



REVIEW OF MEGA INFRASTRUCTURE PROJECTS UNDERTAKEN BY GOVERNMENT OF GUJARAT

¹Shivam .V. Talpada, ²Dr. D. M. Patel, ³Vatsal Upadhyay

¹B.E. Student, ²Principal, ³Assistant Professor

¹Civil Department - D. A. Degree Engineering And Technology , Mahemdabad, India

Abstract : The aim of this study is to know the increasing growth of economy and development in the Gujarat state, where the increasing numbers of the infrastructures are constructed and going to be constructed in the future. In this study you can get an idea and read about the different infrastructure projects in Gujarat and benefits to the economy of the state and country. In this study you can also find the projected growth of GDP of the India. According to research of the World Bank there are several factors influencing the economy growth effectiveness and national competitiveness, including institutions, infrastructure, macroeconomic environment, health and primary education, technological readiness, market size, etc and also, there are various frameworks, models, and analytical tools that can be used in studying the causal relationships between some key infrastructure factors and national competitiveness. The results of study showed that national competitiveness is influenced basically by the level of institutional development and other seven factors, including infrastructure, in turn infrastructure factor is determined mainly by the quality of roads, railroad infrastructure, air transport and electricity supply. As the Gujarat and other states will grow fast as well as India will also grow fast. India has been among the fastest growing economies in the world for close to two decades. The development of new infrastructures in Gujarat, it will also help Gujarat to grow socially, financially and environmentally.

Index Terms - Gujarat, Infrastructure, Economic benefit, developing state and country economy

1.1 INTRODUCTION

The subject of study is to know the growing economy and development by the developing new infrastructural projects in the Gujarat. Gujarat the land of infinite infrastructure is the one of most developing state of India in the list of on-going and upcoming infrastructure projects and the state of endless opportunities, the next gen investment region with the world class infrastructure where persons can scale newer heights, Gujarat is a trend-setters of futuristic planning specially when it comes to infrastructure. Projects like Dholera special investment region (DSIR), Gujarat international financial tech city (GIFT CITY), diamond research and mercantile city (DREAM CITY) and hybrid renewable energy park, bullet train (between Ahmedabad and Mumbai) promising strength of state infrastructure is also coming up. The government's brilliant revelation of the state's futuristic infrastructural planning, Dholera Special Investment Region (DSIR) is a new age city with the world-class infrastructure and it will provides highest quality of living standards.

1.2 Overview of Gujarat:

Gujarat is strategically connected to the major cities of the world, both by air and sea routes. The state has direct international flight connectivity to cities across Europe, Middle East, East Asia, and America. It has a coastline of 1,600 km, dotted with 41 ports: one major, 11 intermediate and 29 minor that connect to major sea-based trade routes and trade centre's like the Middle East, West Europe, Asia, and upcoming destinations on the African Continent. The state also acts as a gateway to landlocked states of India, connecting them by road, rail, and air, thereby boosting their trading opportunities. Gujarat is a forward-looking and progressive state of India in ease of doing business. Gujarat is the fifth-largest Indian state by area, covering some 196,024 km² (75,685 sq mi); and the ninth-most populous state, with a population of 60.4 million. It is bordered by Rajasthan to the northeast, Dadra and Nagar Haveli and Diu to the south, Maharashtra to the southeast, Madhya Pradesh to the east, and the Arabian sea and the Pakistani province of Sindh to the west. The economy of Gujarat is the fourth-largest in India, with a gross state domestic product (GSDP) of ₹19.44 trillion (US\$240 billion) and has the country's 10th-highest GSDP per capita of ₹243,761 (US\$3,100). Gujarat ranks 21st among Indian states and union territories in human development index. The state traditionally has low unemployment and is widely considered one of the most industrially developed states of India and a manufacturing hub. The state has a population of 60 million and has one of the highest urbanization levels 43%, as per census 2011. The state has a high and growing literacy rate of 78.03%, as per census 2011. The contribution of Gujarat's to India's GDP is 8.1%. More than 20% (2020-2021) the Gujarat contribute to the India's exports. The Gujarat ranks 1st in terms of export promotion policy, business environment and infrastructure-Export Preparedness Report 2020. Gujarat ranks 2nd in terms of knowledge workers as per NITI Aayog's India Innovation Index-2019. The Gujarat has 20.9% share in India's fixed capital

investment. The state has double-digit growth rates with gross state domestic product of USD 74 billion (2011-12) growing at a five-year average of 10%. 35.8% share of manufacturing sector in Gujarat's GSDP. 40% of total Indian port cargo is handled by Gujarat's ports.

1.3 Dholera Special Investment Region (DSIR) :

Dholera Special Investment Region is a green-field industrial smart city planned and located approximately 100 km southwest of Ahmedabad. It is likely to become the India's most attractive location for manufacturing and industrial development. Dholera is a desirable future event to be an incubator city, spanning approximately 920 sq.km., encompassing 22 villages of the Dholera taluka in the district of Ahmedabad. Dholera industrial city will have a self-sustaining ecosystem consisting of economic drives through industrialization, utility and logistic infrastructure including education, healthcare, and other public amenities. DSIR, with the help of the government of Gujarat, plans to strategically create an economically and socially balanced new-age city with world-class infrastructure and highest quality of life standards. The city will provide opportunities for the setting up of manufacturing units, which will in turn help in increasing the industrial output of the country and create more than 8 lakhs jobs. DSIR brings the opportunity for the investment in different sectors such as defence, construction, auto and auto ancillaries, pharma and bio-tech, electronics, agro and food processing, transportation, heavy industries and other different sectors. Some of the key economic drives of industrialization utility and logistics are going to be constructed are international airport, 6 lane express way and metro rail (MRTS) connecting Dholera to Ahmedabad, Dholera SIR – the largest industrial smart cities along the influence area of Delhi – Mumbai industrial corridor (DMIC). The vision is to create state of the art infrastructure for a strong economic base and globally competitive environment. It will help to activate local commerce and enhance foreign investment and attain sustainable development, in five years: double the employment potential (14.87 % CAGR), triple industrial output (24.57 % CAGR), quadruple exports (31.95 % CAGR).

1.4 Petroleum, Chemical And Petrochemicals Investment Region (PCPIR) :

The petroleum, chemical and petrochemicals investment region (PCPIR) of Gujarat has a vibrant vision to develop Gujarat as the chemical and petrochemical hub of the country with world-class infrastructure that assures comprehensive development, located at – Dahej, Bharuch district in Gujarat, covering 453 sq.kms of area, provided with a port and ferry service, presence across the complete value chain of chemicals and petrochemicals. Existing industrial units have given direct employment to 13,220 persons and indirect employment to 46,270 persons. Additional 30,000 direct employment will be created in the upcoming units. This will provide 90,000 indirect job opportunities. Additionally, thousands of persons are employed in construction activities of industrial units, residential townships, infrastructural works etc. The large scale economic and industrial activities undertaken in PCPIR would also generate self-employment opportunities. The Investment Already Made & Committed is of Rs.90,000 crore (USD 20.5 bn) and the Infrastructure Development is of Rs.3,200 Crore (USD 727 mn). It is estimated that the size of Indian chemical industry is around USD 163 billion in the year 2017, contributing nearly 3.4% share in the global chemical market. The Indian Chemical industry is projected to reach USD 403 billion by 2025 (Gujarat Chemical sector report NBSO 2018).

1.5 Gujarat international financial tech city (GIFT city) :

Gujarat international financial tech city (GIFT city) is the new financial and technology gateway not just for India but also for the world housing India's first and only international exchange the India inc the daily trading volume of international exchanges at international financial service center has crossed 15 billion us dollars and fast galloping. GIFT City consist of a conducive Multi-Service SEZ (Special Economic Zone) and an exclusive Domestic Area. Strategically planned on 886 acres of land, smart, sustainable and green infrastructure, state-of-the-art urban infrastructural facilities, emerging global financial and IT services hub, upcoming business opportunities in GIFT- international bullion exchange, alternate investment funds (AIFS), global in-house centers (GICS) , fin-tech hub, aircraft leasing, international maritime cluster, creating employment opportunities. The City is located on the bank of river Sabarmati connecting the Business capital (Ahmedabad) and Political capital (Gandhinagar) of Gujarat State- The Growth Engine of India. It is the new business destination offering competitive edge to Financial services and Technology related activities. GIFT City is equipped with some of the latest technology known to man. From the latest public transport, to automated waste collection to an efficient district cooling system, GIFT City has the best amenities available for its residents. GIFT City is a Smart City in every sense with Urban Planning adhering strongly to green-building principles and highest standards of efficiency in terms of energy and environment friendliness. Infrastructure plays a pivotal role in supporting the business environment and quality of life in GIFT City. A judicious combination with latest technology and global best practices in infrastructure service delivery are in place. All of these come together to provide an international standard of working and living. It is estimated that GIFT would provide 500,000 direct and an equal number of indirect jobs which would require 5.76 million square meter of real estate office and residential space.

1.6 Growth in India's financial services sector:

The last decade has seen unprecedented growth in India's financial services sector. It employs over 3 million people, constitutes about 5% of the GDP and has an estimated market capitalization of over US\$ 200 billion. As India experiences continued economic growth, the financial sector could generate about 10-11 million jobs and a GDP contribution of US\$ 350 to 400 billion by 2020. With a sustained growth and rapid development in technology and infrastructure, an increasing share of financial services would get centralized. McKinsey & Company's market assessment report estimates potential of about 6 million centralized jobs across multiple service roles.

1.7 Diamond Research And Mercantile City (DREAM) :

As the name suggest the vision creating diamond research and mercantile city DREAM city is to promote diamond trading value addition activities and research in diamond cutting polishing and processing. This Smart City is projected on a 700 hectare site in the southern part of Surat, adjacent to the village of Khajod, the Outer Ring Road and close to the Dumas airport. The objectives of DREAM City is to encourage and promote diamond and other mercantile activities related to trading, to prepare

business plan cum bankable project report, to provide world class infrastructure, to make citizen-friendly services and safety and many more.

1.8 Mandal Bechraji Special Investment region (MBSIR):

Mandal Bechraji Special Investment region (MBSIR) is a new industrial hub being planned in Gujarat, spread over 102 sq.km covering 7 villages of Ahmedabad and 1 village of Mehsana district is situated at 90 kms from Ahmedabad. The Mandal Bechraji Special Investment region is emerging as an automobile hub 33000 plus hectare of GIS based land available for industrial projects provides wide variety of choices with more than 200 industrial estates of GIDC and more than 45 private industrial and logistic parks ensure operational feasibility. The MBSIR provide specialized industry- specific facilities across sectors (e.g. Textiles and apparel, pharmaceuticals, engineering, ceramics, biotech, food processing, etc.). Mandal Bechraji Special Investment Region is planned in the influence zone of proposed Delhi-Mumbai industrial Corridor Project (DMIC), a joint initiative by the government of India and Japan. Mandal Bechraji hub is located at a distance of 90 km from Ahmedabad and 85 km from Gandhinagar near Bechraji Town in the State of Gujarat. The vision of MBSIR is “to develop a smart industrial city with concepts of reduce, recycle, reuse and efficient transportation network”.

2.1 Review of Blueprint for Infrastructure in Gujarat (BIG 2020) August, 2009 Volume 1B – Summary:

Gujarat Infrastructure Agenda BIG 2020 has established plans for building top-notch infrastructure in the special investment regions, industrial areas, and SEZs in response to this potential. The DFC, ports, and metropolitan regions have all been planned with great road, rail, and air connection to and from these economic hubs. A major component of the Agenda is the management of hazardous waste and the reduction of air, water, and land pollution. The following investments totaling Rs. 231,348 crores have been planned:

Table 2.1 Investment proposed to leverage DFC/DMIC potential

Sector	Investment Rs. Crores
SIR Dholera	108,520
Industrial Nodes & SEZs in DMIC area	30,953
Road Connectivity	25,183
Rail Connectivity	5,278
Greenfield International Airport	3,000
Logistics hub	4795
Power	27,971
Urban Infrastructure including metro	20,623
Hospitality & Recreation	5,025
Total	231,348

2.2 Review of An Empirical Analysis to Assess the GDP Projection of Gujarat State of India:

Growth in the gross domestic product (GDP) is a key indicator of a nation's overall financial health (Maity and Chatterjee, 2012). It is the most accurate way to gauge a country's progress and economic performance (Daga et al., 2004; Gu et al., 2012). In order to examine a country's current situation, GDP examines financial activity by taking into account the economic contribution of all sectors (Maity and Chatterjee, 2012). It is described as the total economic worth of all finished products produced in an economy over a specific time period (Gu et al., 2012). Consumption, investment, government spending, and net exports are the four main components of GDP. Researchers and international development agencies have recently forecasted the values of numerous economic factors (e.g., GDP growth, urbanization, population growth, inflation). A forecast is a statement regarding a given variable's chance of occurring in the future. Government officials and development agencies can adopt an effective development strategy by forecasting estimates of a macroeconomic parameter (Maity and Chatterjee, 2012). Real GDP growth forecasting is the most important economic authority and representative to make a well-thought-out policy decision (Carlomagno et al., 2013). The prediction of GDP growth is essential for gaining a clear understanding of the future state of an economy (Maity and Chatterjee, 2012). A low GDP value suggests that the economy is in a stagnation phase. Booming GDP figure suggests that the economy is functioning effectively as a result of a monetary or fiscal policy that the government has implemented. The many beneficial actions for development thinkers, stakeholders, financial specialists, and government agents to select a sustainable growth plan would also be facilitated by GDP projection based on prior scenarios. However, it might not be able to help a nation implement effective economic strategies or distribute money to different departments (Maity and Chatterjee, 2012). To predict GDP in western economies, many research are conducted. Although few studies in India have been able to project the GDP and its growth in different ways (Daga et al., 2004; Maity and Chatterjee, 2012). The following research queries are addressed in this section: 1) What key factors influence GDP? 2) How does the change in socioeconomic variables affect the GDP? 3) What is the expected trajectory of Gujarat's GDP going forward? Using the ARIMA model, it also evaluates the impact of numerous variables on GDP.

2.2.1. MATERIAL AND METHODS

A. Data Sources and Description

The following contains time series data for Gujarat over 34 years, from 1981 to 2014. Information on GDP and its associated indicators (i.e., agriculture, forestry and logging, fishing, mining and quarrying, manufacturing, electricity, gas, and water supply, construction, trade, hotels, transport, storage, communication, financing, insurance, real estate, and business services), as well as the share of other sectors in aggregate GDP (i.e., agriculture, industry, and service sectors), is taken from the Centre Monitoring Indian Eco (CMIE). Arable land, forest area, gross irrigated area, gross area seeded, route road length, educational institutions and enrolments, postal networks, and railway road length are among figures derived from the CMIE. Census data on the working population, rural population, and urban population (GoI). Urbanization, credit deposit percentage, and literacy rate are all collected from the Planning Commission (GoI). The Ministry of Statistics and Program Implementation's

Central Statistics Office provided the consumer price index (GoI). The Indian Meteorological Department is where information on climatic parameters, such as minimum and maximum temperatures and rainfall, is derived (GoI).

B. Theoretical Framework of Box-Jenkins (B-J) Methodology

The Box-Jenkins forecasting method is founded on statistical ideas that can effectively capture a wide range of time series behaviour. It contains several elements that help you choose the best strategy and identify a model's reasonable functional shape. A division of the B-J methodology is the autoregressive integrated moving average [ARIMA(p, d, q)] time series forecasting tool. Here, q is the number of lagged forecast errors in the prediction equation, p is the number of autoregressive terms, d is the number of non-seasonal differences required for stationarity, and d is the number of non-seasonal differences in this case. Three processes make up the ARIMA(p, d, q) forecasting equation: autoregressive (AR), moving average (MA), and autoregressive and moving average (ARMA). The term "autoregressive integrated moving average" (ARIMA) model is used when regular difference is utilised together with AR and MA. In this case, "I" stands for "integrated," which refers to the difference technique. The B-J strategy, in short, consists of four steps: Identification of the model, estimation, estimation check, diagnostics check, and forecasting are the four steps. The phase that requires the most complexity is model identification. A variable's future prediction can be estimated using one of three methods: point-based forecasting, lower limit-based forecasting, and upper limit-based forecasting (Maity and Chatterjee, 2012). The best estimator to get better predicting results is a point-based forecast (Daga et al., 2004; Cordeiro and Neves, 2009; Maity and Chatterjee, 2012; Carlomagno et al., 2013).

2.2.2. FORMULATION OF UNIVARIATE ECONOMETRIC MODEL

To examine the GDP projection, this study applied univariate and multivariate econometric models using Time Trend Factor, AR(1), AR(2), MA(0), MA(1), MA(2), ARMA(1), and ARMA(2) (Daga et al., 2004; Andersson, 2007; Bessonovs, 2014). In proposed models, time trend factor is included for easy forecasting for in-off-sample and out-off-sample (Maity and Chatterjee, 2012).

A. Time Trend Factor Model (TTF)

It is predicated on the idea that time trend factor is an independent variable and has a large impact on GDP. Additionally, it acknowledges that time series do not exhibit multi-collinearity, auto-correlation, or homoscedasticity. As a result, time series exhibit normal and independent distribution (NID $i(0, \sigma^2)$). Here, the temporal trend factor model is used as a common benchmark model to assess other models' consistency. This is how the model is defined: Here, t is the error terminus equation, β_0 is the intercept coefficient, β_1 is the regression coefficient of the time trend factor, and $\log(\text{GDP})$ is the natural logarithm of GDP (1). B. Model for Autoregressive (AR) Regression The basic econometric technique involves regressing Y_t (the dependent variable) on the values of its own lags. Macroeconomic parameter forecasting is fairly easy. The complete set of observations is combined as a function of earlier observations in order to build an appropriate auto-regressive time series model (Andersson, 2007; Daga et al., 2004; Maity and Chatterjee, 2012). In the forecasting econometric model, the lags of the stationary series are referred to as autoregressive terms. While moving average phrases are used to describe the latencies of forecasting errors. An integrated version stationary series is one that requires a change in order to become stationary. The autoregressive econometric (AR(p)) model's general form is as follows: The natural logarithm of GDP is used here as $\log(\text{GDP})$; β_0 is

2.2.3. EMPIRICAL RESULTS AND DISCUSSION

A. Empirical Results Using a Single Variable Model The fitted GDP and the actual GDP out-of-sample are shown in Figure 2.1. The graph demonstrates how well the fitted values match the real GDP. As a result, it offers compelling evidence that future GDP projections can be made using regression coefficients of explanatory factors. Figure 2.2 displays the estimated GDP for the period of 2015–2050 using the TF, AR(1), AR(2), ARMA(1), and ARMA(2) models. According to the predicted outcomes from the univariate model, Gujarat's GDP is estimated to rise by INR48,093,236 to 66,387,416 Million by 2050. According to projected GDP growth based on a time trend factor model, GDP growth will likely increase between 2020 and 2030, 2030 and 2040, and 2040 and 2050. Additionally, projected outcomes indicate that by 2050, GDP growth is anticipated to improve from 11.35% to 12.50%. (Figure: 2.3). Additionally, it confirms that GDP growth would likely accelerate in the ensuing decades. Additionally, it is anticipated that between 2016 and 2020, GDP will expand by 8.81% to 9.29%. It implies that the GDP would increase between 2016 and 2050. While using the base year of 2004–2005, GDP growth is measured at constant prices. Therefore, any change in the base year would have a direct impact on the rise of GDP.

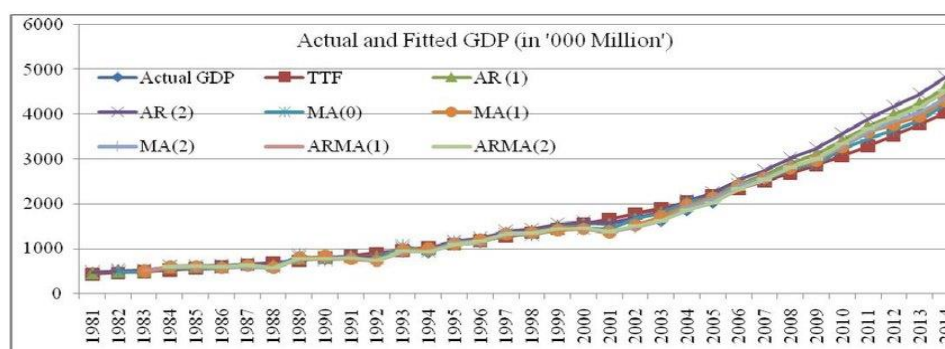


Fig.2.1 Actual GDP and fitted GDP based on univariate model during 1981-2014 Source-Authors

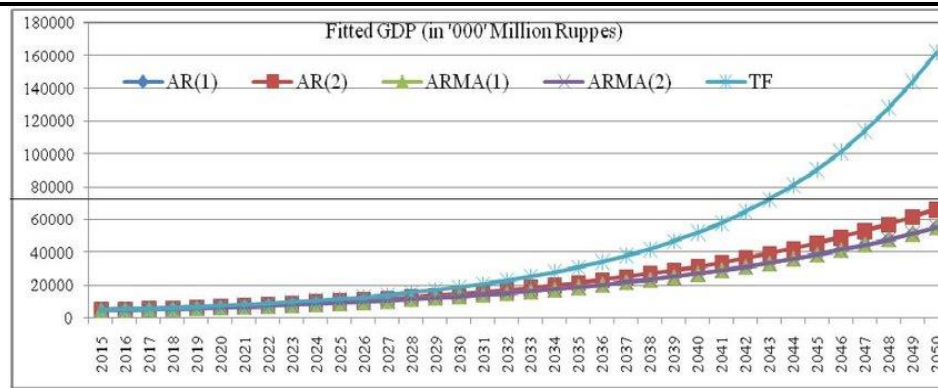


Fig.2.2 Estimated projected GDP based on univariate model during 2015-2050. Source: Author's Estimation.

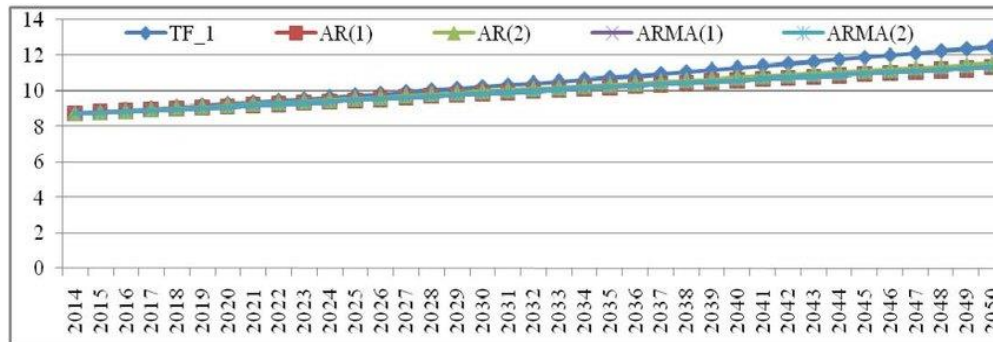


Fig.2.3 Estimated projected GDP based on univariate model during 2015-2050. Source: Author's Estimation.

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