to fully recover to their 2019 figures.
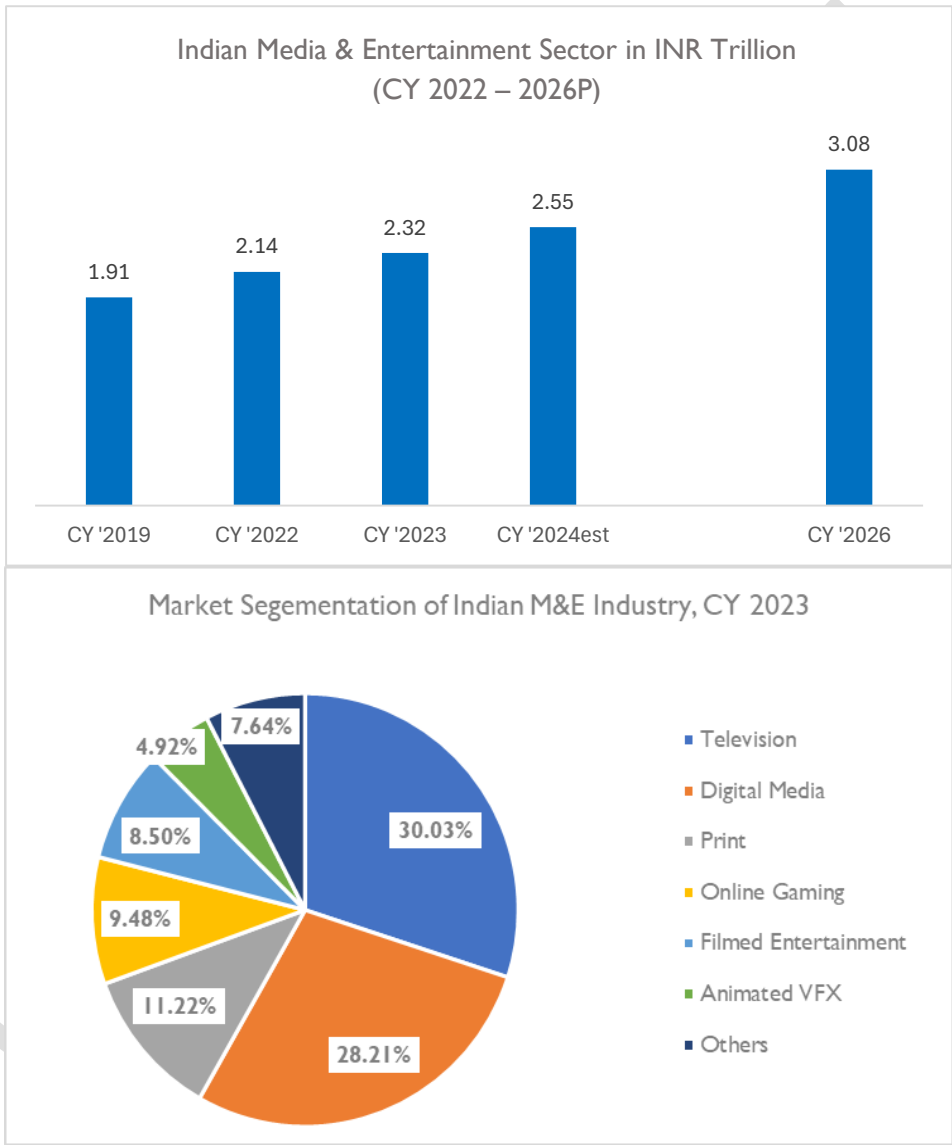
Sources: Dun & Bradstreet Desk Research

While television remains the largest segment, digital media is on track to surpass it by CY 2024, with the overall M&E sector expected to expand at a growth rate of 9.9% from 2.32 trillion in CY 2023 to

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[14] Reinvent report on India's media and entertainment sector, 2024. | Exchange Rate used is 1 USD = 0.012 INR.

INR 2.55 trillion by CY 2024 and further expand at a CAGR of ~9.9% from INR 2.32 trillion in CY 2023 to reach INR 3.08 trillion by CY 2026.

A significant driver of this expansion has been the increasing demand for visual effects (VFX), spurred by the rising popularity of Indian films, television shows, and web series. VFX has become an essential component for filmmakers aiming to create visually stunning content, fundamentally reshaping the industry. This growth presents a significant opportunity for India in the global VFX market. With rapid digital transformation, driven by an increasing number of internet users and affordable smartphones, India is well-positioned to become a major player in the VFX industry. The share of new media, including digital platforms and online gaming, grew from 20% in 2019 to 37.7% in 2023, while traditional media's such as Television, Radio, Print media (newspapers, magazines), Cinema share declined from 76% to 57% during the same period. Segments such as online gaming, filmed entertainment, live events, and out-of-home media experienced robust growth, collectively contributing 48% to the sector's overall expansion.

The shift in consumer behaviour towards on-demand and personalized content through streaming platforms has significantly increased the demand for VFX, with more original titles being commissioned. As a result, Indian studios are gaining global recognition, with international production houses increasingly outsourcing VFX work to India due to its cost-effectiveness and high-quality services. This presents a golden opportunity for India to capture a larger share of the global VFX market, driven by its growing capabilities and reputation in this space.

Despite challenges such as piracy, low broadband penetration in rural areas, and rising competition from digital platforms, the Indian broadcasting and entertainment sector is poised for continued expansion. With the rising demand for high-quality visual content, technological advancements, and a supportive market environment, India is well on its way to becoming a key player in the global VFX landscape.

Indian VFX industry Outlook

Role of India in global VFX market

India is rapidly carving a niche for itself as a major player in the global VFX industry with its unique blend of talent, cost-effectiveness, and technological expertise. This rise can be attributed to two key factors: the range of services offered by Indian VFX studios and the country's growing prominence as a hub for international film productions.

Key Services Provided

Indian VFX studios offer a comprehensive range of services that cater to the diverse needs of the global film industry. These services include:

- ***3D Modeling & Animation:*** Indian artists excel at creating high-quality 3D models of characters, creatures, and environments, bringing life to any imaginable concept.
- ***Compositing & VFX Integration:*** Indian studios are adept at seamlessly integrating VFX elements with live-action footage, ensuring a realistic and believable final product.
- ***Motion Capture & Rotoscoping:*** Studios leverage motion capture technology to create lifelike character animation, while rotoscoping allows for the precise extraction of objects from live-action footage.
- ***Pre-visualization & Concept Art:*** Indian artists play a crucial role in the pre-production phase, creating detailed storyboards and concept art that visualize the director's vision before filming commences.

These services, delivered by a skilled and talented workforce, make Indian VFX studios a compelling option for production houses worldwide.

Emergence as a VFX Hub

Several factors have contributed to India's rise as a VFX hub for international productions. Firstly, India boasts a large pool of talented and passionate VFX artists, many graduating from well-established VFX training programs. Indian Media & Entertainment industry to employ over 2 million people, with a significant portion dedicated to VFX. Secondly, Indian studios offer their services at a competitive cost compared to traditional VFX hubs like Los Angeles. This cost advantage, coupled with the high quality of work produced, makes India an attractive destination for studios worldwide. Furthermore, the Indian government has actively supported the growth of the media and entertainment sector, creating a supportive environment for VFX companies to thrive. This includes initiatives like establishing centers of excellence for animation and VFX education and offering tax breaks for VFX work done in India.

The success of Indian VFX studios is evident in their contributions to major Hollywood blockbusters. Some examples of Indian VFX studios contributions:

- **Avengers: Endgame (2019):** Indian studios contributed to the film's stunning visuals, including the recreation of Thanos' CGI armor and the creation of digital environments.
- **The Jungle Book (2016):** A large portion of the film's photorealistic animals and environments were created by Indian VFX studios.
- **Life of Pi (2012):** The film's Academy Award-winning visual effects, particularly the creation of the digital tiger, were heavily reliant on Indian VFX expertise.

These are just a few examples of India's growing influence in the global VFX market. With its skilled workforce, competitive pricing, and government support, India is well-positioned to solidify its position as a leading VFX hub in the years to come.
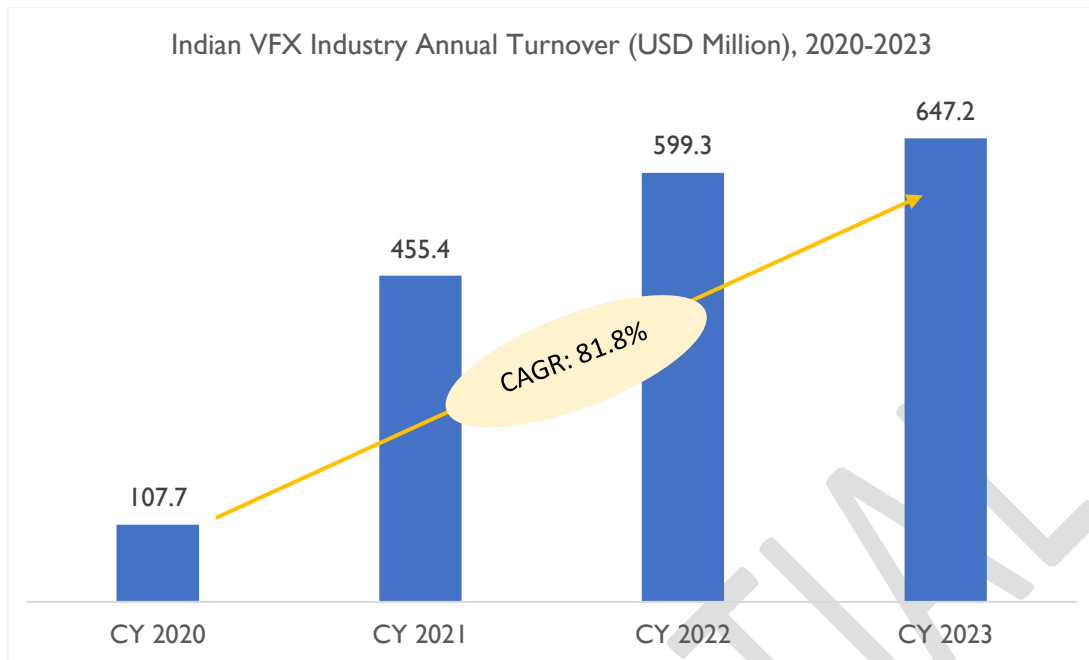
These factors have collectively propelled India to become a major player in the global VFX market. International studios are increasingly collaborating with Indian VFX houses on major blockbusters, recognizing the exceptional talent, competitive pricing, and the range of services offered.

India's share in the Global VFX market

The global VFX market is expected to experience significant growth, with its size projected to increase from USD 84.5 billion in 2024 (estimated) to USD 184.5 billion in 2030. The Indian VFX market currently accounts for a miniscule share of less than 1% in the global VFX space. However, India is making a rapid progress and is expected to benefit from the increasing global VFX market. India's VFX market is estimated to grow at 15.8% CAGR between CY 2024-2030 against global VFX market projected CAGR of 13.9% between CY 2024-2030 with its share expected to grow to above 1% by 2030.

Market Scenario

The Indian VFX industry is experiencing a phenomenal growth spurt, witnessing a surge in market revenue over the past few years. The market has grown exponentially, from USD 107.7 million in CY 2020 to USD 647.2 million in CY 2023, reflecting an impressive CAGR of approximately 81.8%. This translates to a staggering growth rate exceeding 500% in just three years. This remarkable rise signifies a thriving domestic market and a growing global presence for Indian VFX studios.

Indian VFX Industry Annual Turnover (USD Million), 2020-2023

647.2

599.3

455.4

CAGR: 81.8%

107.7

CY 2020   CY 2021   CY 2022   CY 2023

Source: Dun and Bradstreet Research and Estimates

Firstly, the Indian government's initiatives to promote the media and entertainment sector have created a supportive environment for VFX companies to thrive. Tax breaks, infrastructure development, and support for skill development programs have nurtured the growth of a domestic talent pool. A National Film Policy has been established, with a focus on harnessing the potential of the animation segment. This suggests a recognition of animation's importance within the broader AVGC (Animation, Visual Effect, Gaming, and Comic) landscape.

The government has committed to setting up a National Centre of Excellence for Animation, Gaming, Visual Effects and Comics in Mumbai. This centre will likely provide crucial training, resources, and infrastructure to nurture talent across all these creative sectors. To further incentivize growth, the government has unveiled a financial program offering reimbursements for VFX, animation, and post-production projects. Studios can receive up to 30% back on a minimum spend, with an additional 5% bonus for projects that incorporate significant Indian content. This financial support makes it more attractive for studios to utilize Indian services for their projects, further boosting the domestic industry.

Secondly, India boasts a large pool of skilled and well-trained VFX artists. Educational programs focused on VFX are flourishing, ensuring a steady stream of talent to meet the ever-increasing demand. This skilled workforce, coupled with competitive pricing compared to traditional VFX hubs, makes Indian studios an attractive option for international productions.

Thirdly, the surge in demand for high-quality content from streaming services like Netflix and Disney+ has benefitted the Indian VFX industry. As these platforms churn out new shows and movies, Indian studios are well-positioned to contribute their expertise in creating visually captivating content.
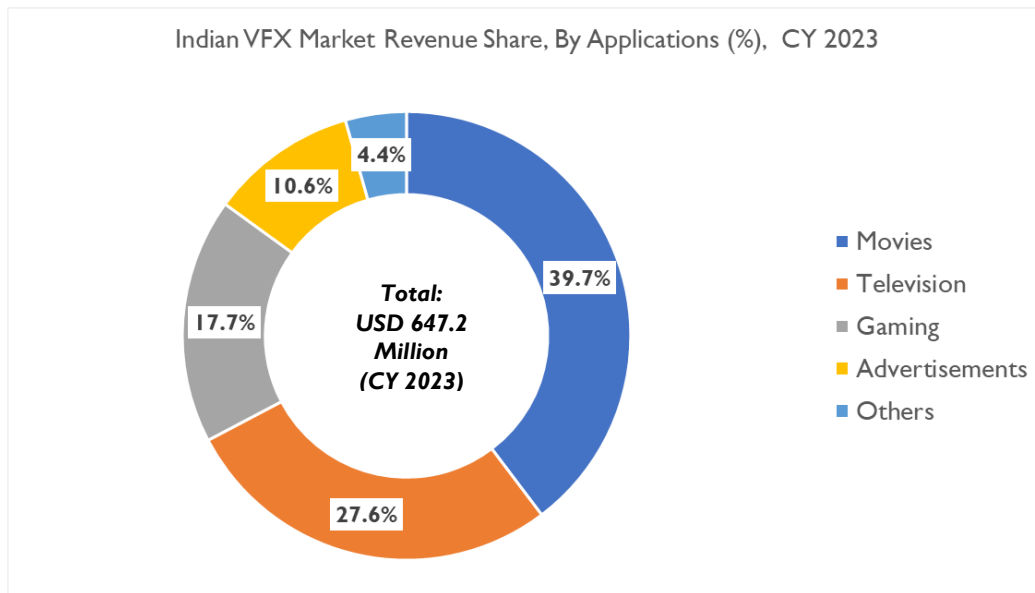
The Indian VFX industry's growth isn't limited to just domestic projects. With its competitive edge and growing talent pool, India is actively collaborating with Hollywood studios on major blockbusters. This collaborative approach is pushing the boundaries of visual effects and solidifying India's position as a prominent player in the global VFX market.

Market Segmentation

The movie segment reigns supreme, contributing a significant USD 256.9 million, or 39.7% of the total VFX market revenue in India for CY 2023. This dominance reflects the growing popularity of visually spectacular Indian cinema, particularly within genres like action, fantasy, and sci-fi. Studios are increasingly relying on VFX to create larger-than-life experiences and enhance storytelling, leading to a high demand for skilled VFX artists specifically focused on movie production.

The dominance of the movie segment in the Indian VFX industry is directly linked to the recent resurgence of Indian cinema. With a staggering 157.4 million people attending movies in 2023, a 29% increase compared to the previous year and exceeding pre-pandemic levels by 8%, there's a clear audience hunger for visually captivating experiences. This renewed interest in cinema is fuelling a significant rise in VFX budgets for Indian films.

Big-budget productions like "Brahmastra" and "RRR" are allocating a whopping 25-30% of their production costs to VFX, a testament to the growing importance of visual effects in contemporary Indian cinema. This trend perfectly aligns with the movie segment contribution capturing a significant 39.7% share of the total VFX market revenue in India for CY 2023. As audiences demand more immersive and visually spectacular experiences, Indian filmmakers are strategically utilizing VFX to enhance storytelling, create larger-than-life visuals, and ultimately, draw viewers back to the theatres. This flourishing collaboration between filmmakers and the VFX industry is propelling the movie segment to the forefront of the Indian VFX market and shaping the future of visual storytelling in Indian cinema.

Indian VFX Market Revenue Share, By Applications (%), CY 2023

Total: USD 647.2 Million (CY 2023)

- Movies: 39.7%
- Television: 27.6%
- Gaming: 17.7%
- Advertisements: 10.6%
- Others: 4.4%

Source: Dun and Bradstreet Research and Estimates

Following closely behind is the television segment, with a revenue contribution of USD 178.6 million, translating to 27.6% of the total market share. The rise of streaming platforms and high-budget television shows in India is driving the demand for VFX in this sector. Television shows are leveraging VFX to create visually captivating narratives, compete with global content, and attract viewers in a crowded entertainment landscape.

The gaming segment emerges as a strong contender, contributing USD 114.6 million, or 17.7% of the market share. The Indian mobile gaming industry is experiencing explosive growth, and developers are turning to VFX to create immersive and visually stunning gaming experiences. This trend is expected to continue as the gaming industry matures and the demand for high-fidelity games soars.

Advertising takes a respectable share of the market with USD 68.6 million and 10.6% contribution. Advertisers are leveraging VFX to create visually stunning commercials that grab viewers' attention and leave a lasting impression, especially in a competitive advertising environment.

Finally, the "Others" segment, encompassing a diverse range of applications such as architectural visualizations and educational content, contributed USD 28.5 million, representing 4.4% of the total market share.

India's burgeoning VFX landscape

India's VFX industry has undergone a remarkable transformation, expanding far beyond its initial confines of a few metropolitan cities. Once predominantly concentrated in Mumbai, Bengaluru, Pune, Hyderabad, Chennai, and Kochi, the industry has witnessed a prolific growth spurt, with studios mushrooming across the country. Mumbai continues to reign supreme as the VFX hub, boasting an impressive 600 to 700 studios. Bengaluru follows closely with around 500 studios, while Hyderabad

and Pune each accommodate a substantial 300 to 400. Chennai houses approximately 300 studios, while Noida and Gurgaon have established a foothold with 150 studios apiece. Kolkata and Indore contribute with 100 studios each, and the industry's footprint extends further to Bhopal, Ahmedabad, and Kochi. This decentralized growth is further accentuated by the emergence of studios in smaller towns, signaling a democratization of the VFX sector and tapping into a wider pool of talent and resources.
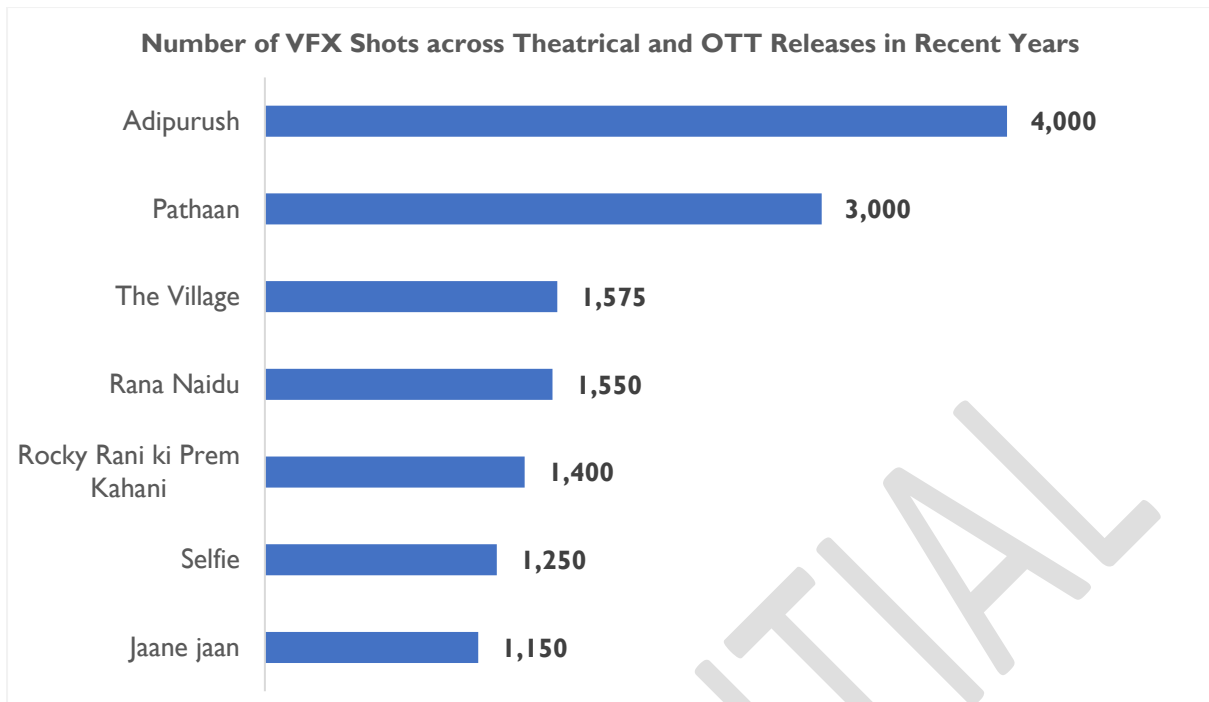
Viewership Rate

The Indian animation and VFX industry have been experiencing significant growth, with the VFX segment playing a substantial role in this expansion. The demand for VFX content is on the rise, driven by its increasing incorporation in films, OTT platforms, and advertising. This trend reflects a robust growth trajectory as VFX continues to gain prominence in various media formats.

Several factors are driving the growth of VFX content viewership in India. There is a rising global demand for high-quality visuals, accompanied by the continuous expansion of digital streaming platforms. Domestic productions are increasingly incorporating advanced VFX techniques, contributing significantly to this growth trend. Additionally, the cost-effective nature of VFX services makes it an attractive option for filmmakers and content creators looking to enhance their storytelling with visually captivating elements.

Trends indicate that audience engagement with VFX content is increasing, particularly among younger demographics such as Gen Z (Generation Z or Zoomers) and Millennials, who favour on-demand content available through streaming platforms. Films with high VFX elements, have seen substantial increases in viewership, showcasing the demand for visually captivating storytelling. While the growth outlook is promising, challenges such as piracy, limited broadband penetration in rural areas, and increasing competition from digital platforms could impact future growth. Despite these challenges, the overall trajectory remains positive, with expectations for continued expansion in viewership and production quality fuelled by advancements in technology and increasing investment in VFX across various media.

VFX usage pattern in India: adoption in India

The landscape of Indian cinema is undergoing a significant transformation, with VFX adoption becoming increasingly prevalent across theatrical and OTT releases. Starting with a moderate number of shots (1,150-1,575) in films like "Jaane Jaan," "Selfie," "Rocky Rani ki Prem Kahani," "Rana Naidu," and "The Village," the data reveals a clear upward trajectory. This suggests a growing comfort level with incorporating VFX into the filmmaking process. However, the figures for "Pathaan" (3,000 VFX shots) and "Adipurush" (4,000 VFX shots) showcase a significant leap. These numbers suggest a paradigm shift towards VFX-heavy productions in Indian cinema.

Number of VFX Shots across Theatrical and OTT Releases in Recent Years

Film	VFX Shots
Adipurush	4,000
Pathaan	3,000
The Village	1,575
Rana Naidu	1,550
Rocky Rani ki Prem Kahani	1,400
Selfie	1,250
Jaane jaan	1,150

VFX adoption in Indian cinema is no longer a novelty; it's become a driving force.

- **Beyond Spectacle:** While creating breathtaking visuals remains a core function, VFX in Indian cinema is moving beyond just spectacle. Filmmakers are strategically using VFX to enhance storytelling, create believable environments, and add emotional depth to characters. For instance, subtle VFX techniques can be used to create a period setting or enhance a character's expressions, seamlessly integrating with the live-action footage.

- **Genre-Bending Narratives:** VFX is empowering Indian filmmakers to explore new narrative possibilities. Genres like sci-fi, fantasy, and mythology, which were previously limited by practical effects, are now flourishing with the help of VFX. This allows for the creation of fantastical creatures, futuristic landscapes, and other elements that were once unimaginable on screen.

- **Regional Language Integration:** The rise of VFX is not limited to mainstream Hindi cinema. Regional language films are increasingly incorporating VFX to cater to their local audiences. This not only elevates the production value but also allows filmmakers to explore regional myths and folklore in a visually captivating way.

- **Cost-Effective Storytelling**: VFX can sometimes be a more cost-effective way to achieve certain visuals compared to traditional methods. For example, creating a complex action sequence through VFX might be more affordable than filming it with practical effects and stunts. This allows filmmakers to stretch their budgets further and achieve their creative vision.

- **Evolving Audience Preferences:** Modern Indian audiences are increasingly drawn to visually spectacular experiences. The success of VFX-heavy films like "Baahubali" franchise and "2.0"

demonstrates the audience appetite for visually stunning narratives. This shift in audience preference is pushing filmmakers to embrace VFX as a crucial storytelling tool.

Adoption by streaming platform

The Indian streaming landscape is witnessing a paradigm shift in the adoption of VFX. Previously, budget constraints often limited the use of visual effects in web series and online content. However, a confluence of factors is driving streaming platforms to embrace VFX with increasing openness and expanding budgets.

Firstly, the growing popularity of Indian streaming platforms has fueled competition for viewers. Platforms like Netflix, Disney+ Hotstar, and Amazon Prime Video are vying for audience attention with a constant stream of original content. To stand out, these platforms are recognizing the power of visually captivating content. VFX can elevate the production value of web series, allowing for the creation of immersive worlds, fantastical creatures, and visually stunning action sequences. This enhanced visual spectacle helps these shows compete with global content and attract a wider audience base.

With the promise of wider viewership and lucrative deals, Indian streaming platforms are increasingly greenlighting projects with larger budgets dedicated to VFX. This has led to a growing demand for skilled VFX artists and studios within the country. Recognizing this opportunity, several VFX studios have sprouted up in India, catering specifically to the needs of streaming platforms. These studios offer competitive pricing while maintaining high-quality standards, making them an attractive option for platforms looking to stretch their production budgets further.

This influx of streaming platforms and the rise of domestic VFX studios have created a positive feedback loop. Streaming platforms are driving the demand for VFX-heavy content, leading to the growth of VFX studios. In turn, these studios are providing the expertise and resources necessary to create visually stunning content that keeps viewers glued to their screens. This collaborative environment is fostering innovation and pushing the boundaries of VFX in Indian streaming productions.

Secondly, the success of VFX-heavy Indian web series has demonstrated its potential to drive viewership. Shows like "The Family Man" (Amazon Prime Video) and "Sacred Games" (Netflix) have garnered critical acclaim and audience praise for their exceptional use of VFX. This success story underscores the power of VFX in creating compelling narratives that resonate with viewers, ultimately leading to higher subscription rates and platform loyalty.

Thirdly, the Indian VFX industry's growth and competitive pricing make it an attractive option for streaming platforms. The availability of skilled VFX artists and studios offering high-quality services at reasonable costs allows platforms to invest in visual effects without breaking the bank. This accessibility

empowers streaming services to experiment with VFX and explore its potential in a cost-effective manner.

Finally, the evolving tastes of Indian audiences are playing a crucial role. As viewers become accustomed to the high production values and stunning visuals of global streaming content, their expectations for Indian web series are rising. Streaming platforms are responding to this demand by allocating larger budgets to VFX, allowing for a more visually polished and immersive viewing experience.

Demand and Supply Scenario of VFX content.

The demand and supply dynamics of VFX content in India reflect the industry's rapid growth and transformation. As the entertainment landscape continues to evolve, both the demand for and supply of VFX content have witnessed significant changes driven by various factors.

The demand for VFX content in India is primarily driven by the burgeoning entertainment sector, which includes films, television, and the increasingly popular OTT platforms. Indian audiences are showing a strong preference for high-quality, visually appealing content, leading filmmakers, and content creators to incorporate advanced VFX techniques into their projects. This demand is further fuelled by the success of visually stunning films.

In addition to the film industry, other sectors such as advertising, gaming, and virtual reality are increasingly utilizing VFX to enhance the user experience. The global reach of Indian content has also spurred demand, with international audiences appreciating the quality and creativity of Indian VFX work. As digital consumption continues to rise, the demand for VFX content is expected to grow, particularly among younger audiences who favour on-demand and interactive content.

India has emerged as a significant hub for VFX production, with numerous studios providing high-quality services at competitive prices. The country's VFX industry benefits from a large pool of talented artists and technicians skilled in the latest technologies. Indian studios are not only catering to domestic demand but are also attracting international projects, thanks to their reputation for delivering cost-effective and innovative VFX solutions.
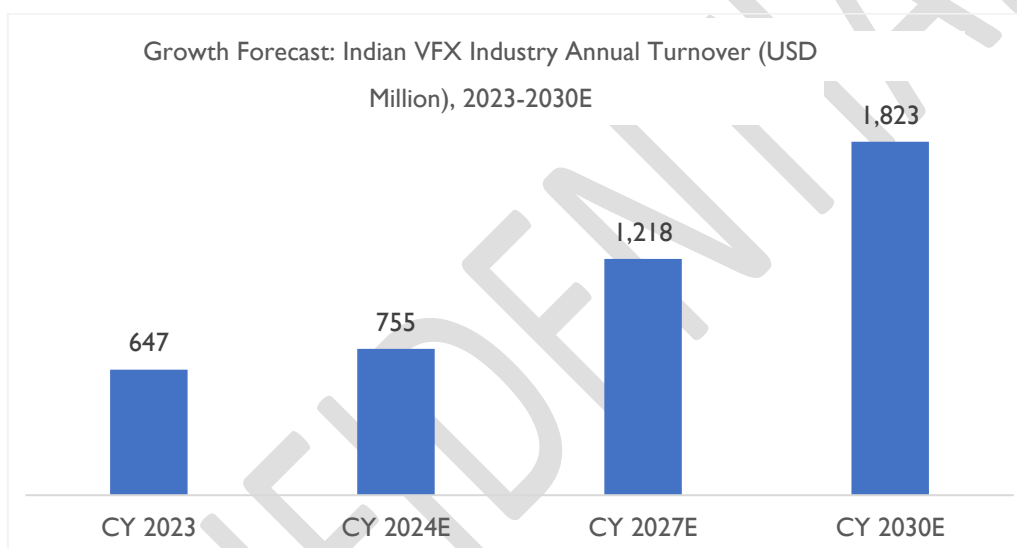
The growth of the VFX industry is supported by various government initiatives aimed at boosting the animation and VFX sector. Initiatives such as the National Centre of Excellence for Animation, Visual Effects, Gaming, and Comics (NCoE) and the Make in India campaign have encouraged investment in infrastructure and skill development, further enhancing the supply capabilities of the industry.

While the demand for VFX content continues to rise, the industry faces challenges in balancing supply. The rapid pace of technological advancement requires continuous upskilling of the workforce to meet the evolving demands of the market. Additionally, issues such as piracy and limited access to advanced technologies in certain regions can impact the supply chain.

Despite these challenges, the Indian VFX industry is well-positioned to meet the growing demand for high-quality content. With ongoing investments in technology, talent development, and infrastructure, the industry is poised to continue its upward trajectory, solidifying India's position as a global leader in VFX production. The balance between demand and supply is expected to stabilize as the industry matures, driven by innovation and a commitment to excellence in visual storytelling.

Growth Forecast

The Indian VFX industry is poised for a remarkable trajectory, with market revenue expected to surge in the coming years. The market is projected to nearly triple in size, jumping from USD 647 million in CY 2023 to a staggering USD 1,823 million by CY 2030. This translates to a CAGR exceeding 15.9%, signifying a booming industry fuelled by several key factors.

Growth Forecast: Indian VFX Industry Annual Turnover (USD Million), 2023-2030E

CY 2023	CY 2024E	CY 2027E	CY 2030E
647	755	1,218	1,823

Source: Dun and Bradstreet Research and Estimates

India's burgeoning middle class boasts a growing disposable income, leading to increased spending on entertainment experiences. This translates to a higher demand for visually captivating content, propelling the demand for VFX-heavy films, television shows, and video games within the domestic market. The Indian OTT market is experiencing explosive growth, with platforms like Netflix and Disney+ Hotstar vying for viewers. These platforms require a steady stream of high-quality, visually engaging content to compete effectively. Indian VFX studios can cater to this demand by creating visually stunning experiences for domestic audiences, further fuelling market growth.

One major driver is the ongoing resurgence of the Indian film industry. As moviegoing flourishes and audiences demand visually spectacular experiences, filmmakers are increasingly relying on VFX to create captivating narratives and larger-than-life visuals. This spurs a continuous rise in VFX budgets for Indian films, further propelling the VFX industry. Regional language cinema in India is also experiencing a renaissance. Filmmakers are increasingly utilizing VFX to enhance storytelling and

create visually spectacular experiences that resonate with regional audiences. This trend is expected to continue, propelling the demand for VFX talent and expertise catered to diverse regional markets.

Beyond domestic productions, India's VFX prowess is attracting international collaborations. Studios are drawn to India's competitive pricing, skilled workforce, and government support for the industry. This collaborative approach with Hollywood and other international players exposes Indian VFX studios to cutting-edge technologies and workflows, further enhancing their capabilities.

The growth story extends beyond movies. The Indian gaming industry is experiencing explosive growth, and VFX plays a crucial role in crafting immersive gaming experiences. The rise of streaming services also fuels demand for VFX-laden television shows and web series. These factors, coupled with the potential of emerging technologies like virtual reality and augmented reality, create a diverse landscape for future VFX growth.

The Indian government also plays a significant role. Initiatives like the National Film Policy and the National Centre of Excellence for Animation, Gaming, Visual Effects and Comics aim to nurture talent, provide infrastructure, and incentivize studios to utilize Indian VFX services. This government support creates a favorable environment for the industry to flourish.

Access of VFX technology

The access to VFX technology in India has evolved significantly over the past few years, with advancements that have reshaped the capabilities and output of the Indian VFX industry. This progress has been fuelled by technological innovations, investments, and a growing talent pool. Looking ahead, the future of VFX technology in India is poised for even greater transformation.

Current Access to VFX Technology

- Advanced Software and Tools: Indian studios have access to industry-standard software such as Autodesk Maya, Adobe After Effects, and Foundry's Nuke. These tools enable the creation of high-quality visual effects, animation, and CGI, which are now integral to Indian filmmaking.

- State-of-the-Art Studios: India is home to several state-of-the-art VFX studios such as Red Chillies VFX, DNEG (Double Negative) India, and Prana Studios. These studios boast cutting-edge technology and infrastructure, allowing them to undertake complex projects and collaborate on international films.

- Global Collaborations: Indian VFX companies are increasingly collaborating with international studios, gaining access to global expertise and advanced technologies. Such collaborations enhance the skills of Indian artists and elevate the quality of VFX work in Indian cinema.

- Government Support and Initiatives: Initiatives such as Make in India and the National Centre of Excellence for Animation, Visual Effects, Gaming, and Comics (NCoE) provide support in

![dun&bradstreet]

terms of training, infrastructure, and financial incentives, bolstering the growth and technological advancement of the VFX industry.

- **Increased Demand in Indian Cinema:** The demand for high-quality VFX in Indian cinema has grown, driven by blockbuster films such as "Baahubali," "2.0," and "RRR," which have set new standards for visual storytelling. This demand has pushed studios to adopt the latest technologies and techniques.

Prospects of VFX Technology Access

- **Emerging Technologies:** The integration of emerging technologies such as Artificial Intelligence (AI), Machine Learning (ML), Virtual Reality (VR), and Augmented Reality (AR) is expected to revolutionize the VFX industry. These technologies will enable more efficient workflows, realistic effects, and immersive experiences.

- **Expansion of Training and Education:** As the industry grows, there will be a greater emphasis on training and education to build a skilled workforce. Institutions and programs focused on VFX, animation, and digital arts are likely to expand, offering specialized courses and certifications.

- **Increased International Collaborations:** Future collaborations with international studios will continue to drive technological advancements and bring global expertise to Indian shores. This trend will enhance the capabilities of Indian VFX studios and expand their reach in global markets.

- **Focus on Sustainable Practices:** With growing awareness of environmental issues, there will be a shift towards sustainable practices in VFX production. Studios may adopt eco-friendly technologies and workflows to minimize their carbon footprint.

- **Growth of the OTT and Gaming Sectors:** The rise of OTT platforms and the gaming industry in India presents new opportunities for VFX technology. As demand for high-quality content increases, VFX will play a crucial role in creating engaging and visually appealing content across these platforms.

- The access to VFX technology in India has seen remarkable growth, transformed the industry and enabled it to compete on a global scale. With continued advancements in technology, increased international collaborations, and government support, the future of VFX in India looks promising. The integration of emerging technologies and a focus on skill development will further enhance the industry's capabilities, opening new possibilities for creativity and innovation. As the demand for high-quality visual content grows, India's VFX industry is well-positioned to thrive in the coming years.

Research & Development in VFX Industry

Research and Development (R&D) is a critical component in the VFX industry, driving innovation and improving production workflows. By focusing on new techniques, tools, and software tailored specifically for VFX projects, companies can enhance their operational efficiencies and creative outputs. Ongoing investment in R&D enables studios to stay competitive in a rapidly evolving technological landscape, ensuring they can meet both client expectations and industry standards.

- *Advancements in Technology:* Recent advancements in VFX technologies stem largely from dedicated R&D activities. These include the development of real-time rendering capabilities which enable filmmakers to visualize complex scenes instantly, as well as the integration of AI tools that automate routine processes and enhance overall creativity. Innovations, such as cloud-based workflows, have also emerged from R&D efforts, allowing studios to collaborate and scale resources efficiently.

- *Collaboration Between Studios and Tech Companies:* Collaboration between VFX studios and technology firms plays a pivotal role in R&D efforts. Such partnerships aim to integrate advanced technologies, including artificial intelligence (AI) and machine learning (ML), into VFX pipelines. This collaborative approach allows for the exploration of new workflows that significantly improve efficiency and creative possibilities within visual effects production.

- *Future Trends and Growth Areas:* The future of R&D in the VFX industry appears promising, particularly with the ongoing integration of AI and ML technologies. These advancements are expected to revolutionize workflows further, aiding in the automation of repetitive tasks, thereby allowing artists to focus on higher-level creative work. Additionally, the rise of VR and AR technologies is likely to expand the creative avenues for VFX, presenting new opportunities for immersive storytelling.

- *Training and Skill Development:* To complement R&D, there is an increased emphasis on training professionals within the VFX sector. Educational institutions are aligning their curricula with industry needs, collaborating directly with studios to ensure that upcoming talent is proficient in the latest tools and techniques. This initiative is vital for sustaining future innovation and maintaining skilled expertise in the rapidly evolving VFX landscape.

Emerging Trends & Challenges

Trends

Technology developments

The Rise of Real-Time Rendering

Traditionally, rendering VFX elements has been a painstaking process, often taking hours or even days to generate a single frame. This time-consuming nature can hinder creative exploration and slow down production cycles. However, the rise of real-time rendering technology promises a paradigm shift. Advanced engines like Unreal Engine and Unity are constantly evolving, allowing artists to see the final visuals instantly as they work. This real-time feedback loop empowers artists to experiment with different approaches, iterate quickly on ideas, and achieve a more efficient workflow.

Impact

Real-time rendering has the potential to significantly accelerate VFX production pipelines. Studios can explore more creative possibilities without the constraints of lengthy rendering times. This can lead to a higher quality of VFX work in shorter timeframes, allowing filmmakers to meet tight deadlines and potentially reduce overall production costs.

Virtual Production: Blurring the Lines Between Reality and Imagination

Virtual production (VP) is emerging as a game-changer, transforming the way movies and shows are filmed. This technology utilizes LED (Light emitting diode) walls and real-time rendering to create immersive virtual environments on set. Actors can interact with these digital landscapes in real-time, leading to more nuanced performances and emotions. VP also eliminates the need for extensive green screen work in post-production, saving time and resources.

Impact

Virtual production offers several advantages. Firstly, it allows for more realistic and dynamic environments, limited only by an artist's imagination. Secondly, the ability for actors to react directly to virtual elements fosters more natural performances. Finally, VP streamlines the filmmaking process, potentially reducing reliance on expensive location shoots and simplifying post-production workflows.

AI and Machine Learning: Empowering Artists, Not Replacing Them

Artificial Intelligence (AI) and Machine Learning (ML) are poised to become valuable tools in the VFX artist's arsenal. These technologies can automate tedious tasks that consume valuable time, such as rotoscoping (isolating objects from footage) and motion tracking. Additionally, AI can assist in generating realistic textures and environments, and even contribute to character animation.

Impact

By automating repetitive tasks, AI and ML free up VFX artists to focus on the more creative aspects of their work, like concept design, animation refinement, and overall visual storytelling. This can lead to a more efficient workflow and potentially allow studios to take on more projects or dedicate more resources to creative exploration. However, it's important to remember that AI is not meant to replace artists. Instead, it should be seen as a collaborative tool that empowers artists to achieve their creative vision with greater efficiency and precision.

The Cloud Revolution: Collaboration Without Borders

Cloud-based solutions are transforming the way VFX studios collaborate and manage complex data. The cloud offers tremendous scalability and remote access capabilities. This allows geographically dispersed teams to work seamlessly together on projects, fostering creative collaboration without physical limitations. Additionally, the cloud's immense storage capacity can handle large datasets efficiently, eliminating the need for expensive on-site infrastructure.

Impact

The cloud revolutionizes collaboration in the VFX industry. Studios can now assemble the best talent from around the world, regardless of location. This global talent pool fosters innovation and allows studios to access a wider range of skillsets for diverse projects. Furthermore, the cloud's scalability ensures studios can handle projects of any size while optimizing resource allocation.

Human-Machine Collaboration: The Future of VFX

The ideal scenario for the future of VFX is not about machines replacing artists, but rather humans and AI working collaboratively. Artists will leverage the power of AI tools to streamline workflows, automate tedious tasks, and enhance their creative vision. This will allow artists to focus on the aspects of VFX that require human touch, such as storytelling, emotional nuance, and artistic interpretation.

Impact

Human-machine collaboration will ultimately lead to a higher output of high-quality VFX work. Artists will be empowered to create even more visually stunning and emotionally engaging experiences for audiences. This collaboration will not only accelerate production cycles but also push the boundaries of what's possible in the realm of visual storytelling.

Changing demand from motion picture industry

Parameter	Overview
The Rise of Episodic Content and Streaming Platforms	Streaming platforms like Netflix and Disney+ are producing a vast amount of high-quality episodic content. This surge in demand for visually captivating shows is driving the need for VFX across a wider range of genres, from fantasy and sci-fi to historical dramas and even comedies. VFX studios will need to adapt to this changing landscape by developing expertise in creating sustained visual effects for longer-form narratives.
Interactive Storytelling and Immersive Experiences	The boundaries between traditional filmmaking and interactive experiences are blurring. Technologies like virtual reality (VR) and augmented reality (AR) are opening up new avenues for storytelling that incorporate VFX in innovative ways. VFX studios will need to adapt their skillsets to create visuals that not only look stunning but also function seamlessly within interactive environments.
The Need for Emotional Resonance	While creating visually spectacular experiences remains important, the VFX industry is moving beyond just spectacle. Motion picture studios are increasingly demanding VFX that enhances storytelling and evokes emotional responses from audiences. This requires VFX artists to have a deeper understanding of character development, narrative flow, and the subtle nuances of human emotion.
Demand for Cost-Effective and Efficient Solutions	The pressure to deliver high-quality VFX within budget constraints remains a constant challenge. Studios will be looking for VFX studios that can offer efficient workflows and cost-effective solutions, particularly for episodic content with longer running times. This may lead to a rise in automation tools and the strategic use of AI to optimize production pipelines.

Focus on Global Audiences	The global reach of streaming platforms has opened up new markets for the motion picture industry. To cater to these diverse audiences, VFX studios will need to be culturally sensitive and create visuals that resonate with viewers from different backgrounds. This may involve incorporating elements of local folklore or mythology into VFX design.

VFX Beyond Entertainment: Emergence of New Consumer Segments

The Indian VFX industry has traditionally catered to the entertainment sector, creating visually stunning experiences for movies, television shows, and streaming content. However, the potential of VFX is rapidly expanding beyond entertainment, with new consumer segments emerging that are embracing the power of visual effects.

Revolutionizing Education with Edtech (Education Technology)

The Edtech sector is witnessing a surge in India, and VFX is playing a crucial role in creating engaging and interactive learning experiences. Such as exploring the human body through immersive 3D models or visualizing complex scientific concepts through animated simulations. VFX has the power to transform dry textbooks into captivating experiences, fostering a deeper understanding and a more engaging learning environment.

VFX in Healthcare: Enhancing Medical Practices and Patient Care

The medical field is recognizing the immense value proposition of VFX. 3D modeling and animation can be used to create incredibly realistic anatomical simulations. These simulations provide surgeons with a safe and controlled environment to practice complex procedures before operating on real patients. This not only enhances surgical precision but also improves patient outcomes. Furthermore, VFX can be employed to develop virtual reality (VR) experiences that can be used for various purposes. For instance, VR can be used for phobia therapy, allowing patients to confront their fears in a safe virtual environment. Additionally, VR can be used for patient education, providing a more interactive way for patients to understand their conditions and treatment options. VR experiences can even be used for post-surgical rehabilitation, helping patients recover faster and more effectively.

Transforming Design with VFX: Shaping the Future of Architecture and Interiors

The world of architecture and design is also being transformed by VFX. Architects can now utilize 3D rendering and animation to create virtual tours of unbuilt structures. These virtual tours allow clients to experience their dream spaces before a single brick is laid. This not only fosters better communication between architects and clients but also helps clients make informed decisions before

construction begins. Similarly, interior designers can leverage VFX to create photorealistic mockups of different design layouts. These mock-ups allow clients to visualize the look and feel of their space with various design options. This empowers clients to make well-informed choices about their interior design plans, leading to a more satisfying result.

The emergence of these new consumer segments presents exciting opportunities for the Indian VFX industry. By catering to these diverse needs, VFX studios can tap into new revenue streams and further solidify their position as a global leader in visual effects. Furthermore, this diversification will not only benefit these new sectors but also contribute to advancements in VFX technology as studios develop innovative solutions to meet the unique challenges of these emerging applications.

Challenges

Talent crunch & its impact

The Indian VFX industry is experiencing a golden age, fueled by a booming market and exciting technological advancements. However, amidst this growth, a significant challenge threatens to impede progress: the talent crunch. The surging demand for skilled VFX artists is outpacing the current talent pool, creating a bottleneck in project execution with potential ramifications across the industry.

Demand Outpaces Supply:

The rapid growth of the Indian VFX market has created a ravenous appetite for skilled artists. Studios require individuals with expertise in various specializations, including 3D animation, compositing, rotoscoping, and a range of other VFX techniques. However, educational institutions and training programs haven't been able to adapt to this exponential growth. Traditional curriculum development cycles struggle to keep pace with the ever-evolving needs of the industry, leading to a shortage of artists with the necessary skillsets.

Impact:

This lack of qualified talent can significantly hinder project delivery timelines. Studios might struggle to find the right artists for specific projects, leading to delays in meeting deadlines and potentially jeopardizing production schedules. Furthermore, the pressure to fill these vacant positions can drive up salaries across the board, impacting production budgets and potentially squeezing profit margins for studios.

Global Competition for Talent:

The Indian VFX industry is no longer operating in isolation. Studios are now competing with established VFX hubs like Los Angeles and Vancouver for a limited pool of global talent. While India offers competitive pricing, these established hubs may hold an edge in terms of salaries and career progression opportunities. This can be particularly enticing for top-tier artists, potentially drawing them away from the Indian market.

Impact:

The global competition for talent can lead to a brain drain of skilled artists from India. This not only hinders the growth of domestic expertise but also weakens the overall talent pool available to Indian studios. Studios might be forced to compromise on the skill level of hired artists, potentially impacting the quality of their VFX work.

The talent crunch presents a significant challenge for the Indian VFX industry. However, by focusing on upskilling initiatives, employee retention strategies, and exploring collaborative solutions, the industry can overcome this hurdle and ensure its continued success on the global stage.

Regulatory Landscape

The Indian VFX industry operates under a regulatory framework that ensures compliance with national and international standards. Key areas include Censorship and Content Guidelines by the Central Board of Film Certification (CBFC), which regulate content for films, Television (TV), and digital platforms. Employment and Labor Laws ensure fair treatment and protection for employees, while Data Protection and Privacy laws, such as the Information Technology Act, 2000, safeguard sensitive information. Additionally, Environmental Regulations encourage sustainable practices, such as energy-efficient operations and waste management, to minimize environmental impact.

In India, the VFX industry is supported and regulated by several bodies and initiatives that aim to foster growth, ensure compliance with industry standards, and promote innovation.

Regulatory Bodies

Name of the Body	Function
Central Board of Film Certification (CBFC)	The CBFC is responsible for regulating the content of films, including those with VFX, to ensure they meet censorship and certification standards before public release.
Ministry of Information and Broadcasting (MIB)	This government ministry oversees the film and television industry in India, including policies and regulations related to content creation and distribution.
National Association of Software and Service Companies (NASSCOM)	NASSCOM is a trade association for the Indian IT and business process outsourcing industries, which includes VFX. It works to promote growth, innovation, and competitiveness in the sector.
Ministry of Electronics and Information Technology (MeitY)	MeitY is responsible for digital infrastructure and policies that impact the technology used in the VFX industry, including data protection and digital innovation.
Film Federation of India (FFI)	FFI works to promote and develop the film industry in India, providing a platform for VFX

	studios to engage with filmmakers and other stakeholders.

Government Initiatives

Skill India Initiative

Launched on July 15, 2015, the Skill India Initiative is a government program focused on enhancing skills across various sectors, including the VFX industry. By providing vocational training programs, the initiative aims to create a skilled workforce capable of meeting the demands of the rapidly evolving VFX sector. Skill India has significantly contributed to increasing employability and productivity by training thousands of individuals in creative and technical skills. This initiative helps bridge the skill gap and ensures a steady supply of skilled artists, thereby supporting the industry's growth and development.

Make in India

Launched on September 25, 2014, Make in India is an initiative designed to promote the growth of the domestic VFX industry by encouraging local production and investment in creative sectors. This program has led to the establishment of new studios and facilities, bolstering the domestic industry and attracting foreign projects and collaborations. As a result, India's share in the global VFX market has increased, enhancing the industry's competitiveness and encouraging innovation and investment in the creative economy.

Film Facilitation Office (FFO)

Established in 2015, the Film Facilitation Office (FFO) aims to promote India as a destination for film production, benefiting the VFX industry by facilitating international co-productions and collaborations. The FFO provides a single-window clearance system for filmmakers, streamlining the process of shooting in India and making it an attractive destination for film production and post-production work. This initiative has increased international collaborations, driving growth in the VFX industry and expanding its reach in the global market.

Animation, Visual Effects, Gaming and Comics (AVGC) Task Force

Announced in the Union Budget of 2022-23, the Animation, Visual Effects, Gaming and Comics (AVGC) Task Force was formed by the Indian government to recommend strategies for boosting the AVGC sector. This task force focuses on policy formulation, skill development, and creating a favourable ecosystem for growth. By making recommendations to drive future policies and initiatives, the task force aims to support the VFX industry's expansion, enhancing its global positioning and ensuring sustainable development in the sector.

Digital India Initiative

Launched on July 1, 2015, the Digital India Initiative aims to transform India into a digitally empowered society, significantly impacting the VFX industry by enhancing digital infrastructure and promoting the use of advanced technologies. This initiative has facilitated better connectivity and access to digital tools, enabling studios to adopt cutting-edge techniques and improve production quality. By supporting technological advancement, Digital India has played a crucial role in enhancing the capabilities of the VFX industry and strengthening its position in the global market.

IP rights regulation of VFX

Intellectual Property (IP) rights play a crucial role in protecting the interests of creators, studios, and other stakeholders in the VFX industry. In India, IP rights regulation for the VFX industry encompasses several aspects to safeguard creative works and ensure fair use. The framework for IP rights encompasses several key areas:

Key Aspects of IP Rights Regulation in the VFX Industry

Copyright Law	
Protection Scope	Under the Copyright Act of 1957, India's copyright law safeguards original works of authorship, encompassing visual effects. This protection covers both the artistic and technical aspects of VFX, including designs, animations, and CGI elements.
Rights Granted	Creators of VFX are granted exclusive rights to reproduce, distribute, perform, and display their works. This ensures that VFX studios and artists retain control over the use and dissemination of their creative outputs.
Duration and Registration	Copyright protection in India lasts for the lifetime of the author plus 60 years. While copyright protection is automatic, registration with the Copyright Office can provide legal advantages in disputes and enforcement.
Trademarks	
Protection Scope	Trademarks protect symbols, logos, and names used in the VFX industry, such as studio names, branding, and product names. This helps in distinguishing services and products in the marketplace.
Registration and Enforcement	Trademarks are registered with the Trademark Registry under the Trademarks Act, 1999. Registration provides exclusive rights to use the mark and prevents unauthorized use by others. Enforcement can include legal action against infringement or dilution of the trademark.

Patents	
Protection Scope	Patents may protect innovative technological processes or inventions used in the VFX industry, such as new methods of rendering or compositing. However, patents are less common in VFX compared to copyright and trademarks.
Registration	Patents are granted under the Patents Act, 1970 and require a formal application process. Patent protection typically lasts for 20 years from the filing date.
Design Rights	
Protection Scope	The Design Act, 2000 provides protection for the aesthetic aspects of a design, including the visual appearance of VFX elements if they are new and original. This can cover graphical user interfaces or unique visual styles used in digital content.
Registration	Design protection is achieved through registration with the Design Office, and the rights last for 10 years, with a possible extension of 5 years.
Contractual Agreements	
Importance	Contracts play a critical role in IP rights regulation for the VFX industry. Agreements between studios, artists, and clients should clearly define IP ownership, usage rights, and compensation.
Types	Typical contracts include work-for-hire agreements, which ensure that the studio or client owns the IP rights to the VFX created, and licensing agreements, which grant permission for specific uses of the IP.
Enforcement and Dispute Resolution	
Mechanisms	IP rights enforcement involves legal measures to address infringement, which can include civil suits, cease-and-desist

	orders, and claims for damages. The IP Tribunal and Civil Courts are responsible for adjudicating IP disputes.
Challenges	Enforcement can be challenging due to issues such as piracy, unauthorized distribution, and lack of awareness among stakeholders. Industry bodies and associations often play a role in advocacy and education to support IP rights.
Digital Rights Management (DRM)	
Emergence	With the rise of digital content distribution, DRM technologies are increasingly used to protect VFX content from unauthorized use and piracy.
Implementation	DRM tools help in controlling access, monitoring usage, and ensuring compliance with licensing agreements
Global Harmonization	
Alignment	India has been aligning its IP regulations with international standards, such as those set by the World Intellectual Property Organization (WIPO), to facilitate global protection and enforcement of VFX-related IP.

Competitive Landscape

The Indian VFX industry is not a monolithic entity, but rather a dynamic ecosystem with a fragmented structure. Numerous studios, both large and small, compete for a share of the market. This fragmentation fosters innovation as studios specialize in certain niches or cater to specific budget ranges. However, collaboration is also a key aspect of the competitive landscape. Studios often partner on large projects, leveraging each other's strengths and expertise.

Several key factors shape competition in this dynamic market. Talent availability is crucial, with studios vying for skilled artists across various VFX specializations. Studios also compete on the basis of pricing, with India offering a cost-effective advantage compared to established VFX hubs. Additionally, the ability to deliver high-quality work consistently and meet tight deadlines is essential for attracting and retaining clients.

The competitive landscape is further intensified by the presence of global VFX giants. Companies like Weta Digital (New Zealand), Framestore (France), and Industrial Light & Magic (USA) possess immense resources, experience, and a proven track record of delivering cutting-edge visual effects. These studios often compete for major Hollywood blockbusters, but they may also collaborate with Indian studios on specific projects, leveraging India's cost advantage and talent pool.

However, Indian VFX studios are not merely subcontractors. Domestic players like, Prime Focus, Digikore Studios and DNEG India are carving their niche in the global market. These studios are actively involved in major Hollywood productions, contributing their expertise to films like Dune and The Jungle Book. Additionally, they cater to the growing demand for VFX within the Indian film industry itself.

The fragmented structure of the Indian VFX industry, coupled with the presence of both global giants and domestic players, creates a competitive yet collaborative environment. This fosters innovation, cost-effectiveness, and a skilled workforce, all of which are crucial for the Indian VFX industry to maintain its edge and solidify its position as a major player on the global stage.

Key Players Profiling

Global Players

Weta Digital (New Zealand)	
	Company Profile: Founded in 1993 by Peter Jackson, Richard Taylor, and Jamie Selkirk, Weta Digital now Weta FX (Effects) is a New Zealand-based visual effects (VFX) and animation studio. Renowned for its groundbreaking work in creating

lifelike characters and environments, Weta FX has established as a known brand in the global VFX industry.

Services Provided:

Pre-visualization: Weta FX creates detailed storyboards and animatics to help filmmakers visualize scenes before filming begins. This allows for better planning and cost-efficiency.

Animation: From creating realistic characters to complex creatures and environments, Weta FX offers a full spectrum of animation services. Their expertise includes character rigging, animation, and fur and cloth simulation.

Performance Capture: Weta FX utilizes advanced technology to capture an actor's performance and translate it into digital animation. This allows for incredibly realistic and nuanced character portrayals.

Simulation: From fire and water simulations to complex particle effects, Weta FX employs sophisticated simulation techniques to create believable and immersive visuals.

Compositing: The process of seamlessly blending computer-generated elements with live-action footage is a Weta FX specialty. Their compositing artists ensure a cohesive visual experience for audiences.

Modeling and Rendering: Weta FX creates intricate 3D models of characters, creatures, and environments. Their powerful rendering technology brings these models to life with stunning detail and realism.

Expertise:

Character Creation: Weta FX is renowned for its ability to create incredibly realistic and lifelike characters. They have pushed the boundaries of what's possible in CGI, bringing iconic characters like Gollum, King Kong, and Neytiri to life on the big screen.

Creature Design: From fantastical creatures to grounded animals, Weta FX possesses expertise in designing and animating believable creatures that seamlessly integrate into the film's world.

Environments: Whether it's Middle-earth, Pandora, or a futuristic cityscape, Weta FX excels at creating vast and immersive environments that transport audiences into the story.

Technical Innovation: Weta FX is constantly developing and pushing the boundaries of VFX technology. Their proprietary software tools and techniques allow them to achieve groundbreaking visual effects.

Use Cases / Projects:

Weta FX's work can be seen in a wide range of films, from fantasy and science fiction epics to historical dramas and comedies. Some notable examples:

The Lord of the Rings Trilogy (2001-2003): Weta FX's groundbreaking work on this trilogy redefined what was possible in fantasy filmmaking. They created iconic creatures like Gollum and the Balrog, and brought the world of Middle-earth to life in stunning detail.

Avatar (2009): Weta FX played a pivotal role in creating the visually stunning world of Pandora and the Na'vi characters. Their advancements in performance capture and 3D animation helped to revolutionize the way VFX is used in filmmaking.

King Kong (2005): Weta FX brought the legendary ape back to life with a photorealistic CGI portrayal that redefined creature animation.

The Jungle Book (2016): Weta FX seamlessly blended live-action performances with CGI animals to create a visually stunning and heartwarming adaptation of the classic Disney tale.

Avengers: Endgame (2019): Weta FX contributed their expertise to the epic culmination of the Marvel Cinematic Universe, creating impressive visual effects for some of the film's most action-packed sequences.

Framestore (France)

Company Profile:

Founded in 1986 by William Sargent and Sharon Reed, Framestore is a French animation and visual effects (VFX) studio with a global presence. Renowned for its expertise across a wide range of VFX disciplines, Framestore has established itself in the industry, contributing to countless Hollywood blockbusters and critically acclaimed films.

Services Provided:

Pre-visualization: Framestore creates detailed storyboards and animatics to help filmmakers visualize scenes before filming begins. This allows for better planning, cost-efficiency, and creative exploration.

Concept Art & Design: From initial character sketches to elaborate environment design, Framestore's concept artists help bring a film's visual identity to life.

Character Animation: The studio offers a full spectrum of animation services, from creating realistic human characters to fantastical creatures. Their expertise includes character rigging, animation, and fur and cloth simulation.

Creature Design & Animation: Framestore's artists excel at designing and animating believable creatures, seamlessly integrating them into the film's world.

VFX Simulation: From fire and water simulations to complex particle effects, Framestore employs sophisticated simulation techniques to create realistic and immersive visuals.

Compositing: The seamless integration of computer-generated elements with live-action footage is a Framestore specialty. Their compositing artists ensure a cohesive and believable visual experience for audiences.

Virtual Production: Framestore is embracing cutting-edge technologies like virtual production, utilizing LED walls and real-time rendering to create immersive environments on set.

Post-Production: Framestore offers comprehensive post-production services, including color grading, visual effects editing, and final film mastering.

Expertise:

VFX for Film & Advertising: Framestore possesses a diverse skillset applicable to both feature films and high-end commercials.

Character Animation: The studio has a strong reputation for creating lifelike and expressive characters, as seen in films like "Paddington" and "Fantastic Beasts: The Crimes of Grindelwald."

Creature Design & Animation: From photorealistic creatures in "Guardians of the Galaxy" to fantastical beasts in "Harry Potter" films, Framestore's expertise in creature design and animation is highly sought-after.

Environments: Whether it's recreating historical landmarks or building fantastical worlds, Framestore excels at creating detailed and immersive environments.

Virtual Production: The studio is at the forefront of virtual production, utilizing this technology to enhance creativity and streamline workflows.

Use Cases / Projects:

Framestore's impressive filmography showcases their diverse skillset and contribution to various cinematic experiences. Some notable examples:

Gravity (2013): Framestore played a crucial role in creating the film's realistic and visually stunning portrayal of space. Their work on weightlessness and zero-gravity environments was groundbreaking.

Paddington (2014): The studio brought the beloved bear character to life with a charming CGI animation style that captured Paddington's warmth and humor.

Fantastic Beasts: The Crimes of Grindelwald (2018): Framestore helped create the magical world of the film, from fantastical creatures to breathtaking environments.

The Jungle Book (2016): They collaborated on this project, contributing their expertise in character animation and creature design.

	The King's Speech (2010): Framestore's subtle and detailed VFX work helped to enhance the film's historical setting.

Industrial Light & Magic (USA)	
Industrial Light & Magic	***Company Profile:*** Founded in 1975 by the legendary filmmaker George Lucas, Industrial Light & Magic (ILM) is a pioneering American visual effects (VFX) company. Renowned for its groundbreaking work in countless films, ILM has revolutionized the way movies are made.
	Services Provided: ***Pre-visualization and Concept Design:*** ILM creates detailed storyboards, animatics, and concept art to help filmmakers visualize scenes and characters before filming begins. ***Character Animation***: From creating iconic droids like R2-D2 [15] and C-3PO [16] to animating fantastical creatures like Gollum in "The Lord of the Rings" trilogy (co-produced by Weta Digital), ILM offers a full spectrum of animation services. ***Creature Design & Animation:*** The studio's artists excel at designing and animating believable creatures, seamlessly integrating them into the film's universe. ***VFX Simulation:*** From fire, water, and explosions to complex particle effects, ILM utilizes sophisticated simulation techniques to create realistic and immersive visuals. ***Compositing:*** The seamless blending of computer-generated elements with live-action footage is an ILM specialty. Their compositing artists ensure a cohesive visual experience for audiences. ***Virtual Production:*** ILM is at the forefront of virtual production, utilizing LED walls and real-time rendering to create immersive environments on set.

[15] R2-D2 or Artoo-Detoo, a Fictional Robot character created by George Lucas in Star Wars.
[16] See-Threepio is a humanoid robot character in the Star Wars.

StageCraft: This proprietary ILM technology creates massive LED video walls that project high-resolution environments, allowing actors to perform in virtual sets and enhancing realism.

Expertise:

Pioneering Spirit: ILM has a long history of innovation, pushing the boundaries of what's possible in VFX.

Character Creation: The studio is renowned for its ability to create iconic and beloved characters, breathing life into creatures and droids that have become cultural touchstones.

World Building: From the sprawling galaxies of Star Wars to the fantastical landscapes of Jurassic Park, ILM excels at creating immersive and believable worlds.

Technical Innovation: ILM is constantly developing new technologies and techniques, shaping the future of VFX.

StageCraft Technology: This innovative approach to virtual production allows for more realistic and creative filmmaking possibilities.

Use Cases / Projects:

ILM's filmography is a testament to their enduring legacy and influence on the VFX industry. Some notable examples:

Star Wars Series (1977 - Present): ILM's groundbreaking work on the original Star Wars trilogy revolutionized VFX and continues to inspire filmmakers today. Their work on subsequent Star Wars films showcases their ongoing innovation.

Jurassic Park (1993): ILM brought dinosaurs to life with stunning CGI animation, forever changing the way audiences perceived special effects.

The Lord of the Rings Trilogy (2001-2003): ILM co-produced this trilogy with Weta Digital, contributing their expertise in character animation and creature design to create the fantastical world of Middle-earth.

Pirates of the Caribbean Series (2003-2017): The studio's work on this series included creating realistic seafaring environments and fantastical creatures like Davy Jones and the Kraken.

	Avengers: Endgame (2019): ILM contributed their VFX expertise to this epic culmination of the Marvel Cinematic Universe, bringing iconic characters and action sequences to life.

Indian Players

DNEG India
Company Profile: DNEG India, a subsidiary of the global VFX giant DNEG, is a visual effects (VFX) studio based in Mumbai, India. Established in 2006, DNEG India has become a major player in the global VFX industry, contributing to numerous Hollywood blockbusters and critically acclaimed films.
Services Provided: DNEG India offers a comprehensive range of VFX services, including: *Compositing:* Seamlessly integrating computer-generated elements with live-action footage. *Character Animation:* Creating realistic and lifelike characters, both human and fantastical. *Creature Design & Animation:* Designing and animating believable creatures for films. *Environment Creation:* Building detailed and immersive digital environments. *Simulation:* Utilizing sophisticated techniques to create realistic fire, water, and other effects. *Pre-visualization & Concept Art:* DNEG India helps filmmakers visualize scenes and characters before filming through detailed storyboards, animatics, and concept art.
Expertise: *Technical Proficiency:* DNEG India utilizes the latest VFX software and technologies, ensuring high-quality and innovative work.

	Global Collaboration: As part of the DNEG network, they leverage expertise and resources from studios worldwide. *Talent Pool:* DNEG India has a team of skilled artists with experience in various VFX disciplines. *Adaptability:* The studio adapts its services to meet the specific needs and budget of each project. *Cost-Effectiveness:* India's VFX industry offers a cost-competitive advantage compared to some established VFX hubs.
DNEG	*Use Cases / Projects:* DNEG India's impressive filmography showcases their contribution to a wide range of films. Some notable examples: *Interstellar (2014):* DNEG India contributed to the film's stunning visuals, including the depiction of black holes and wormholes. *Blade Runner 2049 (2017):* The studio's work on this film included creating futuristic environments and replicant characters. *Tenet (2020):* DNEG India's VFX expertise helped bring the film's time-reversal sequences to life. *Dune (2021):* DNEG India played a role in creating the film's vast desert landscapes and colossal sandworms. *Indian Co-productions:* DNEG India has also collaborated on VFX for Indian films, contributing to their growing visual spectacle.

Identical Brains Studios Limited

IDENTICAL BRAINS	*Company Profile:* Identical Brains Studios Limited is a growing Indian media and entertainment company specializing in visual effects (VFX) and post-production services. Founded in 2019 by Raghav Rai and Dinesh Jadhav, the company has established itself as a reliable partner for filmmakers and content creators across various media formats.

Services Provided:

Compositing: Seamlessly integrating CG elements with live-action footage.

Rotoscoping: Isolating foreground elements from a background for compositing purposes.

Matchmoving: Tracking camera movement to accurately integrate CG elements into live-action scenes.

Green Screen Removal & Keying: Removing green screens and replacing them with desired backgrounds.

2D & 3D Tracking: Tracking objects or actors within a scene for various VFX tasks.

Environment Creation: Building digital environments to enhance visual storytelling.

Color Grading: Adjusting colors and enhancing the overall look of a film or video project.

Motion Graphics: Creating dynamic and visually appealing graphics for various applications.

Expertise:

VFX for Film & Television: Identical Brains possesses the skills and experience to handle VFX needs for both film and television productions.

Post-Production Pipeline: Their expertise encompasses various post-production services, ensuring a smooth workflow from VFX to final delivery.

Adaptability: The company adapts its services to meet the specific requirements and budget of each project.

Teamwork: Identical Brains emphasizes teamwork and collaboration between artists and clients.

Strengths

Emerging Player: While a relatively young company, Identical Brains demonstrates a commitment to quality and a growing portfolio.

	Technical Skills: They have expertise in various VFX techniques, indicating a skilled team. *Experience:* The founders' experience in the industry suggests a strong foundation for the company's growth.

Phantom Digital Effects Limited[17]	
PhantomFX	**Company Profile:** Phantom Digital Effects Limited, established in 2016, is a leading visual effects and animation studio that has delivered thousands of shots for feature films, web series, and television commercials across the globe. With over ten years of experience, the company is driven by a commitment to storytelling, creating memorable visuals that resonate with audiences.
	Services Provided: *Visual Effects:* Comprehensive VFX services to enhance live elements or create realistic ones from scratch. *Animation:* Expertise in 2D and 3D animation for projects of all sizes, from concept art to final output. *Concept Art:* Visualization of unique characters, creatures, sets, and props for any story. *Previsualization:* Detailed pre-visualization sequences to aid in planning and execution. *VFX Supervision:* End-to-end VFX pipeline management to optimize production and post-production processes.
PhantomFX	**Expertise** *Character Creation:* Designing and animating realistic and believable digital characters, from humans to fantastical creatures. *Environment Design:* Building intricate and detailed virtual environments, ranging from futuristic cities to historical settings.

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[17] Phantom Digital Effects, formerly known as Phantom Creative Effects, was established in 2010 and incorporated as a company in 2016.

Visual Effects Simulations: Creating dynamic and realistic simulations of natural phenomena, such as fire, water, and smoke.

Compositing: Seamlessly integrating live-action footage with computer-generated imagery to create visually stunning sequences.

Use Cases/Projects

Top-Tier VFX and Animation Projects (2010-2015): Phantom Digital executed 207+ projects during this period, with notable works including Avengers - Assemble (2012), Oz the Great and Powerful (2013), and The Legend of Hercules (2014).

High-Profile Collaborations and Adaptation (2016-2020): From 2016 to 2020, Phantom Digital completed over 229 projects, including significant contributions to Ghostbusters (2016) and Baahubali 2: The Conclusion (2017). During the COVID-19 pandemic, they demonstrated resilience by delivering over 200 VFX shots for Cats and Dogs 3 while adapting to remote work conditions.

Recent Achievements and Expansion (2021-2022): In recent years, Phantom Digital has worked on blockbuster projects like RRR (2021) and Flash (2021, 2022), while also acquiring an 80% majority stake in Tippett Studio, enhancing their global VFX capabilities.

Iconic Contributions and Versatility: Phantom Digital has been instrumental in creating memorable VFX sequences for major productions such as Mission: Impossible - Fallout, Game of Thrones, and numerous television commercials.

Prime Focus Limited
Company Profile: Prime Focus Limited (PFL) is a global leader in media and entertainment services, known for providing comprehensive creative, technology,

production, and post-production solutions. Founded in 1997 by Namit Malhotra, PFL has grown into the world's largest independent integrated media services company, with a workforce of over 8,000 professionals spread across 16 cities and 4 continents.

Services Provided:

Creative Services: Stereo 3D conversion, animation, VFX/CGI, digital production, animatics, and stop motion.

Technology Products & Services: Media Enterprise Resource Planning (ERP) Suite, cloud-enabled media services.

Production Services: Equipment rental.

Post-Production Services: Digital intermediate, colour grading, sound, and picture post, visual effects, broadcast packaging.

Expertise:

Advanced VFX: Specializing in creating and integrating complex visual effects for films, TV, and digital content.

Post-Production Mastery: Expertise in refining the final product with top-notch editing, colour grading, and sound design.

High-Quality Animation: Proficient in producing animation for various media platforms, including feature films and commercials.

3D Conversion: Skilled in converting 2D content into 3D formats, enhancing the viewing experience in films.

Use Cases/Projects

Sci-Fi & Fantasy Films: Contributed to Edge of Tomorrow (2014) and Kong: Skull Island (2017), creating immersive worlds.

Genre Diversity: Worked on 28 Weeks Later (2007), Robin Hood (2010), and The Jungle Book (2016), demonstrating versatility across genres.

Upcoming Projects: Continuing their legacy with projects like Start Lit Journey 2025, Animal Friend 2025, The Tish Tash 2025 including others, showcasing their ongoing influence in the visual effects and post-production industry.

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Digikore Studios Limited

Company Profile:

Digikore Studios Limited is a leading visual effects studio based in India, founded in 2000 by Mr. Abhishek Rameshkumar More. The company specializes in delivering high-quality Visual Effects (VFX) for a wide range of projects, including films, web series, TV series, documentaries, and commercials. With over two decades of experience, Digikore has established itself as one of the top VFX companies in India, working with major global studios like Disney, Marvel, Netflix, and Amazon.

Services Provided:

Visual Effects (VFX) Services: Includes rotoscope, wire and rig removal, reflection removal, muzzle flash compositing, beauty fixes, and general cleanup to enhance visual quality and integrate effects seamlessly.

Compositing and Match Moving: Specializes in green screen compositing, match moving, driving composites, and day-to-night conversion, ensuring CGI elements align perfectly with live-action footage.

Set Extension and Crowd Simulation: Offers set extension to expand physical environments digitally, and crowd multiplication to simulate large groups, enhancing the scale and depth of scenes.

Specialized CGI Techniques: Expertise in creating computer-generated effects like blood compositing, and detailed animation, bringing complex visual elements to life in film and television productions.

VFX for 360-Degree Footage: Enhances virtual reality storytelling with immersive visual effects for 360-degree videos.

Expertise:

Visual Effects (VFX): Expertise in creating and integrating complex visual effects for films, TV, and digital content.

Animation: Produces high-quality animations for various media platforms, including feature films and commercials.

	VFX for Films: Specializes in creating CGI, animation, and compositing to enhance cinematic storytelling. **Post-Production Services:** Offers a comprehensive range of post-production services, ensuring high-quality final outputs. **Deliveries**: The company generated VFX for more than 200 Hollywood films, web series, TV series, and commercials.
DIGIKORE STUDIOS	***Use Cases/Projects*** **Stranger Things (2016):** Digikore's VFX artists have played a pivotal role in bringing the Upside Down to life, creating immersive and terrifying alien worlds. **Game of Thrones (2011-2019):** From dragons to epic battle sequences, Digikore's expertise has been instrumental in crafting the visually stunning world of Westeros. **Jumanji: Welcome to the Jungle (2017):** Digikore contributed to the creation of the fantastical jungle environment and the realistic animal characters. **Titanic (1997):** Digikore's VFX work helped to recreate the iconic sinking of the Titanic, a scene that remains one of the most memorable in cinematic history. **Haider (2014):** Digikore's VFX team created the visually striking sequences that helped to enhance the film's narrative and atmosphere. **Deadpool (2016):** Digikore's expertise was used to create the film's signature blend of humor and violence, including the character's distinctive fourth-wall breaks.

Financial Performance of the Key Players [18]

Prime Focus Limited

Key Indicators (INR Million)	FY 2022	FY 2023	FY 2024
Revenue from Operations	1,209.20	407.42	334.48
EBITDA[19]	919.00	207.22	293.99
PAT[20]	2,907.00	-243.18	-3.22
EBITDA Margin (%)	76.0%	50.9%	87.9%
PAT Margin (%)	240.4%	-59.7%	-1.0%
ROA[21]	14.4%	-1%	-0.02%
ROCE[22]	17.6%	1%	1%
Net Worth	15,825.10	15,675.69	15,688.69
Long-term Debt	2,309.50	2,000.00	2,000.00
Debt Equity Ratio	0.15	0.13	0.13
Return on Equity	18.4%	-1.6%	0.0%

Phantom Digital Effects Limited

Key Indicators (INR Million)	FY 2022	FY 2023	FY 2024

[18] Financial Filings on Company Website | Due to the unavailability of the latest financial data for DNEG India beyond the fiscal year 2023, it is not incorporated in the analysis as that would introduce a discrepancy in benchmarking when compared to the other players whose financial data extends to the fiscal year 2024.
[19] EBITDA – Earnings before Interest, Tax, Depreciation and Amortization.
[20] PAT – Profit After Tax.
[21] ROA – Return on Assets.
[22] ROCE – Return on Capital Employed.

Revenue from Operations	223.33	578.94	893.31
EBITDA	80.36	256.31	456.14
PAT	49.03	161.96	241.15
EBITDA Margin (%)	36.0%	44.3%	51.1%
PAT Margin (%)	22.0%	28.0%	27.0%
ROA	32.6%	25.7%	13.5%
ROCE	119.8%	48.8%	23.0%
Net Worth	52.57	442.09	1,447.43
Long-term Debt	7.67	15.50	52.19
Debt Equity Ratio	0.15	0.04	0.04
Return on Equity	93.3%	36.6%	16.7%

Digikore Studios Pvt Ltd

Key Indicators (INR Million)	FY 2022	FY 2023	FY 2024
Revenue from Operations	250.13	344.40	449.62
EBITDA	75.12	154.35	272.66
PAT	4.67	43.75	95.42
EBITDA Margin (%)	30.0%	44.8%	60.6%
PAT Margin (%)	2%	12%	21%
ROA	6%	21%	17%

ROCE	34%	90%	28%
Net Worth	15.52	15.06	88.69
Long-term Debt	26.72	10.76	80.35
Debt Equity Ratio	1.72	0.28	0.19
Return on Equity	30.1%	72.2%	22.5%

Financial Analysis

The VFX industry displays a varied performance landscape, characterized by differences in growth, profitability, and financial stability among its key players Prime Focus Limited, Phantom Digital Effects Limited and Digikore Studios Limited. Prime Focus has encountered substantial revenue decline, pointing to potential operational or market challenges and faced sharp deteriorations in profitability, indicating severe financial distress or ongoing restructuring needs.

The sector has exhibited robust growth trends, with consistently increasing revenues and improving profitability metrics. Enhanced EBITDA and PAT margins in these companies reflect effective cost management and successful revenue generation strategies. Although there has been some decline in return on assets (ROA) and return on capital employed (ROCE) in recent years, these firms still show strong performance compared to their peers, suggesting efficient asset and capital utilization.

Additionally, there are companies demonstrating positive performance with steady revenue growth and improved profitability, albeit at a slower pace compared to the high-growth segment. The positive trajectory in profitability is a favourable sign, but the growth rates vary significantly across the sector. Financial stability among these companies also varies; some maintain a stable net worth and low debt-equity ratios, indicating financial resilience despite performance issues, while others display a growing net worth and conservative debt management, reflecting strong financial positions.

Overall, the VFX industry holds promising growth potential, particularly for companies' adept at managing operational and financial challenges. While some players are capitalizing on growth and profitability, others face significant hurdles that require strategic interventions to fully leverage the sector's opportunities.