ISSN 2249-5630

Nirma University Journal of Business and Management Studies

Vol. 6, Nos. 1 & 2; January - June 2023

Articles

NIRMA UNIVERSITY
INSTITUTE OF MANAGEMENT
NAAC ACCREDITED 'A+' GRADE

Institute of Management

SAQS ACCREDITED

Send your feedback to:
The Editor, Nirma University Journal of Business and Management Studies, Institute of Management, Nirma University, S.G. Highway, Ahmedabad 382481, Gujarat, India.
Tel: +91 79 7165 2000, +91 2717 241900-4
Email: nujbms.im@nirmauni.ac.in
Website: www.nirmauni.ac.in

Annual Subscription

Rates by Post	**India**	**Overseas**
for Individuals	Rs. 500	US $ 15
for Institutions	Rs. 1000	US $ 25

For subscription related enquiries write to:

Nirma University Journal of Business And Management Studies, Institute of Management, Nirma University, S.G. Highway, Ahmedabad 382481, Gujarat, India.
Tel: +91 79 7165 2000, +91 2717 241900-4
Email: nujbms.im@nirmauni.ac.in
Website: www.nirmauni.ac.in/imnu

Payment may be made by crossed demand draft drawn in favour of "Institute of Management, Nirma University", payable at Ahmedabad.

Claims for missing issues should be made within three months of publication.

Printed and published by Ms. Ritu Agarwal, Publication officer on behalf of Institute of Management, Nirma University and printed at M/s Shivkrupa Offset Printers, 3 J/K Block Ravi Estate, Opp. Gurudwara BRTS Bus Stop, Dudheshwar, Ahmedabad- 380004 and published at Institute of Management, Nirma University, Sarkhej Gandhinagar Highway, Ahmedabad 382481, Gujarat. Editor : Dr. Pradeep Kautish

* *New Series*

Nirma University Journal of Business and Management Studies

Vol. 6, Nos. 1 & 2, January – June 2023

Contents

Articles

A CRITICAL REVIEW ON FACTORS AFFECTING ONLINE PHARMACIES

Prof. Anand Thakur*
Ms. Ishita Bansal**
Ms. Archita Singla***

ABSTRACT

With the progression in technology and digitalisation, the world is moving towards Internet platforms for seeking health-related advice, information and medication. The pandemic-induced lockdown has further aggravated the condition. The global online pharmacy market was projected to be valued at US $ 0.8 billion in 2020 (Chawla, 2021). Attributes such as improved access, convenience, cost savings and a comprehensive range of medicines characterise online pharmacies. Nevertheless, the subject of Internet pharmacies has always been a matter of controversy and criticism. It pertains to the sale of counterfeit and substandard medicines, lack of adequate counselling and threats of cybersecurity, ultimately risking the health and survival of patients. Despite legal and regulatory concerns, Internet pharmacies are ubiquitous in today's digital environment. Therefore, the current study sought to systematically review Internet pharmacies, specifically focusing on how consumers interact with these online platforms. To meet the purpose of the study, the recently published articles relating to

** Head & Dean, School of Management, Central University of Punjab, Bathinda.*

*** Senior Research Fellow, School of Management, Central University of Punjab Bathinda*

**** M.Com Student, School of Management, Central University of Punjab, Bathinda.*

online or Internet pharmacies have been reviewed. Renowned databases such as Scopus and Google Scholar were used to search the literature. The study's findings revealed that marketers could invest in factors such as perceived usefulness, convenience, trustworthiness, social influence, perceived risk and digital literacy to deliver an ideal customer experience in online pharmacies. The study's findings might be imperative for marketers to understand the customers' perception of online pharmacies. Based on the study's input, marketers can stimulate customers' patronage of online pharmacies.

Keywords: *Online Pharmacies, Internet Medicine Shopping, Perceived Risk, Digital Literacy, Social Influences*

1. INTRODUCTION

With approximately five billion people using the Internet worldwide, its usage continues to proliferate (Pasquali, 2023). The expansion of digital literacy and improved health consciousness among the general public has significantly increased Internet usage for health-related consultations. Consumers utilise the Internet to acquire various health-related services and products (Lanseng & Andreassen, 2007). They maintain real-time contact with physicians and hospitals, providing healthcare services in a virtual environment through mobile phones and computers with Internet access. Telehealth, m-health, or e-health offers remote monitoring, virtual visits, access to medical specialists and advice about self-management of healthcare. These virtual advancements have driven the growth of online pharmacy markets (Prescient & Strategic Intelligence, 2022). During the lockdown, virtual patient care and online pharmacy services advanced to become essential to the healthcare delivery system (Weis, 2021). A notable portion of the health-related queries directed online is about online pharmacies (Muntinga & Taylor, 2018). As medical awareness grows and e-health advances, more individuals are opting to purchase medications from online pharmacies (Zhang et al., 2015). It is estimated that the online pharmacy industry will generate revenue of US $31.64 billion in 2023. By 2027, the industry is projected to increase at a pace of 13.40% annually, with a market value of US $52.33 billion. The percentage of users accessing online pharmacy services is expected to increase from 21.65% in 2023 to 29.04% by 2027. The expected average revenue earned per user (ARPU) is $19.03 (Statista, 2023). In today's digital era, where consumers hold significant power, the use of online pharmacies is becoming increasingly inevitable. It is crucial for both the world and the pharmaceutical industry to not only adapt to this change and embrace technology in healthcare but also uphold safety and regulatory standards (Salib, 2022).

An online pharmacy, also known as an e-pharmacy or Internet pharmacy, is a business that deals in both prescription and nonprescription drugs using web-based channels (Sabbir et al., 2020; Abanmy, 2017; Desai, 2016; Alfahad et al., 2015; Montoya & Jano, 2007). Owing to the attributes of convenience, privacy, accessibility, economy and availability, online pharmacies have been emerging as a primary choice of buyers (Salib, 2022). Online pharmacies extend the benefits of convenience and personalisation to individuals with physical or geographical deprivation (Desai, 2016). Moreover, the e-pharmacy portals provide information about alternatives and the adverse effects of medicines (Desai, 2016; Alfahad et al., 2015; Schifano et al., 2006; Makinen et al., 2005). Increased tendency for self-diagnosis makes e-pharmacies a suitable choice for consumers' health management (Mendoza, 2015; Fittler et al., 2013; Montoya & Jano, 2007).

With the setting up of the first online pharmacy in the 1990s in the USA, several stimuli, namely globalisation, direct-to-consumer healthcare, the proliferation of e-commerce and the mounting cost of prescription pharmaceuticals and healthcare (Mackey & Nayyar, 2016; Mendoza, 2015) have led to the expansion of digital pharmacies. Nevertheless, Internet pharmacies suffer the limitations of partial regulation (Abanmy, 2017; Levaggi et al., 2009). The online channel may compromise patient safety (Montoya & Jano, 2007). Some illegal online pharmacies or rogue pharmacies bypass the certification procedure or do not adhere to stipulated regulations (Mackey & Nayyar, 2016; Anderson et al., 2016; Kelly, 2015; Fittler et al., 2013). Illegitimate e-sellers sell without a prescription, deal in fake and inferior medicines (Ashames et al., 2019; Monteithet al., 2016; Clark, 2015; Mendoza, 2015) and risk the morbidity and mortality of consumers (Leontiadis & Hutchings, 2015). The “World Health Organization” (WHO) has found these counterfeiters to be highly versatile in their imitation techniques to avoid detection (WHO, 2018).

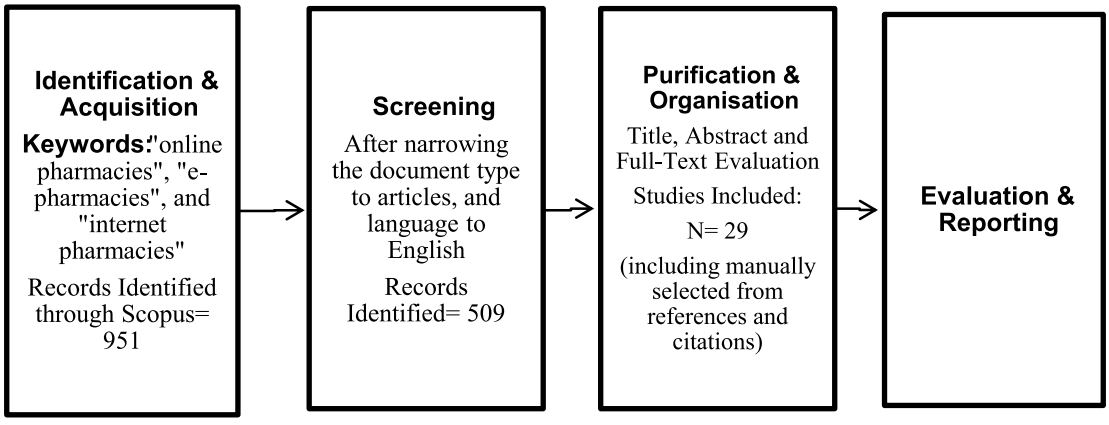
Despite these concerns, online medicine purchases have grown, as many consumers perceive them as convenient and cost-effective (Ashames et al., 2019). The COVID-19 epidemic has dramatically expedited the use of e-pharmacies and other online purchases of products and services (Fitter et al., 2022). Notably, e-pharmacies have become critical to healthcare delivery in Western nations. The pharmaceutical industry uses technology to improve customer choice, accessibility and affordability. It also enables chemists to manage patient-drug risks while accepting ownership and duty for medicine safety, effectiveness and total value. Furthermore, e-prescriptions, digital health data and instantaneous prescription monitoring enable chemists to guarantee the safe and effective administration of medications (Dineen-Griffin & Usman, 2021). The focus on digital health has increased dramatically due to the COVID-19 epidemic. The COVID-19 pandemic has drastically altered

consumers' attitudes towards digital business models. Online pharmacies provide a more comprehensive range of choices to consumers, making them beneficial for individuals who prefer or need to obtain their medications without visiting a physical pharmacy. This increased access to medication choices enhances the overall consumer experience, providing greater convenience for individuals with busy schedules or mobility challenges (Mantel-Teeuwisse et al., 2021). Therefore, the present study focuses on exploring the factors affecting consumers' behavioural intention towards the usage of online pharmacies.

Previous studies on online pharmacies (Long et al., 2022; Orizio et al., 2011) have primarily focused on the types and features of these platforms, their operational aspects, product quality and consumer purchasing behaviours. However, due to the proliferation of e-commerce platforms and the impact of the COVID-19 pandemic, consumers have increased the uptake of online pharmacies. Researchers have used various theoretical and conceptual frameworks to examine consumer attitudes towards online pharmacies. However, there remains a lack of comprehensive understanding of the factors shaping customer behaviour in the context of online pharmacy. Therefore, this study aims to review the literature on online pharmacies and identify the most prominent factors. By addressing this research gap, this study will add to the existing literature on online pharmacies and help future researchers working in this domain. Furthermore, knowledge of the factors will aid online pharmacy platform designers in focusing on key attributes that can enhance consumers' behavioural intentions to adopt these platforms. A consumer-friendly online pharmacy experience will lead to a greater adoption intention.

2. RESEARCH METHODOLOGY

The present study investigates factors influencing customers' behaviour towards online pharmacies through exploratory research. Existing literature on online pharmacies was reviewed using Scopus and Google Scholar databases. The research papers were identified through systematic keyword searches, including "online pharmacies", "e-pharmacies" and "Internet pharmacies" in the abstracts. Articles published in marketing and consumer behaviour were considered, focusing on English-language publications. Selection criteria included relevance to the research question, "What are the factors affecting consumers' adoption of online pharmacies?" (Turner et al., 2013) Articles were then analysed by cross-checking their abstracts for relevance. After a full-text evaluation, articles were selected for investigation. Each selected article was classified based on author(s), document title, publication year, source name, theory employed, method used, context and independent variables.



3. REVIEW OF LITERATURE

Fittler et al. (2018) emphasised that the acceptance of online pharmacies has been moderate, and consumers' attitude towards adopting online pharmacies is determined by Internet usage behaviour. In addition, an analysis of demographic variables showed that youngsters are more engaged in purchasing medicines online. Holtgrafe and Zentes (2012) stated that the accessibility of specialised information, confidence in the opinions of healthcare professionals, the ability to search the Internet and the perceived value and reliability of online resources about over-the-counter (OTC) medications influence consumers' choice of online resources when they are looking for information about nonprescription drugs. The preference for using online resources as an information source influences the decision to choose an online purchase channel. Roblek et al. (2018) studied the factors that affected Slovenian customers' online browsing and purchase of OTC medicines. First, customers' behaviour concerning OTC drugs was found to be influenced by technology literacy. Second, customers' perceived trust in the advantages and disadvantages of adopting online pharmacy stores significantly influenced their usage behaviour. The main advantages discovered were time and money savings, improved information access and round-the-clock availability. However, downsides included concerns about service provider incompetence and product quality confusion. Finally, socio-economic characteristics, including income, location and education, partially influence customers' behaviour. In addition, age had a moderating effect.

Using the “Technology Adoption Model (TAM)” and other variables, Ma (2021) investigated the factors influencing nonadopters' inclination to utilise online pharmacies. Researchers discovered a positive relationship between the perceived utility and trustworthiness of online pharmacies and their simplicity of use. These characteristics had a favourable and significant impact on nonadopters' inclination to utilise Internet pharmacies. Perceived risk showed a

negative direct relationship with trustworthiness and a negative indirect effect on the purchase intention of nonadopters. Using the TAM, Sampat and Sabat (2022) found that confidence and perceived utility were the primary factors influencing consumers' attitudes and behavioural intentions towards adopting online pharmacies. In addition, the findings revealed a negative association between perceived risk and a user's attitude and behavioural intention. This implies that buyers are sceptical of buying medications from Internet pharmacies. To investigate the factors affecting public behavioural intention towards the e-health system in Saudi Arabia, Almazroi et al. (2022) used the extended TAM, trust, privacy and service quality. The study outlined that perceived usefulness and privacy stimulate behavioural intention towards e-health systems. However, the impact of trustworthiness, quality of the system and easiness of use was not proven. Alsadoun et al. (2023) explored the factors driving online pharmacy users' behaviour, drawing upon the “Unified Theory of Acceptance and Use of Technology (UTAUT)” model of technology adoption behaviour. Technology trust and technical awareness significantly shaped customer behavioural intention towards online pharmacies, while perceived risk showed an insignificant impact. In a similar study underlying the UTAUT model, Sabbir et al. (2021) identified the factors influencing young Bangladeshi customers' adoption of online pharmacies. All variables were found to have a considerable impact in predicting customers' desire to use online pharmacies, except perception of risk and innovativeness. The study extended a vital link between health management and technology adoption in healthcare services.

Gani et al. (2022) also expanded the UTAUT 2 model to comprehend the drivers of customers' behavioural intentions towards online pharmacy services. It was revealed that the intention to use online pharmacies was significantly related to performance expectancy, website information, doctors' services, social influence, return policy, facilitating conditions and perceived reliability. Alwhaibi et al. (2021) studied consumers' use, perceived safety and risks associated with online medicinal purchases. The majority of respondents indicated encouraging factors for buying medicines over the Internet. Economical prices, instant access, a wide range of merchandise and improved privacy have been the most cited motivators. However, buyers highlighted the perceived risk of the inability to differentiate between licensed and unlicensed websites. Srivastava and Raina (2020) highlighted the factors influencing customers' adoption, usage and recommendation intention towards online pharmacies by combining the components of TAM, UTAUT2, self-determination theory and e-health scale. The findings indicated that hedonic motivation, social influence, performance and effort expectancy significantly determine the customers' behavioural intention, resulting in the intention to recommend the platforms. Liu et al. (2020) performed

a sentiment analysis on drug review data to identify consumer satisfaction factors. The authors identified four significant factors classifications: logistics, drug prices, customer service and drug effects. Regarding consideration, logistics speed was ranked highest, and drugs' effect was the least. Drugs' prices and customer service follow the logistics. Another study conducted on UAE respondents showed that 10% of the participants had bought medicines online, driven by cheaper costs and the unavailability of medicines in a local pharmacy. However, the majority expressed concerns about the quality of online medicines (Ashames et al., 2019). Ezeudoka and Fan (2024) examined the factors influencing the usage of Internet pharmacies by applying the extended TAM. The results demonstrated that perceived usefulness, expectancy of performance, trust and societal impact led to user inclination towards these platforms. Technical literacy also enhanced the impact of intention on actual usage. Al Halbusi et al. examined the adoption of e-pharmacies in Qatar using UTAUT 2 in their 2024 study. They discovered that various factors influenced customers' behavioural intentions and eventual adoption, including performance expectations, expected effort, peer pressure, enabling circumstances, hedonic incentives, trust in technology and alertness. They also found that the relationship between intention and actual adoption was moderated by recommendations spread through word of mouth. Almohammed et al. (2023) analysed the inhibitors and motivators towards using online pharmacies. The product quality, completeness of the order delivered and product and packaging condition satisfied the users. Moreover, time savings, special offers and a large variety encouraged their use, while a preference for visiting a pharmacy in person, reliance on the pharmacist's expertise and the vicinity of a pharmacy inhibited their adoption.

Littlejohn et al. (2005) found that the socioeconomically privileged segments of society are more likely to produce patients who meet the requirements of literacy and accessibility to the Internet and digital payment methods. These individuals are also likely to use online prescription websites primarily. Soboleva et al. (2022) found that gender and age influenced consumer behaviour towards online pharmacies differently. Women favoured the ease and affordability of online pharmacies, while men criticised them because of lack of counselling, ignorance of shelf life and cost. Similarly, Hu et al. (2021) indicated that internal factors, such as the customer's attitude, personality and emotions, along with perceived risks and external factors, such as culture, medicinal information, platform design, network, logistics and distribution, would affect consumers' purchase decisions. Adjie et al. (2023) used the push-pull-mooring framework and the IS Success model to find pricing perception, trust and satisfaction as essential push elements, while information quality and system/service quality were identified as pull factors. Similarly, subjective norms were the mooring element with

the most significant influence on switching intentions. Gharibeh et al. (2023) found that although online pharmacy clients are satisfied with the ease of delivery and ordering, they are concerned about fraud and additional expenses. Zhao et al. (2023) identified elements influencing customer satisfaction, including online customer assistance, medicine efficacy, cost performance, packaging and logistics and delivery. Fittler et al. (2022) highlighted convenience as a common advantage, although concerns about product information accuracy and pharmaceutical misuse persisted. Medi et al. (2020) created a scale that considers convenience and service quality advantages, as well as risks such as drug quality and financial stability. Brijnath et al. (2015) and Holiday-Goodman et al. (2007) highlighted cost, convenience and quality as reasons for using an online pharmacy, whereas Gurau (2005) highlighted issues regarding licencing, privacy and medicine quality. Wong-Rieger (2004) examined factors affecting online pharmaceutical purchases using risk perception and social cognition theories. Lobuteva et al. (2002) highlighted convenience benefits such as accessibility, safety during pandemics, the opportunity to order at any time and risks such as wrong medicine or nondelivery.

4. DISCUSSION AND FINDINGS

This review aimed to identify the factors that influence the intention to use online pharmacies.

4.1 Sources: The table presents the numerous sources of empirical publications that were chosen for the study, highlighting a wide variety of journals contributing to research on online pharmacies.

Table 1. Sources of Empirical Articles Selected for SLR

Name of the Journal	TP	Name of the Journal	TP
Health Informatics Journal	2	International Journal of Electronic Marketing and Retailing	1
Journal of Science and Technology Policy Management	2	International Journal of Pharmaceutical and Healthcare Marketing	1
Saudi Pharmaceutical Journal	2	International Journal of Electronic Healthcare	1
Research in Social and Administrative Pharmacy	1	Frontiers in Pharmacology	1

Journal of Engineering and Technology Management	1	The Bottom Line	1
BMC Medical Informatics and Decision-Making	1	Journal of Pharmacy & BioAllied Sciences	1
International Journal of Business Innovation and Research	1	Drugs: Education, Prevention and Policy	1
Journal of Medical Internet Research	1	Transformations in Business & Economics	1
BMJ Open	1	Informatics in Medicine Unlocked	1
Journal of Advanced Pharmacy Education and Research	1	BMC Health Services Research	1
The Patient-Patient-Centered Outcomes Research	1	Journal of Pharmaceutical Marketing & Management	1
Journal of Pharmacy Technology	1	Journal of Consumer Marketing	1
International Journal of Pharmaceutical Research	1		

Note: TP- Total Publications

4.2 Theory: Table 2 lists the theoretical frameworks that are widely used in the studies on online pharmacies. These frameworks collectively illuminate the multifaceted interplay of factors driving technology adoption and usage in the online pharmacy landscape.

Table 2: Theories Used in Online Pharmacy Studies

Theory	**Authors**
Technology Acceptance Model	(Almazroi et al., 2022; Ezeudoka & Fan, 2024; Ma, 2021; Sampat & Sabat, 2022; Srivastava & Raina, 2021; Holtgrafe & Zentes, 2012)
UTAUT	(Al Halbusi et al., 2024; Alsadoun, 2023; Gani et al., 2022; Sabbir et al., 2021; Srivastava & Raina, 2021)
Theory of Habitual Purchase Behaviour	(Hu et al., 2021)
Self-Determination Theory	(Srivastava & Raina, 2021)

External Consumer Information Search Model	(Holtgrafe & Zentes, 2012)
Push Pull Mooring Theory	Adjie et al. (2023)
Information System Success Model	Adjie et al. (2023)
Risk Perception Theory	Wong-Rieger, (2004)
Social Cognition Theory	Wong-Rieger, (2004)

4.3 Country: This table depicts the geographical distribution of authors contributing to research on online pharmacy.

Table 3: Countries

Country	**Authors**
India	(Sampat & Sabat, 2022; Srivastava & Raina, 2021; Medi et al., 2020)
Saudi Arabia	(Alwhaibi et al., 2021;Almazroi et al., 2022; Almohammed et al., 2023; Alsadoun, 2023)
China	(Liu et al., 2020; Hu et al., 2021; Ma, 2021)
Qatar	(Al Halbusi et al., 2024)
Russia	Lobuteva et al., 2022; Soboleva et al., 2022)
Bangladesh	(Sabbir et al., 2021; Gani et al., 2022)
South Africa	(Ezeudoka & Fan, 2024)
Germany	(Holtgrafe & Zentes, 2012)
Hungary	(Fittler et al., 2018; Fittler et al., 2022)
Scotland	(Littlejohn et al., 2005)
Slovenia	(Roblek et al., 2018)
UAE	(Ashames et al., 2019)
Jordan	(Gharaibeh et al., 2023)
Indonesia	(Adjie et al., 2023)
Australia	(Brijnath et al., 2015)
United States	(Holiday-Goodman et al., 2007; Wong-Rieger, 2004)
United Kingdom	(Gurau, 2005)

4.4 Methodology: Table 4 shows the two main approaches employed by researchers investigating Internet pharmacies: surveys and qualitative studies.

Table 4: Widely Used Methods in Online Pharmacy Studies

Methodology	Authors
Survey	(Al Halbusi et al., 2024; Holiday-Goodman et al., 2007; Almazroi et al., 2022; Almohammed et al., 2023; Ashames et al., 2019; Alsadoun, 2023; Alwhaibi et al., 2021; Ezeudoka & Fan, 2024; Fittler et al., 2018; Gani et al., 2022; Holtgrafe & Zentes, 2012; Hu et al., 2021; Ma, 2021; Sabbir et al., 2021; Sampat & Sabat, 2022; Soboleva et al., 2022; Srivastava & Raina, 2021; Gharaibeh et al., 2023; Adjie et al., 2023; Fittler et al., 2022; Lobuteva et al., 2022; Roblek et al.2018; Gurau, 2005)
Qualitative Studies	(Littlejohn et al., 2005; Liu et al., 2020; Adjie et al. 2023; Brijnath et al., 2015; Wong-Rieger, 2004)
Experimental Study	(Ashames et al., 2019)

4.5 Constructs:

Customers' behaviour towards Internet pharmacies is influenced by a number of elements, such as perceived usefulness, reliability, social influence, perceived danger and digital literacy. Numerous studies have examined these aspects throughout a range of time periods, with multiple authors emphasising their importance in influencing customer attitudes and actions within the context of online pharmacies.

Table 5: Factors Affecting Customer Behaviour Towards Online Pharmacies

Factors	Authors
Perceived Usefulness	(Al Halbusi et al., 2024; Almazroi et al., 2022; Ezeudoka & Fan, 2024; Gani et al., 2022; Ma, 2021; Holtgrafe & Zentes, 2012; Liu et al., 2020; Sabbir et al., 2021; Sampat & Sabat, 2022; Srivastava & Raina, 2021; Fittler et al., 2018; Soboleva et al., 2022; Hu et al., 2021; Gharaibeh et al., 2023; Adjie et al., 2023)
Convenience	(Almohammed et al., 2023; Alwhaibi et al., 2021; Liu et al., 2020; Fittler et al., 2018; Soboleva et al. 2022; Gharaibeh et al., 2023; Adjie et al., 2023; Fittler et al., 2022; Lobuteva et al., 2022; Medi et al., 2020; Brijnath et al., 2015; Holiday-Goodman et al., 2007; Gurau, 2005)
Trustworthiness	(Al Halbusi et al., 2024; Almazroi et al., 2022; Ezeudoka & Fan, 2024; Gharaibeh et al., 2023; Gani et al., 2022; Holtgrafe & Zentes, 2012; Ma, 2021; Roblek et al., 2018; Sabbir et al., 2021; Sampat & Sabat, 2022; Alsadoun et al., 2023; Adjie et al., 2023)

Social influence	(Al Halbusi et al., 2024; Wong-Rieger, 2004; Sabbir et al., 2021; Ezeudoka & Fan, 2024; Gani et al., 2022; Srivastava & Raina, 2021; Adjie et al., 2023)
Perceived Risk	(Alwhaibi et al., 2021; Wong-Rieger, 2004; Hu et al., 2021; Ma, 2021; Soboleva et al., 2022; Sampat & Sabat, 2022; Sabbir et al., 2021; Fittler et al., 2018; Gharaibeh et al., 2023; Adjie et al., 2023; Lobuteva et al., 2022; Medi et al., 2020; Gurau, 2005)
Digital Literacy	(Al Halbusi et al., 2024; Wong-Rieger, 2004; Alsadoun, 2023; Ezeudoka & Fan, 2024; Holtgrafe & Zentes, 2012; Littlejohn et al., 2005; Roblek et al., 2018; Sabbir et al., 2021; Gharaibeh et al., 2023; Adjie et al., 2023)

The following factors (Figure 2) have been studied in the available literature:

a) **Perceived Usefulness –** Usefulness implies enhancing the serviceability of online pharmacy platforms. A higher level of usefulness indicates that customers perceive using e-platforms results in increased work performance (Davis et al., 1989). It pertains to easy navigation, information availability and interactive features. Perceived usefulness infers enhanced efficiency, improved output, increased effectiveness, expedited processes, accelerated transactions and swift operations (Prastiawanet al., 2021). If medicine buyers consider the e-pharmacy platform to enhance the quality of self-health management, their behavioural intention to adopt these platforms might be strengthened.

b) **Convenience –** Convenience encompasses characteristics such as ease of use, time efficiency, minimal effort requirement and simplification of tasks. Convenience has been identified as a critical driver for customers' inclination to embrace technology-based business models. It increases user comfort and reduces the time and effort required to utilise such advanced technology. Convenience in the context of Internet pharmacy requires an automated and accessible online service available 24/7. Internet pharmacies must have the potential to offer benefits, such as time and cost savings and eliminating spatial constraints. Reducing the need for consumers to travel to various physical stores to review different products can significantly save time. Additionally, users can compare prices for the same product within a single mobile app, allowing for potential cost savings.

c) **Trustworthiness –** Consumers' conviction about a vendor's trustworthiness and reliability eliminates the need for an extensive verification process. As a result, consumers can engage in online transactions more quickly and easily, enjoying the benefits of convenience and efficiency (Ma et al., 2021). A potential consumer's

perception of a vendor's competency, benevolence and veracity alleviates perceived uncertainty regarding the vendor's authenticity. Trustworthiness increases the likelihood of the consumer using an Internet pharmacy by developing a sense of reliance and confidence in the e-vendor. Propensity to trust is supposed to make consumers more comfortable and willing to engage in transactions with Internet pharmacies.

d) Social Influence – It is typically described as the impact of interaction with another individual or a group on an individual's thoughts, feelings, behaviours, or attitudes. This influence occurs when the other individual or group is professed as alike, desirable, or possessing expertise (Kelman, 1958). Various technology adoption and consumer behaviour theories have highlighted the importance of social influence concerning technology adoption and acceptance. In TPB and TAM2, this aspect has been termed subjective norms or social factors. It is also an essential element of the UTAUT and UTAUT2 models. In the context of information system adoption, the informational form of social influence becomes operational. Individuals accept information as evidence of reality. This forces individuals to integrate the beliefs of others into their views (Graf-Vlachy et al., 2018).

e) Perceived Risk – Consumer behaviour involves an inherent element of risk due to the uncertainty surrounding the consequences of product usage. The outcomes and effects of using a product cannot be anticipated with complete certainty, which introduces a potential for unpleasant experiences. Introducing new technologies or systems can be perceived as a departure from familiar routines and may involve uncertainties about their performance, compatibility, or potential negative consequences. This perception of risk can influence consumers' decision-making and their comfort level or willingness to adopt new information systems. Apprehension about the quality of online medicine may create hesitation in adopting e-pharmacies. The perceived complexity and security issues associated with human–computer interactions and online transactions can increase the overall uncertainty and reduce consumers' willingness to adopt new e-pharmacies.

f) Digital Literacy – Digital literacy encompasses the skills and competencies required to comprehend, analyse, organise and evaluate information using digital technologies. Digital literacy enhances individuals' confidence to utilise certain technologies effectively. Technically aware consumers are more inclined to accept and integrate e-services into routine activities. As a result, they perceive the technology as less daunting or challenging, making it appear more effortless to use in their eyes (Buchanan et al., 2013). This favourable perception of ease of use further supports their confidence and

motivation to engage with the technology. Overall, digital literacy equips individuals with the ability to navigate, utilise and critically engage with digital technologies.

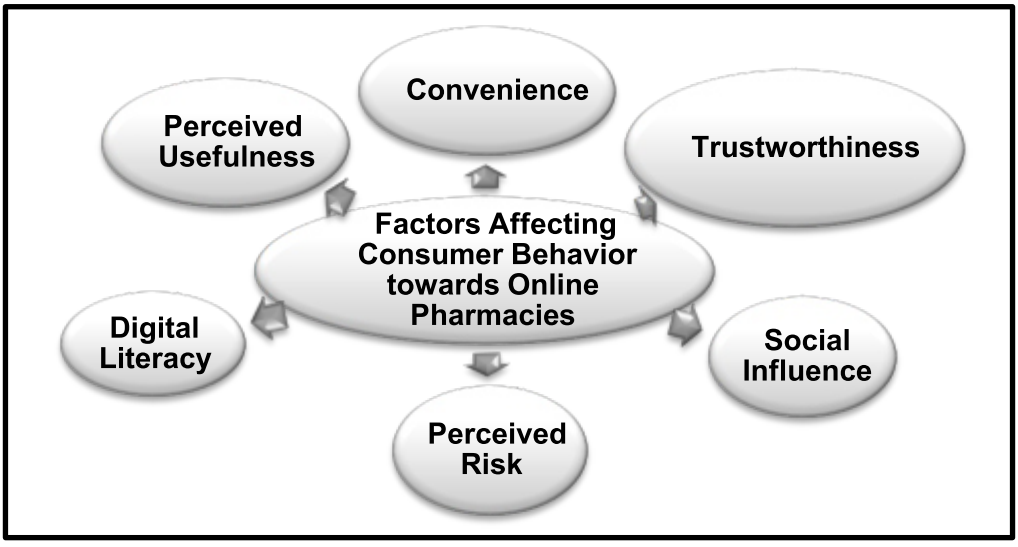


Figure 2: Factors Affecting Consumer Behavior Towards Online Pharmacies

5. THEORETICAL AND MANAGERIAL IMPLICATIONS

An extensive literature review on the factors influencing consumers' adoption of online pharmacies might provide theoretical insights into the complex interaction of technological, social, psychological and environmental aspects that shape consumer behaviour in the digital healthcare ecosystem. Further, it enhances current theories, such as the “Diffusion of Innovation Theory” and “Technology Acceptance theories”, by identifying variables unique to the adoption of online pharmacies, such as “perceived usefulness”, “trustworthiness” and “risk perception”. Furthermore, it contributes to health behaviour theories by clarifying the importance of attitudes, beliefs and perceived norms in consumer decisions. Findings from the present study emphasise an ample scope of research in the context of online pharmacies. Identifying the factors affecting consumers' behaviour towards online pharmacies will aid future researchers in conducting empirical studies and generalising the findings. Marketers can invest in enhancing factors such as perceived usefulness, convenience, trustworthiness, social influence, perceived risk and digital literacy to provide an ideal customer experience and urge continuance intention. Future studies can be conducted to assess how significant these identified factors are on customers' motivation to adopt online pharmacies.

When developing marketing plans, online pharmacies should consider various attributes that affect customers' decision-making. Managers should devote their resources to improving the customer service variables to gain a competitive edge. This entails concentrating on elements such as promptness, dependability and customised support. Online pharmacy designers should thus aim at making the sites easy to use and navigate. They must design simple and streamlined purchasing procedures with clear instructions. Customers would be pleased to use e-medicine stores with user-friendly layouts and efficient site designs. In addition, as consumers consider trust a key element, marketers should offer credible product information. This transparency instills customer trust and confidence, encouraging loyalty and favourable word-of-mouth referrals. To boost the effect of social influence on the consumers of pharma companies , customer reviews and comments can emerge as a crucial strategy. Positive testimonials act as strong endorsements for future clients. Moreover, the marketing programs can be tailored to suit the different segments of customers based on their demographics. Chatbots and online consultations with the doctor will help users seek live and prompt answers to their health-related issues, thus alleviating the perceived risk and lack of trustworthiness. Similarly, customised emails and health blogs may enhance health-conscious consumers' conviction in the e-pharmacy platform. Finally, authorities might utilise the knowledge to create or improve legislation governing Internet pharmacies, assuring customer safety and building trust in these platforms. Overall, the study's implications include enhancing online pharmacy services' standards, usability and security and enabling customers to make prudent choices regarding their health-related needs.

6. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

Customers of the growing e-pharmacy business have become more demanding than ever before. Knowledge of the factors that affect consumer perception and usage intention gains relevance in the present scenario. A review of the available literature revealed that studies conducted to check customers' experience with online pharmacies are scarce. Therefore, future research on elements that generate positive customer experience can be performed. A study of the attributes of online pharmacies that lead to customers returning to these sites will help e-healthcare marketers develop strategies based on customer preferences and thus gain consumer loyalty. Further, theoretical perspectives such as technology affordance theory, uses and gratification theory, social cognitive theory, information systems success model, resource-based view, diffusion of innovations theory and flow theory have been underutilised in the context of online pharmacies, leaving ample opportunities for researchers to explore their applicability and implications in this specific domain. In

addition, until now, most studies have relied upon quantitative research methodologies to explore consumers' acceptance of e-pharmacies. However, contemporary research tools like Twitter mining, netnography, and online experiments can be utilized to get novel insights into this field. Using these unique methodologies, researchers can observe real-time consumer attitudes, behaviours and interactions in the digital environment, offering a better knowledge of the dynamics affecting consumer perceptions and behaviours towards e-pharmacies. This multimethod approach can add to the current body of knowledge and provide new views on the changing environment of online pharmacy acceptability. Finally, research on Internet pharmacies may be conducted in a wider geographic area. Although previous research may primarily concentrate on particular areas or nations, it is vital to investigate the global landscape of Internet-based pharmacies. Investigating how cultural, legislative and socioeconomic issues affect online pharmacy practices in different locations can give valuable insights into the industry's unique difficulties and potential.

ASSESSING PROGRESS MADE BY THE GUJARAT STATE IN TERMS OF ATTAINING SUSTAINABLE DEVELOPMENT GOALS

Dr. Pratham Parekh*

ABSTRACT

The global discourse on aligning national priorities with sustainable development goal (SDG) indicators has gained momentum. India has actively monitored its progress toward these goals using the SDG India Index, incorporating data from three editions. This index reflects the relevance of SDG targets, data availability and alignment with the national indicator framework.

Gujarat, a prominent Indian state, serves as the study's focal point. Performance across 16 SDGs is analysed using data from the 2018, 2019 and 2020 SDG India Index editions. The analysis involves comparing Gujarat's performance with other states on a goal-wise and indicator-wise basis. Notably, Gujarat consistently outperforms national aggregates in numerous indicators during this period.

This study aims to comprehensively assess Gujarat's progress in terms of the attainment of 17 SDGs from 2018 to 2020, as reported by NITI Aayog. The primary objective is to grasp how the state's

**Assistant Professor, Institute of Management, Nirma University*

performance intersects with national priorities and SDG indicators, contributing to the broader discourse on sustainable development in India.

This study employs a two-tiered analysis. First, a goal-wise comparison assesses Gujarat's achievements in specific SDGs relative to other states. Second, an indicator-wise analysis evaluates Gujarat's performance against national aggregates. This dual approach offers insights into Gujarat's contributions to SDG attainment and areas where it excels.

This study concludes with highlights of Gujarat's progress in aligning with SDGs, outperforming national aggregates in multiple indicators. Additionally, the study identifies research gaps in the national indicator framework and explores the advantages and disadvantages of progress indices in measuring social development at the national level.

Keywords: *Sustainable Development, National Development, NITI Aayog*

1. INTRODUCTION

In the year 2015, the United Nations General Assembly introduced a groundbreaking global development agenda titled "Agenda 2030" (General Assembly, 2015). This global agenda outlined an indelible vision for a development framework beyond 2015. This framework was crafted by drawing upon the insights gained from the partial progress made towards the Millennium Development Goals (MDGs) by 2015. The new Agenda 2030 is anchored on four overarching pillars: People, Planet, Prosperity, Peace and Partnership. Based on four idealistic masts, the 17 Global Sustainable Development Goals (SDGs) were declared, namely, (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reducing inequality, (11) sustainable cities and communities, (12) responsible consumption and production, (13) climate action, (14) life below water, (15) life on land, (16) peace, justice and strong institutions and (17) partnerships for the goals.

These global 17 SDGs offer promising framework for the future of the entire human race. One interesting attribute of these goals is that they can be culturally, socially and politically customised as per country- and subcountry (states)-specific priorities.

As of now, there are fewer than 10 years remaining to achieve these global goals. The United Nations declared the period from 2020 to 2030 as the "Decade of Action" (General Assembly, 2015). During this decade, all member countries are anticipated to expedite the implementation of various policies, projects and sustainable solutions and the execution of

strategies for their sustainable development.

Within the Indian context, there exists a consensus among all stakeholders regarding the urgency of adopting, implementing and monitoring the SDGs at the local, subnational and national levels of governance. This consensus has visibly translated into enthusiastic engagement from civil society, the private sector and governments alike. A multitude of SDG-linked policy initiatives has been undertaken by various State Governments in India. These policies are executed through programs and schemes that have yielded positive outcomes in many states (Parekh, 2021).

1.1 Scope and Implications

The scope of the study covers several aspects, including the examination of methodologies used for deriving indicators and composite scores, critical evaluation of data sources for transparency and reliability, analysis of composite scores assigned to different states and union territories (UTs) and exploration of stakeholder consultation processes. By investigating these aspects, the study seeks to uncover potential biases, limitations and areas for improvement in the assessment frameworks employed by NITI Aayog.

The implications of this study are multifaceted. First, it holds relevance for policymakers and stakeholders involved in sustainable development planning and implementation, providing insights that can inform policy decisions aimed at enhancing the effectiveness and inclusivity of development initiatives. Second, by highlighting potential data gaps, inconsistencies, or biases, the study underscores the importance of ensuring data integrity and transparency in monitoring progress towards SDGs. Third, it contributes to fostering greater accountability and transparency in governance by encouraging critical scrutiny of assessment methodologies used by governmental institutions. Finally, the study offers opportunities for further academic inquiry and research into performance assessment methodologies in the context of SDGs, laying the groundwork for future scholarly endeavors in this area.

2. SDG IN THE INDIAN CONTEXT

As per the SDG Index Global Report 2017, India was ranked at the 110th position out of 157 countries. This rank is below that of India's neighbors, including Sri Lanka, Nepal, Bhutan and China. India's poor performance in promoting sustainable development has been mostly dominated by discourse related to the unavailability of basic infrastructure (Rao, 2015), unmet food insecurity (Vani et al., 2017) and degrading environmental quality (Gurjar, Ravindra, & Nagpure, 2016).

After the publication of the Global SDG Index Report in 2017, newly formed apex national planning bodies in India were entrusted with the task of monitoring the progress of states and countries on SDG implementation. NITI Aayog, declared as the premier national institute for overseeing SDG implementation, was authorised to institutionalise monitoring, reporting, reviewing and engaging with states and various stakeholders to achieve SDGs at national, subnational and local levels in India.

To gauge the outcomes of SDG-oriented policies, NITI Aayog introduced the SDG India Index. This index serves as the official and primary tool in India for monitoring SDG progress at both the state and national levels. It employs straightforward methodologies to assess the progress made by Indian states, aiding state governments in refining their understanding of existing policies and highlighting policy blind spots.

The initial version of the SDG India Index (considered as the Baseline report), released in 2018, monitored 13 goals, 39 targets and 62 indicators. The second version, released in 2019, assessed the progress of Indian states based on 16 SDGs and 100 indicators spanning 54 targets. The most recent iteration of the index, released in 2021, evaluates 16 goals, 115 indicators and 70 targets (NITI Aayog, 2021). All versions of the index rank Indian states and UTs according to the progress they have achieved across predefined indicators and goals. The second and third versions of the indexes heavily rely on the National Indicator Framework (NIF), developed by the Ministry of Statistics and Programme Implementation (National Statistical Office, Ministry of Statistics and Programme Implementation, 2021). A comparison of all three versions of the SDG India Indexes is provided (see Figure 1).

Baseline report – 2018	V2.0 report – 2019-20	V3.0 report – 2020-21
13 goals	16 goals + qualitative analysis on goal 17	16 goals + qualitative analysis on Goal 17
39 targets	54 targets	70 targets
62 indicators	100 indicators	115 indicators
Goal-wise ranking on States/ UTs	Goal-wise ranking on States/ UTs + State/ UT profiles	Goal-wise ranking on States/ UTs + State/ UT profiles
Preceded National Indicator Framework (NIF)	Aligned with NIF: 68 indicators completely aligned, 20 refined, 12 new to cover goals 12, 13, and 14	Aligned with NIF: 76 indicators completely aligned, 31 refined, 8 in consultation with the line ministries

Figure 1:Comparison of all three versions of SDG India Index

3. LITERATURE REVIEW

The scientific literature on SDGs in India has consistent increase in recent years, with the year 2023 marking a significant peak in the number of articles, totaling 462 (40.58%). Additionally, there were 274 (9.02%) book chapters and 231 (3.96%) conference papers. Analysis of Scopus metadata reveals a diverse range of subject areas, with "Social Sciences" emerging as the dominant category, constituting 800 (26.62%) of the documents by 2023. However, there remains a limited body of scientific literature focussed on India's SDG monitoring policy or the assessment of states' progress in achieving SDGs. Several studies have highlighted an urgent need to describing the challenges and limitations of the SDG India Index report prepared by NITI Aayog, emphasising the need to address methodological issues in measuring progress towards the SDGs.

Pattani, Itee and Hitesh Bhatia (2017) reviewed India's progress under the MDGs and highlighted a need for a more streamlined and transparent monitoring system for the SDGs. The study highlights that the success of the SDGs depends on the establishment of a less bureaucratic and more transparent system for monitoring, evaluation and accountability. Roy et al. (2022) analysed the performance of Indian cities in their pursuit of the SDGs. The authors made an attempt to identify developmental disparities among cities, highlighting issues of inequality, and noted the adverse environmental impacts of economic development. Das, Rupak and Debabrata Das (2019) provided a detailed analysis of India's progress towards the achievement of SDGs, drawing attention to challenges in poverty reduction, education, healthcare and access to clean water and electricity. Their analysis indicated that India faces a considerable journey to achieve 100% access to clean drinking water and electricity. Hashimoto et al. (2022) applied machine learning regression techniques to evaluate the SDGs India Score and identified health and poverty as the most significant contributing factors to India's progress towards the SDGs.

Another set of studies demonstrates India's efforts and challenges in pursuing SDGs with the involvement of NITI Aayog and the need for community engagement and state-specific strategies. Chaturvedi et al. (2019) offered a historical perspective on sustainable development and its alignment with India's development policies. Deshpande et al. (2017) emphasised the significance of community partnerships and education in realising SDGs, especially in poverty reduction and the promotion of health and equality. Panda et al. (2018) assessed the status of SDGs in India, revealing disparities among states and advocating for state-specific policies. The state-level indices underscore the need for tailored policymaking to address regional variations. In conclusion, this analysis emphasises the significant

disparities among Indian states, calling for a united effort to achieve consistent progress nationwide.

Fonseca, Domingues and Dima (2020) conducted a study to explore the relationships among the 17 SDGs with the aim of elucidating their mutual connections. Their research revealed that SDG1 (poverty elimination) and SDG3 (good health and well-being) exhibit synergistic relationships with most other goals. Furthermore, SDG7 (affordable and clean energy) demonstrated significant associations with multiple SDGs, highlighting the pivotal role of sustainable energy in various facets of development. However, a moderately negative correlation with SDG12 (responsible consumption and production) underscored the imperative for enhanced energy efficiency and sustainable consumption patterns (Fonseca et al., 2020).

The SDGs Report 2018 offers a comprehensive analysis of progress made towards achieving SDGs (UN, 2018). This report is based upon data collected from international and regional organisations; it evaluates the advancements of regions and countries towards SDGs. It highlights the pivotal role of national statisticians, policy experts, civil society and academia in contributing to this evaluation. The report emphasises the significance of trust and unity in rallying people towards common goals, ultimately highlighting the importance of collective action.

Morton, Pencheon and Squires (2017) examined the challenges linked with the implementation of the SDGs, with a particular focus on distinguishing them from the MDGs. Authors' work necessities a comprehensive, system-wide strategic approach that integrates economic, social and environmental dimensions into policies and actions. Their study cautions against prioritising individual goals in isolation, emphasising the potential positive interactions between them. This examination highlights the importance of developing a holistic understanding of systems and explores the potential benefits of transitioning from the current development model (Morton et al., 2017).

Diaz Sarachaga, Jato-Espino and Castro-Fresno (2018) assessed the suitability of the SDG Index as a benchmark for evaluating progress towards the 2030 Agenda. The findings of their work indicate that the majority (60%) of SDG indicators were excluded from the SDG Index because of the lack of available data. This work sets up ground and needs for devising regional SDG Indices to prioritise lower-performing goals and provides a more accurate reflection of sustainability (Diaz Sarachaga et al., 2018).

Saito et al. (2017) dealt with the role of sustainability science in addressing global challenges, including the SDGs. They emphasised the imperative of adopting a transdisciplinary approach to comprehending complex global issues. The authors underscored the innovative character of the SDGs in promoting global governance for sustainability. Furthermore, they highlighted the significance of novel metrics, such as the inclusive wealth index, for monitoring the implementation of the SDGs (Saito et al., 2017).

Pogge and Sengupta (2015) conducted a critical examination of the formulation of the SDGs. Authors' arguments revolve around the draft's lack of specificity regarding responsibilities and accountability. The paper calls for enhanced goal clarity, structural reforms in the global institutional order, the inclusion of stronger human rights language, and the implementation of precise measures to track progress. It accentuates the importance of bolstering the moral power and appeal of the SDGs to inspire global action (Pogge and Sengupta, 2015). Langford (2016) engaged in a discussion of the political dimensions inherent in the SDGs. The article reflects on the comprehensive nature of the SDGs and their potential to serve as guiding principles for global development. It underscores the transformative and integrated nature of the SDG agenda, emphasising its historic significance in shaping the future.

Stewart (2015) identified three critical issues concerning the SDGs. First, the challenge of ensuring national ownership of these globally agreed-upon goals is emphasised. It is essential to adapt the SDGs to local priorities and circumstances to secure national commitment. Second, economic structures necessary to achieve specific goals, particularly the reduction of inequality, are left unspecified. Existing economic policies may hinder progress in this regard. Third, the integration of sustainability and economic goals remains incomplete. The promotion of economic growth should align with sustainability objectives, emphasising the need for "green growth" (Stewart, 2015).

Willis (2016) provided an overview of the SDGs, highlighting the differences from the MDGs, such as the broader range of goals and the inclusion of both global North and South countries. These changes have implications for international development planning, necessitating a shift in approach.

Khalid, Sharma and Dubey (2020) highlighted concerns raised by developing countries regarding the SDGs. Despite emerging from global consensus, questions persist about their effectiveness in addressing the challenges faced by developing nations. The authors present a case study for India, with the aim of informing SDG implementation strategies in developing countries.

Giribabu, Mohapatra, Reddy and Prasada Rao (2018) dealt with the correlation between India's social safety net program, Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the SDGs. Recognised as the world's largest social safety net program, MGNREGA aims to enhance livelihood security by providing wage employment and has led to sustainable asset creation. The study highlights how community-based participation can contribute to the achievement of all 17 SDGs in India. Srivastava (2018) argued that India's progress on the MDGs was hindered by the lack of a robust system for monitoring and evaluation. To achieve the SDGs, he emphasised the need for a national evaluation policy (NEP) in India to standardise the evaluation process, ensuring the collection of authentic data and timely corrective actions. David (2018) addressed the challenges India faces in achieving the SDGs, emphasising the shift from a growth-focussed approach to SDGs. This shift presents the need to pass on natural resources to future generations unimpaired. The paper discusses specific challenges and offers suggestions to overcome them. Singh and Rahman (2021) established a connection between corporate sustainability and the SDGs, emphasising their interrelation. The study focusses on the alignment of the top 100 Indian companies with the SDGs and introduces an SDG-triple bottom line (TBL) framework, shedding light on factors influencing business adoption of the SDGs.

Rahman Zaini and Akhtar (2019) assessed the importance of different SDGs from India's perspective and employed interpretive structural modeling (ISM) to develop a hierarchical model for their adoption. The study identifies the relatedness between the SDGs and common sustainability targets, emphasising their interconnectedness. Dhyani, Karki and Petwal (2018) provided insights from a South Asia workshop, discussing ecosystem management, nature-based solutions and SDGs in India. While not an academic article, this report offers valuable perspectives on localising SDGs using nature-based solutions. Ramos (2016) highlighted the universal and multidimensional nature of the SDGs, emphasising the need for integrated frameworks that promote environmentally respectful growth shared by all. The concept of sustainable development challenges governments to align policies with this worldview. Ramanujam, Caivano and Agnello (2019) discussed the role of institutions of accountability in India's pursuit of the SDGs. They argued that integrating a baseline conception of distributive justice is essential for addressing income inequalities and achieving the SDGs.

Some recent studies offer insightful perspectives on India's journey towards achieving the SDGs and the methodologies employed to assess progress. Mohata et al. (2024) presented a novel approach to forecast the SDG Index of Indian states, utilising machine learning

techniques and a comprehensive dataset encompassing socio-economic, demographic and environmental indicators. Their analysis reveals varying degrees of progress across different SDGs, highlighting the complexity of developmental challenges. Similarly, Aggarwal (2023) constructed an Inclusive Development Index (IDI) for Indian states, focussing on holistic evaluation and adherence to methodological directives. This index provides a nuanced understanding of inclusivity, categorising states based on their performance. Chattopadhyay and Chakraborty (2019) contributed to the discourse by re-evaluating the performance of Indian states concerning Goal 4 of the SDGs, aiming to refine assessment methodologies and address inherent complexities. Their study underscores the need for sophisticated evaluation methods to capture the intricate interplay of diverse criteria, thus facilitating more accurate and comprehensive performance rankings.

These studies collectively emphasise the importance of robust methodologies in assessing progress towards the SDGs and highlight the multifaceted nature of developmental challenges. As India navigates towards its developmental goals, the insights provided by these studies serve as valuable contributions towards informed policy-making and action. Additionally, they underscore the imperative of subregional and regional cooperation in supplementing national efforts and ensuring coherence in achieving the SDGs, particularly in light of disruptions such as the COVID-19 pandemic (Chaturvedi, 2021).

Sharma and Tripathi (2022) conducted a thorough evaluation of India's progress towards the SDGs, utilising the SDG India Index versions 1.0, 2.0 and 3.0 developed by NITI Aayog. Their analysis demonstrates a consistent improvement in India's overall score, rising from 57 in 2017–18 to 66 in 2020–21, indicating substantial advancement across states and UTs during this period. This upward trajectory underscores the efficacy of ongoing efforts in aligning with the SDGs and signifies commendable progress towards sustainable development objectives.

In a complementary study, Pradhan et al. (2023) focussed on elucidating the opportunities and challenges in achieving the SDGs within Odisha. Employing econometric analysis, they explored the relationship between public spending in the social sector and the Multidimensional Poverty Index (MPI), aiming to discern the investment prerequisites for SDG realisation. Their findings reveal a significant correlation between augmented public expenditure and reduced MPI levels, suggesting the potential for increased investment in the social sector to facilitate SDG attainment in the state. However, amidst financial constraints and economic uncertainties, alternative financing avenues may warrant exploration, underscoring the need for effective governance and efficient policy implementation.

Khalid, Sharma and Dubey (2018) proposed a novel methodology for identifying a representative indicator set to measure sustainable development in India, grounded in the SDGs. Their approach, delineated in three stages, aims to align with the country's unique requirements and preferences. Illustrated through the lens of SDG 7, pertaining to energy, their method offers insights into India's progress in sustainable development. Despite its simplicity, the proposed technique demonstrates effectiveness and holds promise for adoption by other developing nations, contributing to a broader understanding of sustainable development progress. However, the release of the second edition (2019) of the SDG Index India report by NITI Aayog is accompanied by persisting methodological shortcomings, as highlighted by Khalid, Sharma and Dubey (2020). Weaknesses in justification and coverage regarding proxy indicator identification, target establishment, state classification, indicator imputation and data deficiencies are evident. Addressing these concerns is imperative to enhance the credibility and statistical validity of future SDG Index reports, ensuring a more accurate representation of India's progress towards SDGs.

Dwivedi & Sharma (2022) examined the current status of key targets pertaining to Indian UTs, employing the SDG India Index 3.0 and a novel methodology. Utilising Shannon Entropy and COCOSO techniques within a multicriteria decision-making (MCDM) model, the study evaluates the efficacy of these targets. The findings highlight Chandigarh as the front-runner in implementing SDGs, achieving commendable outcomes compared to its counterparts. Conversely, Dadra Nagar Haveli and Daman & Diu rank lowest, indicating a lag in SDG implementation within these UTs. This disparity underscores the need for enhanced efforts to ensure comprehensive SDG implementation across all regions.

A critical examination reveals persistent gaps, particularly in the assessment of India's SDG monitoring policies and the progress of states towards achieving the goals. Although studies by Pattani and Bhatia (2017), Roy et al. (2022), Das and Das (2019) and Hashimoto et al. (2022) highlight various challenges and factors influencing India's progress, they often fall short of proposing concrete solutions or policy implications. Moreover, efforts to emphasise community engagement and state-specific strategies lack empirical evidence supporting their effectiveness, indicating a need for further research in this area (Chaturvedi et al., 2019; Deshpande et al., 2017; Panda et al., 2018).

Although some studies advocate for the development of regional SDG indices (Diaz Sarachaga et al., 2018) and a transdisciplinary approach to addressing global challenges (Saito et al., 2017), they provide limited practical guidance on implementation. Critiques of the formulation and implementation of the SDGs (Pogge and Sengupta, 2015; Langford,

2016; Stewart, 2015) highlight the need for alternative approaches and structural reforms but lack consensus on specific recommendations. In addition, while discussions on the role of accountability institutions in achieving the SDGs are present (Ramanujam et al., 2019), empirical research on the impact of institutional reforms remains scarce, pointing to a gap in understanding the practical implications of these reforms for sustainable development in India.

While existing studies offer valuable insights into India's progress towards the SDGs, there are notable research gaps that need to be addressed. Future research should focus on developing robust monitoring mechanisms, exploring innovative policy interventions and evaluating the effectiveness of institutional reforms to advance SDGs in India.

4. METHODOLOGY

Research methodology incorporates an analytical framework that harnesses secondary data from NITI Aayog to critically assess Gujarat's progress towards the SDGs. It adheres to the highest standards of sociological research, contributing significantly to the understanding of sustainable development within the Indian context. The study is designed to yield comprehensive insights into sustainable development in the Indian state of Gujarat. The methodology draws upon secondary data compiled by the National Institution for Transforming India (NITI Aayog) spanning the years from 2018 to 2021. The selected indicators for this study are derived from the SDG India Indices, a framework by NITI Aayog. This methodology entails two fundamental aspects:

4.1. NITI Aayog's Indicator Derivation Method:

In order to establish the credibility and robustness of the data source, it is important to inspect the methodological approaches adopted by NITI Aayog for the derivation of these indicators. Transparency, data sources and statistical techniques utilised by NITI Aayog are examined. Such analysis ensures methodological precision, ensuring the utmost reliability of the research findings..

4.2 Critical Descriptive Approach:

The research approach of the study is characterised by its critical and systematic examination of the indicators and their associated values, as reported by NITI Aayog and various Ministries of the Government of India. Such critical perspective aims to uncover potential biases, limitations, or discrepancies in the data used for public policy framing. This scrutiny

of the data enhances the integrity of the research and its capacity to identify nuanced insights.

4.2.a.Two-Layered Analysis:

Within this methodology, a dual-layered analysis is employed to comprehensively assess Gujarat's progress towards SDGs:

Description of Goal Attainment: In the first layer of analysis, the study scrutinises Gujarat's overall performance concerning goal attainment. This holistic examination provides a broad perspective on the state's achievements in relation to the SDGs.

Description of Indicator Performance: In the second layer of analysis, Gujarat's performance is scrutinised against each individual indicator under every SDG. This granular approach provides a nuanced understanding of Gujarat's strengths and weaknesses in pursuit of sustainable development.

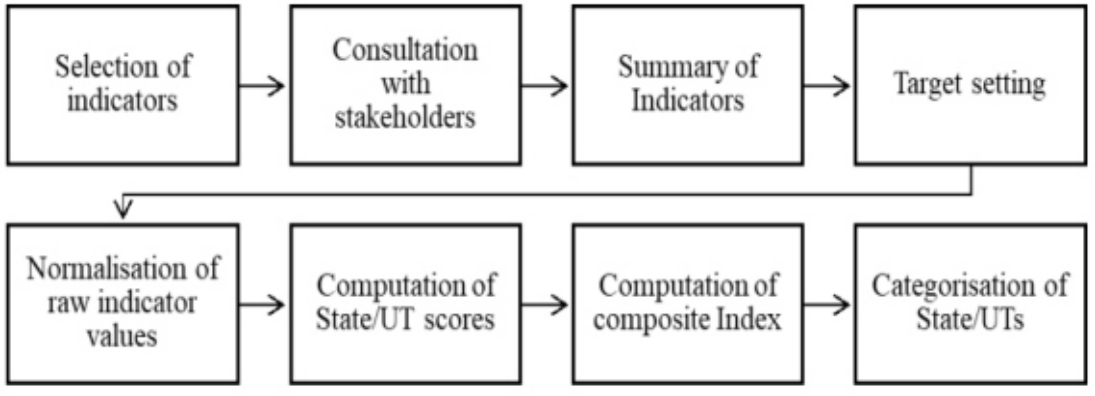


Figure 2:NITI Aayog's approach for formulating SDG India Index

NITI Aayog's SDG indices borrow the majority of indicators from NIF and map them with national development priorities. For this purpose, NITI Aayog follows several criteria, as shown in Figure 2, to decide the suitability of indicators, which is based on sound technicality, availability and quantitative criteria.

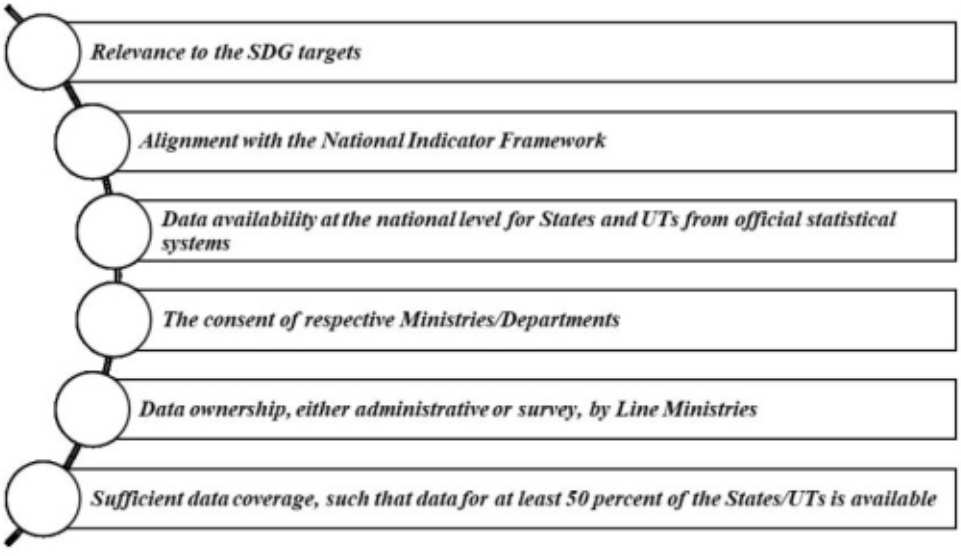


Figure 3:Criteria for selection indicators

The majority of indicators selected for the SDG India Index are derived from the NIF. In cases where NIF indicators are unavailable, a suitable proxy indicator from the relevant official data source is adopted. Indicators for which state-level data were unavailable have been excluded.

Each indicator possesses a unique range of values. Therefore, it is imperative to standardise all values on a common scale. To achieve this, raw indicator values underwent a normalisation process, which ensured comparability. The normalised scale ranges from 0 to 100, with 0 denoting the lowest performance and 100 signifying the full attainment of the target. In instances where states exceeded 100% of the target, their scores were capped at 100. Following the normalisation of raw data, NITI Aayog computed scores for each state across each goal. This computation was based on the arithmetic mean of normalised values for each goal within each state. Equal weightage was assigned to each indicator.

To calculate the composite index, arithmetic means of goal scores were determined for every state. These scores reflect the overall positioning of each state and provide insights into their progress when compared to previous versions of the index. Subsequently, the rounded scores were used to categorise all Indian states and UTs into performance categories (see Table 1).

Table 1: Progress Categories Defined Based on a Composite Score Range

Category	Index Score
Achiever	100
Front Runner	65-99
Performer	50-64
Aspirant	Less than 50

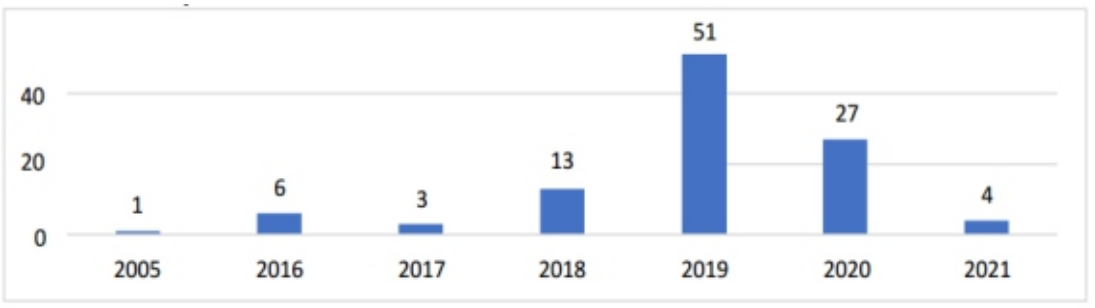


Figure 4: Periodicity of data values used to develop indices by NITI Aayog

Eighty-two (78.10%) of indicators under study contain data values from the year 2019 to 2021 while 22 (20.95%) indicators contain data values ranging from 2016 to 2018, followed by 1 (0.95%) indicator that contains a value from 2005.

5. PERFORMANCE OF GUJARAT (GOAL-WISE)

According to performance categories devised by NITI Aayog, Gujarat state had 53.85% of goals under the front-runner category and 23.08% of goals under the aspirant category during 2018. Similarly, during 2019, 33.33% of Gujarat's goals were under the aspirant category, while 53.33% of goals were under the front-runner category. By 2020, there were 33.33% under the performer category, while 13.33% of goals remained under the aspirant category, followed by 53.33% of goals under the front-runner category. Consistently, 53.33% of Gujarat's goal-wise performance has remained under the front-runner category.

Comparing this scenario with national aggregates, it can be observed that during 2018, 50% of India's goals were under the performer category, followed by 31.25% of goals under the front-runner category and 18.75% of goals under the aspirant category. In 2019, the lack of progress is observed at the national level. During 2020, 56.25% of goals of India were under the front-runner category, while 31.25% of goals were under the performer category, followed by 12.05% of goals under the aspirant category.

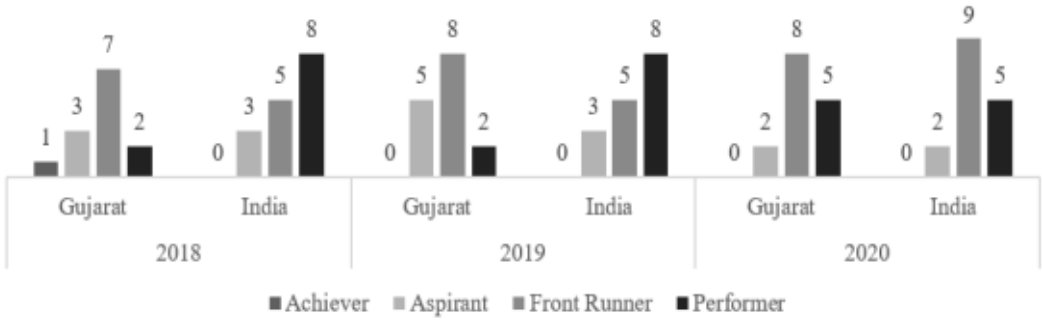


Figure 4:Comparision of No. of goals under each performance category for Gujarat and India

Although grasping goal-wise performance, it can be observed that the performance of Gujarat for goals 1, 3, 11, 12 and 13 has improved up to a subsequent extent, with values moving from lower-performance categories to upper-performance categories. Conversely, for goals 6, 8, 10 and 15, composite values have degraded within three years. On the other side, performance for goals 5, 7, 9 and 16 has steadily improved without any change in the performance category.

Goal	Year	Achiever	Front Runner	Performer	Aspirant
Goal1	2018				48
	2019				47
	2020		66		
Goal2	2018				49
	2019				39
	2020				46
Goal3	2018			52	
	2019		67		
	2020		86		
Goal4	2018		67		
	2019				47
	2020			52	
Goal5	2018				31
	2019				36
	2020				49
Goal6	2018	100			
	2019		92		
	2020		93		
Goal7	2018		67		
	2019		75		
	2020		94		
Goal8	2018		80		
	2019		75		
	2020			64	
Goal9	2018		65		
	2019		88		
	2020		72		
Goal10	2018		79		
	2019			59	
	2020			64	
Goal11	2018			52	
	2019		77		
	2020		87		
Goal12	2019				33
	2020			50	
Goal13	2019			63	
	2020		67		
Goal15	2018		71		
	2019		77		
	2020			61	
Goal16	2018		73		
	2019		86		
	2020		82		

Table 2: Goal wise Composite score of Gujarat under each Progress Category across three years

When examining the movement of goals under each performance category in Gujarat, it can be observed that goals 2 and 5 have remained under the "Aspirant" category, while goals 7, 9 and 16 have remained under the "Front Runner" category across three years. Similarly, goal 1 moved from the "Aspirant" category to the "Front Runner" category in 2020. Goals 3 and 11 ranked down from the "Performer" category to the "Front Runner" category in 2019 and 2020, respectively. Goals 8 and 15 moved up from the "Front Runner" category in 2018 and 2019 to the "Performer" category in 2020. Goal 10 moved from the "Front Runner" category in 2018 to the "Performer" category in 2019 and remained stagnant in 2020. Goal 13 moved from the "Performer" category in 2019 to the "Front Runner" category in 2020. Similarly, goal 12 moved up from the "Aspirant" category in 2019 to the "Performer" category in 2020. It is clear that the movement of goals across performance categories has either remained stagnant or has been negative, with very few exceptions..

Goals	2018				2019			2020		
	Achiever	Front Runner	Performer	Aspirant	Front Runner	Performer	Aspirant	Front Runner	Performer	Aspirant
1				■			■	▲		
2				■			■			■
3			■		▼			■		
4		■					▼		▲	
5				■			■			■
6	■				▼			■		
7		■			■			■		
8		■			■				▼	
9		■			■			■		
10		■				▼			■	
11			■		▼			■		
12							■		▲	
13						■		▲		
15		■			■				▲	
16		■			■			■		

Table 3: Movement of Goals of Gujarat under each Progress Category across three years

Where

■ = "*no change*"

▲ = "*improvement in comparison with the previous year*"

▼= "*deterioration in comparison with the previous year*"

6. PERFORMANCE OF GUJARAT (INDICATOR-WISE)

To grasp the performance of Gujarat in terms of indicators under each SDG, 57 indicators from 2018, 101 indicators from 2019 and 116 indicators from 2020 are used. It is observed that the majority of indicators (12.28%) during 2018 are derived from SDG4, followed by SDG5 and SDG16. Comparing the number of indicators of 2019 with 2018, it is observed that the number of indicators increased by 43.56%, with 16 (15.48%) new indicators introduced. Excluding these new indicators, an increase of 11 (10.89%) indicators is observed under goals 1–3. An important indicator titled "Renewable share of installed generating capacity (%)" under SDG7 dropped in the years 2019 and 2020. Similarly, while comparing 2019 with 2020, it is observed that the majority of 6 (13.04%) indicators were introduced under SDGs9 and 11. Overall, during 2019, 45 (44.55%) indicators were added, and during 2020, 14 (12.17%) were added to the indices (see Table 4).

Goals	2018 (base year)		2019			2020		
	No. of Indicators	% of Indicators	No. of Indicators	% of Indicators	Change from 2018	No. of Indicators	% of Indicators	Change from 2019
SDG1	1	1.79%	5	4.95%	4	6	5.22%	1
SDG2	4	7.14%	7	6.93%	3	7	6.09%	-
SDG3	4	7.14%	8	7.92%	4	10	8.70%	2
SDG4	7	12.50%	9	8.91%	2	11	9.57%	2
SDG5	6	10.71%	8	7.92%	2	9	7.83%	1
SDG6	5	8.93%	7	6.93%	2	7	6.09%	-
SDG7	3	5.36%	2	1.98%	-1	2	1.74%	-
SDG8	4	7.14%	7	6.93%	3	9	7.83%	2
SDG9	4	7.14%	4	3.96%	-	7	6.09%	3
SDG10	5	8.93%	9	8.91%	4	7	6.09%	-2
SDG11	4	7.14%	5	4.95%	1	8	6.96%	3
SDG12		0.00%	7	6.93%	7	7	6.09%	-
SDG13		0.00%	4	3.96%	4	5	4.35%	1
SDG14		0.00%	5	4.95%	5	5	4.35%	-
SDG15	3	5.36%	6	5.94%	3	7	6.09%	1
SDG16	6	10.71%	8	7.92%	2	8	6.96%	-
Total	**56**	**100.00%**	**101**	**100.00%**	**45**	**115**	**100.00%**	**14**
Change					**44.55%**			**12.17%**

Table 4: Distribution of Indicators considered for calculating Gujarat's performance during three years against each SDG

In baseline data, there is only 1 indicator, which is increased to 5 indicators in 2019, followed by 6 indicators in 2020. Looking at the performance of the state in 2018, it is observed that 38 out of 57 (66.67%) indicators are above national aggregates, while 18 out of 57 (31.58%) are below national aggregates. One (1.75%) indicator titled "Change in an estimated population of wild elephants over 5 years (%)" is excluded due to its nonfeasibility for calculation. Out of all of the above national aggregate indicators, 15 (26.32%) are from SDG4, SDG6 and SDG16. Similarly, out of all below national aggregate indicators, 10 (17.54%) are from SDG2, SDG3 and SDG5, which are very crucial social goals.

Similarly, while looking at the performance of the state during 2019, it can be observed that 69 out of 101 (68.32%) indicators have performed better than national aggregates and 31 out of 101 (30.69%) indicators. One (0.99%) indicator titled "Percentage increase in the use of nitrogen fertilisers in the coastal states" is omitted from the calculation due to the nonavailability of data value. Out of all of the above national aggregates indicators, 26 (25.74%) are from SDG3, SDG6, SDG8 and SDG11. Similarly, out of all below national aggregate indicators, 17 (16.83%) are from SDG4, SDG5 and SDG10 (see Table 5).

Goals	2018		2019		2020	
	Indicators are not better than national aggregates	Indicators better than national aggregates	Indicators are not better than national aggregates	Indicators better than national aggregates	Indicators are not better than national aggregates	Indicators better than national aggregates
SDG1		1	3	2	2	4
SDG2	3	1	4	3	5	2
SDG3	3	1		8	3	7
SDG4	2	5	6	3	6	5
SDG5	4	2	6	2	4	5
SDG6		5		7	1	6
SDG7		3		2		2
SDG8		4	1	6	3	6
SDG9	1	3		4	1	6
SDG10	1	4	5	4	3	4
SDG11	1	3		5	1	7
SDG12			3	4	4	3
SDG13			2	2	1	4
SDG14				4		5
SDG15	2	1	1	5	2	5
SDG16	1	5		8	1	7
Total	**18**	**38**	**31**	**69**	**37**	**78**

Table 5: Goal wise Distribution of Indicators performed below and above the national average from 2018 to 2020

During 2020, 78 (67.83%) indicators presented were better than national aggregates and 37 (32.17%) were not better than national aggregates. Out of all of the better than national aggregates indicators, 21 (26.92%) are from SDG3, SDG11 and SDG16. Similarly, out of all not better than national aggregate indicators, 15 (40.54%) are from SDG2, SDG4 and SDG5. Observing the movement of indicators to gauge performance in comparison with national aggregates, it is observed that indicators under SDG1, SDG5, SDG8, SDG9, SDG11, SDG13, SDG14 and SDG15 present steady increases while indicators under SDG10 are completely stagnant, followed by SDG8 and SDG15, which have been stagnant since 2019. Indicators under SDG2, SDG3, SDG6, SDG12 and SDG16 present a decreasing trend, though they are above national aggregates (see Figure 4 and Annexure 1 for more details).

7. CONCLUSION

Since 2018, NITI Aayog in India has been officially tasked with monitoring the progress of states and UTs using the indicators discussed in this paper. To fulfill this mandate, NITI Aayog has been annually releasing SDG India Index reports since 2018. These reports serve as conduits for disseminating information, data and insights regarding the strides made by Indian states towards achieving the Global SDGs. The primary objective of these indices is to gauge the progress of individual states and UTs across all 16 SDGs. The indices provide a clear snapshot of the status through a composite score and shed light on data-related issues, which are instrumental in formulating strategic policy interventions while fostering a sense of cooperative federalism among the states (NITI Aayog, 2018).

The most recent, third edition of the SDG India Index, released on June 3, 2021, was prepared in collaboration with the states and UTs, the United Nations Systems of India, the Ministry of Statistics and Programme Implementation and relevant Ministries of the Government of India. Notably, the number of indicators employed to measure progress has surged from 62 indicators spanning 39 targets in 2018 to 115 indicators (an increase of 167%) spanning 70 targets (an increase of 203%) in 2020 (NITI Aayog, 2021b).

The second and third versions of the index incorporated 68 and 76 indicators, respectively, in 2019 and 2020 from the NIF (NITI Aayog, 2021a). This equates to 66.09% of the total indicators used in the 2020 index. To put this in perspective, the second version of the index comprised 88% of the total indicators, while the third version included 93.04% of indicators sourced from the NIF, indicating a growing reliance on NIF data. However, when considering the broader context, it becomes evident that the share of SDG indicators in the second version of the index within the NIF stands at 29.14%, encompassing 88 SDG

indicators out of a total of 302 NIF indicators. Similarly, in the third version of the index, the share of SDG indicators amounts to 34.74%, encompassing 107 indicators out of 308 NIF indicators. With less than half of the indicators originating from the NIF, there is room for skepticism regarding the claim of measuring the holistic progress of the state across all SDGs.

In terms of categorising composite scores, it is noteworthy that some states with significant disparities in data values find themselves placed within the same category. For example, in 2020, under SDG2, Jharkhand scored 19, while West Bengal scored 46. Both states are categorised as "Aspirants". Despite a substantial score difference of 27 points, they share the same classification. Hence, it can be argued that the score range categories established by NITI Aayog are overly broad. Refining the score ranges and subsequently the categorisation process could yield a more nuanced and realistic portrayal of progress (Parekh, 2021). Consequently, there is an urgent need for a critical examination of the values recorded in all three versions of the SDG India Index, along with a thorough review of the methodology, as these indexes have significant policy implications. Therefore, this study focusses on assessing the performance of Gujarat as the unit of analysis.

An area of concern arises from NITI Aayog's assertion that they consulted with the Government of Gujarat and Non-Government Agencies involved in SDGs when creating the 3rd version of the SDG India Index. However, no indicators, targets, or data associated with these stakeholders are evident in the index. NITI Aayog had many opportunities to incorporate data from stakeholders in cases where data was either unavailable or missing. Rather than resorting to a NULL value in the computation, an alternative value may have been employed. It is noteworthy that the Sustainable Development Solutions Network (2021) similarly relies on data provided by audited and vetted non-governmental agencies.

A data qualm in the context of the performance of Gujarat state since the 2018 baseline report of NITI Aayog observed that Gujarat has dramatically jumped from a composite score of 48 in 2018 to 60 in 2019 and a score of 64 in 2020. Because of this, it becomes necessary to gauge progress made by the state through each indicator. It is observed that 38 out of 56 (67.86), 69 out of 101(68.32%) and 78 out of 115 (67.83%) indicators during 2018, 2019 and 2020, respectively, have performed better than national aggregates. Through this comparison, it becomes clear that the performance of Gujarat in terms of achieving SDGs has remained almost constant, although there is an improvement in composite scores and rank calculated by NITI Aayog. This opens up avenues for further detailed inquiry on the status or progress made by the state for achieving SDGs..

8. REFERENCES:

Aggarwal, S. C. (2023). How inclusive are Indian states: Evidence from inclusive development index. *Arthaniti: Journal of Economic Theory and Practice*, 22(2), 151-180.

Chattopadhyay, A., & Chakraborty, S. (2019). Performance Reflections on Quality Education in Respect of SDGs: A Re-Assessment of Indian States and UTs Using TOPSIS Approach. *Asian Review of Social Sciences*, 8(1), 102-109.

Chaturvedi, S. (2021). *Evolving Indian strategy on SDGs and scope for regional cooperation*.

Chaturvedi, S., James, T. C., Saha, S., & Shaw, P. (2019). Introduction: Sustainable development goals and India. *2030 Agenda and India: Moving from Quantity to Quality: Exploring Convergence and Transcendence*, 1-13.

Das, R., & Das, D. (2019). The 2030 Agenda for Sustainable Development: Where Does India Stand?. *Journal of Rural Development*, 266-295.

David, M. (2018). Sustainable Development Goals (SDGs)-Challenges for India. *Journal of Critical Reviews*, 5(7), 11. DOI: 10.5958/0976-5506.2018.00172.9

Deshpande, S. S., Sen, S., & Vaidya, S. A. (2017). Community Partnerships and Education: paving the way to sustainable development in India. *OIDA International Journal of Sustainable Development*, *10*(12), 49-66.

Dhyani, S., Karki, M., & Petwal, A. (2018, October). Localizing SDGs in India using nature based solutions (NbS). Indian Academy of Sciences.

Diaz Sarachaga, J. M., Jato-Espino, D., & Castro-Fresno, D. (2018). Is the Sustainable Development Goals (SDG) index an adequate framework to measure the progress of the 2030 Agenda. *Sustainability*, 10(5), 145. DOI: 10.1002/SD.1735

Dwivedi, P. P., & Sharma, D. K. (2022). Application of Shannon Entropy and COCOSO techniques to analyze performance of sustainable development goals: The case of the Indian Union Territories. *Results in Engineering*, *14*, 100416.

Fonseca, L., Teixeira Domingues, J. P., & Dima, A. (2020). Mapping the Sustainable Development Goals Relationships. *Sustainability*, 12(8), 3359. DOI: 10.3390/su12083359

General Assembly. (2015). Resolution adopted by the General Assembly on 25 September 2015: Transforming our world: the 2030 Agenda for Sustainable Development. United Nations. Retrieved June 12, 2021, from https://upload.wikimedia.org/wikipedia/commons/d/d5/N1529189.pdf

Giribabu, D., Mohapatra, C., Reddy, C., & Prasada Rao, P. V.V. (2018). Holistic correlation of world's largest social safety net and its outcomes with Sustainable Development Goals. *International Journal of Sustainable Development and World Ecology*, 25(1), 17. DOI: 10.1080/13504509.2018.1519492

Gurjar, B. R., Ravindra, K., & Nagpure, A. S. (2016). Air pollution trends over Indian megacities and their local-to-global implications. *Atmospheric Environment*, *142*, 475-495.

Hashimoto, T., Shirota, Y., & Chakraborty, B. (2022, August). SDGs India Index Analysis using SHAP. In *2022 International Electronics Symposium (IES)* (pp. 461-465). IEEE.

Jones, P., Wynn, M., Hillier, D., & Comfort, D. (2017). The Sustainable Development Goals and Information and Communication Technologies. *International Journal of Social Analysis and Management*, 1(1). DOI: 10.28992/IJSAM.V1I1.22

Khalid, A. M., Sharma, S., & Dubey, A. K. (2018, August). Developing an indicator set for measuring sustainable development in India. In *Natural Resources Forum* (Vol. 42, No. 3, pp. 185-200). Oxford, UK: Blackwell Publishing Ltd.

Khalid, A. M., Sharma, S., & Dubey, A. K. (2020). Some methodological issues in India's SDG index report 2019. *Econ. Polit. Wkly*, *55*(32-33).

Khalid, A., Sharma, S., & Dubey, A. (2020). Concerns of developing countries and the sustainable development goals: case for India. *Asia Pacific Journal of Social Work and Development*, 30(2), 20. DOI: 10.1080/13504509.2020.1795744

Langford, M. (2016). Lost in Transformation? The Politics of the Sustainable Development Goals. *Ethics & International Affairs*, 30(1), 42. DOI: 10.1017/S0892679416000058

Mohata, R., Chandrakar, A., Mishra, S., Sharma, V., Humuavbi, I., & Ekakitie, E. L. (2024, February). Regression Analysis as a Metric for Sustainability Development: Validation of Indian Territory. In *2024 IEEE International Conference on Computing, Power and Communication Technologies (IC2PCT)* (Vol. 5, pp. 625-630). IEEE.

Morton, S., Pencheon, D., & Squires, N. (2017). Sustainable Development Goals (SDGs), and their implementation: A national global framework for health, development and equity needs a systems approach at every level. *British Medical Bulletin*, 121(1), 73-84. DOI: 10.1093/bmb/ldx031

National Statistics Office. (2021, March). *Sustainable Development Goals: National Indicator Framework Progress Report 2021* (Version 3). Ministry of Statistics and Programme Implementation. http://mospi.nic.in/sites/default/files/publication_reports/SDG-NIF-Progress2021_March%2031.pdf

NITI Aayog & United Nations. (2019, August). *SDG India Index and Dashboard 2019–20*. NITI Aayog, Government of India. http://niti.gov.in/sdg-india-index-dashboard-2019-

————————— (2021a, June). *SDG India Index & Dashboard 2020–21: Partnerships in the Decade of Action*.

————————— (2021b, June 3). *NITI Aayog Releases SDG India Index and Dashboard 2020–21* [Press release]. https://pib.gov.in/PressReleasePage.aspx?PRID=1723952

NITI Aayog. (2018, December). *SDG India Index: Baseline Report 2018*. https://niti.gov.in/writereaddata/files/SDX_Index_India_21.12.2018.pdf

Panda, R., Sethi, M., & Agrawal, S. (2018). Sustainable development goals and India: A cross-sectional analysis. *OIDA International Journal of Sustainable Development*, *11*(11), 79-90.

Parekh, P. (2021). Assessing Prospects and Retrospect of Progress Monitoring of Sustainable Development Goals in India. *The Journal of Oriental Research Madras*, *92*(5), 94–109. https://doi.org/10.13140/RG.2.2.12677.06881

Pattani, I., & Bhatia, H. (2017). *Millennium to sustainable development goals: A review of India's progress and challenges*.

Pogge, T., & Sengupta, M. (2015). The Sustaintable Development Goals (SDGs) as Drafted: Nice Idea, Poor Execution. *Ethics & International Affairs*, 29(4), 42-51.

Pradhan, B. K., Yadav, S., Ghosh, J., & Prashad, A. (2023). Achieving the sustainable development goals (SDGs) in the Indian state of Odisha: challenges and opportunities. *World Development Sustainability*, 100078.

Rahman Zaini, S. H., & Akhtar, A. (2019). Modelling the sustainable development goals for India - an interpretive structural modelling approach. *World Review of Science, Technology and Sustainable Development*, 16(2-4), 8. DOI: 10.1504/WRSTSD.2019.10019998

Ramanujam, N., Caivano, N., & Agnello, A. (2019). Distributive Justice and the Sustainable Development Goals: Delivering Agenda 2030 in India. *The Law and Development Review, 12*(2), 5. DOI: 10.1515/ldr-2019-0020

Ramos, G. I. (2016). The Sustainable Development Goals: A duty and an opportunity. *OECD Yearbook, 2016*(1), 6. DOI: 10.1787/9789264264687-3-EN

Rao, S. (2015). Disparities in infrastructure as a barrier to attain faster inclusive growth trajectory: an inter-state analysis. *Indian Journal of Economics and Development*, *11*(3), 725-741.

Roy, A., Garai, N., & Biswas, J. K. (2022). *Exploration of urban sustainability of India through the lens of sustainable development goals*.

Saito, O., Managi, S., Kanie, N., Kauffman, J., & Takeuchi, K. (2017). Sustainability science and implementing the sustainable development goals. *Sustainability Science*, 12(1), 45-59. DOI: 10.1007/s11625-017-0486-5

Santosh Vani, S. V., Bhaumik, S., Nandan, A., & Siddiqui, N. A. (2017). Hazardous Waste-Impact on health and Environment for sustainable development in India. *World Scientific News*, *70*(2), 158-172.

Sharma, S., & Tripathi, U. (2022). *India's March Forward: Progress on the Index for the Sustainable Development Goals*. In Handbook of Research on Building Greener Economics and Adopting Digital Tools in the Era of Climate Change (pp. 192-209). IGI Global.

Singh, A., & Rahman, Z. (2021). Integrating corporate sustainability and sustainable development goals: towards a multi-stakeholder framework. *Cogent Business & Management*, 8(1), 9. DOI: 10.1080/23311975.2021.1985686

Srivastava, A. (2018). Standardizing evaluation process: Necessary for achieving SDGs - A case study of India. *Evaluation and program planning*, 68, 13. DOI: 10.1016/j.evalprogplan.2018.05.001

Stewart, F. (2015). The Sustainable Development Goals: a comment. *Development Policy Review*, 33(2), 30. DOI: 10.1080/17449626.2015.1084025

Sustainable Development Solutions Network. (2021, June). *Sustainable Development Report 2021 The Decade of Action for the Sustainable Development Goals*. https://www.sustainabledevelopment.report/

The Sustainable Development Goals Report. (2018). 10.18356/7d014b41-en

UN. (2018). The Sustainable Development Goals Report 2018. 10.18356/7d014b41-en

United Nations. (n.d.). *The Sustainable Development Agenda*. United Nations Sustainable Development. Retrieved July 19, 2021, from https://www.un.org/sustainabledevelopment/development-agenda/

Willis, K. (2016). Viewpoint: International development planning and the Sustainable Development Goals (SDGs). *International Development Planning Review*, 28(4), 28. DOI: 10.3828/IDPR.2016.11

Annexure-1: Gujarat's performance (Absolute values) for each SDG indicator against national aggregates

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
SDG1											
Headcount ratio as per the Multidimensional Poverty Index (%)			21.7								27.9
Percentage of households living in katcha houses		2	2							4.2	4.2
Percentage of households with any usual member covered by a health scheme or health insurance					23.1	23.1				28.7	28.7
Percentage of population living below the national poverty line		16.63	16.63							21.92	21.92
Percentage of the population (out of total eligible population) receiving social protection benefits under Pradhan Mantri Matru Vandana Yojana (PMMVY)			92.83								91.38
Persons provided employment as a percentage of persons who demanded employment under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)					82.99	83.63				85.26	84.44
Population living below National Poverty line (%)	16.63								21.92		
Proportion of the population (out of total eligible population) receiving social protection benefit under Maternity Benefit					8.9					36.4	
SDG2											
Children under age 5 years who are stunted (%)				38.5					38.4		
Gross Value Added (constant prices) in agriculture per worker (in Lakhs/worker)		1.03	1.05							0.68	0.71
Percentage children aged 0–4 years who are underweight					34.2					33.4	
Percentage of adolescents aged 10–19 years who are anaemic						33.4					28.4
Percentage of beneficiaries covered under National Food Security Act (NFSA),2013			100								99.51
Percentage of children aged 6-59 months who are anaemic (Hb<11.0 g/dl)		38.2								40.5	
Percentage of children under age 5 years who are stunted					39.1	39.1				34.7	34.7
Percentage of children under five years who are underweight						34.2					33.4
Percentage of pregnant women aged 15-49 years who are anaemic					51.3	51.3				50.3	50.4
Pregnant women aged 15-49 yrs who are anaemic (11.0g/dl) (%)				51.3					50.3		
Ratio of rural households covered under public distribution system (PDS) to rural households where monthly income of highest earning member is less than Rs.5,000	1.09	1.09							1.01	1.01	
Rice and wheat produced annually per unit area (Kg/Ha)						2640					2995.2
Rice, wheat and coarse cereals produced annually per unit area (Kg/Ha)				2377.5	2314.3				2589.2	2516.7	

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
SDG3											
Children aged 12-23 months fully immunized (BCG, Measles and three doses of Pentavalent vaccine) (%)				50.4					62		
Death rate due to road traffic accidents (per 1,00,000 population)			10.88								11.56
HIV incidence per 1,000 uninfected population		0.07	0.05							0.07	0.05
Maternal Mortality Ratio (per 1,00,000 live births)		87	75	91					130	122	113
Monthly per capita out-of-pocket expenditure on health as a share of Monthly Per capita Consumption Expenditure (MPCE)			9.5								13
Percentage of children in the age group 9-11 months fully immunized						87					91
Percentage of currently married women aged 15-49 years who have their demand for family planning satisfied by modern methods		43.1								47.8	
Percentage of fully immunised children in the age group 0-5 years		59.6								59.2	
Percentage of institutional deliveries out of the total deliveries reported		66	99.5							54.7	94.4
Suicide rate (per 1,00,000 population)						11.2					10.4
Total case notification rate of Tuberculosis per 1 lakh population		228	232	224					138.33	160	177
Total physicians, nurses and midwives per 10,000 population		43.05	41.19							37.6	36.84
Under 5 mortality rate (per 1,000 live births)	43	43.5				31			50	50	36
SDG4											
Adjusted Net Enrolment Ratio (ANER) in elementary education (class 1-8)						85.38					87.26
Adjusted Net Enrolment Ratio in Elementary (Class 1-8) and Secondary (Class 9-10) education				74.97	74.97				75.83	75.83	
Average annual dropout rate at secondary level (class 9-10)				25.04	24.08	23.84			17.06	19.89	17.87
Children in the age group of 6-13 who are out of school (%)	1.94								2.97		
Correct responses on Learning Outcomes in Language, Mathematics and EVS for Class 5 students (%)	58								54.69		
Correct responses on Learning Outcomes in Language, Mathematics, Science and Social Science for Class 8 students (%)	54.25								44.58		
Disabled children (5-19 Years) attending educational institution		62.62								61.18	
Elementary and secondary schools with Pupil Teacher Ratio less than/equal to 30 (%)	70.47	70.47							70.43	70.43	
Gender Parity Index (GPI) for higher education (18-23 years)					0.85	0.85				1	1
Gross Enrolment Ratio (GER) in higher education (18-23 years)					20.4	20.4				26.3	26.3
Gross Enrolment Ratio (GER) in higher secondary (class 11-12)						41.2					50.14

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Percentage of children in the age group 6-13 years who are out of school		1.94								2.97	
Percentage of persons (15 years and above) who are literate						80.7					74.6
Percentage of persons with disability (15 years and above) who have completed at least secondary education			22.8								19.3
Percentage of schools with access to basic infrastructure (electricity, drinking water)			99.95								84.76
Percentage of students in grade III, V, VIII and X achieving at least a minimum proficiency level in terms of nationally defined learning outcomes to be attained by pupils at the end of each of above grades					74.78					71.03	
Percentage of students in grade VIII achieving at least a minimum proficiency level in terms of nationally defined learning outcomes to be attained by the pupils at the end of the grade			81.05								71.88
Percentage of trained teachers at secondary level (class 9-10)			91.8		50.57					78.84	82.62
Pupil Teacher Ratio (PTR) at secondary level (class 9-10)			33								21
School teachers professionally qualified (%)	99.95								81.15		
SDG5											
Average female to male ratio of average wages/salaries received per day by regular wage/salaried employees of age 15-59 for rural and urban	0.74								0.7		
Female labour force participation rate (LFPR)				0.25	15.4	0.28			0.32	17.5	0.33
Female to male ratio of average wage/salary earnings received during the preceding calendar month among regular wage salaried employees (rural+urban)					0.72					0.78	
Married women aged 15-49 who have ever experienced spousal violence (%)				23					33.3		
Operational land holding gender wise (percentage of female operated operational holdings)			16.49		0.6					13.96	13.96
Per lakh women who have experienced cruelty/physical violence by husband or his relatives during the year			11.17								19.54
Percentage of currently married women aged 15-49 years who have their demand for family planning satisfied by modern methods						67.4					72
Percentage of elected women over total seats in the state legislative assembly						7.56					8.46
Percentage of ever married women aged 15-49 years who have ever experienced spousal violence		23								33.3	

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Percentage of seats won by women in the general elections to state legislative assembly					7.14					8.32	
Proportion of sexual crime against girl children to total crime against children during the calendar year					80.83					59.97	
Proportion of women in managerial positions including women in board of directors, in listed companies (per 1,000 persons)			190								190
Rate of Crimes Against Women Per 100,000 Female Population		27	27.1							57.9	62.4
Ratio of female to male average wage/salary earnings received among regular wage/salaried employees			0.81								0.74
Seats won by women in the general elections to state legislative assembly (%)	8.79								8.7		
Sex ratio at birth				848	855	866			898	896	899
Women in the age group of 15-49 years using modern methods of family planning (%)				46.9					53.5		
SDG6											
Annual ground water withdrawal against net annual availability (%)	67.91								61.53		
Districts verified to be Open Defecation Free (%)	100								31.95		
Installed sewage treatment capacity as a proportion of sewage created in urban areas (%)	74.36								37.58		
Percentage of blocks/mandals/taluka over-exploited		11.21	10.08							18.01	17.24
Percentage of districts verified to be ODF (SBM(G))		100	100							88.41	100
Percentage of ground water withdrawal against availability						63.91					63.33
Percentage of households having improved source of drinking water		99.1								95.5	
Percentage of individual household toilets constructed against target (SBM(G))			100								100
Percentage of industries (17 category of highly polluting industries/ grossly polluting/ red category of industries) complying with waste water treatment as per CPCB norms		78.91	80.6							87.62	88.4
Percentage of rural households with individual household toilets		100								100	
Percentage of rural population getting safe and adequate drinking water within premises through Pipe Water Supply (PWS)			197.6								148.8
Percentage of schools with separate toilet facility for girls			99.87								95.33
Percentage of urban households with individual household toilets		138.2								97.22	
Population having safe and adequate drinking water in rural areas (%)	99.99								71.8		
Proportion of schools with separate toilet facility for girls		99.95								97.43	

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Rural households with individual household toilets (%)	100								82.72		
SDG7											
Households using Clean Cooking Fuel (%)	52.6								43.8		
Percentage of households electrified	100	100	100						94.57	99.99	99.99
Percentage of LPG+PNG connections against number of households		66.7	93.32							61.4	92.02
Renewable share of installed generating capacity (%)	24.09								17.51		
SDG8											
Annual growth rate of GDP (constant prices) per capita	9.68		7.69						6.5		5.1
Annual growth rate of Net Domestic Product (NDP) per capita		9.76								5.66	
Automated Teller Machines (ATMs) per 1,00,000 population			17.53								17.31
Average unemployment rate per 1000 persons for males and females	10								63.5		
Ease of Doing Business (EODB) Score (feedback score)		97.99				20.19				67.23	71
Households with a bank account (%)	100								99.99		
Labour Force Participation Rate (LFPR) (%) (15-59 years)		49.8	54.9							49.8	53.6
Number of ATMs per 1,00,000 population	17.2								16.84		
Number of banking outlets per 1,00,000 population		14.61								12.48	
Number of functioning branches of commercial banks per 1,00,000 population			12.99								11.69
Percentage of households covered with a bank account under PMJDY against target			100								99.99
Percentage of households with a bank account		100								99.99	
Percentage of regular wage/ salaried employees in non-agriculture sector without any social security benefit						50.8					51.9
Percentage of women account holders in PMJDY					0.48	50.25				0.53	55.34
Unemployment rate (%) (15-59 years)		4.8	3.4							6	6.2
SDG9											
Gram Panchayats covered under Bharat Net (%)				31.45					42.43		
Innovation score as per the India Innovation Index						23.63					35.59
Manufacturing employment as a percentage of total employment		20.04	20.84							12.13	12.07
Number of Internet Subscribers per 100 population	41.85	54.51	64.79						33.47	48.48	55.41
Number of mobile connections per 100 persons in rural and urban area (Mobile Tele density)	103.8	104.3	94.71						82.97	88.41	84.38

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Percentage of targeted habitations connected by all-weather roads under Pradhan Mantri Gram Sadak Yojana (PMGSY)	100	100	100						47.38	69.89	97.65
Percentage Share of GVA in manufacturing to total GVA (current prices)			36.74								16.1
Score as per Logistics Ease Across Different States (LEADS) report			3.62								3.18
SDG10											
Gini Coefficient of Household Expenditure in Rural India		0.25								0.28	
Gini Coefficient of Household Expenditure in Urban India		0.28								0.36	
Growth rates of household expenditure per capita among the bottom 40 per cent of the population in rural India					16.56					13.61	
Growth rates of household expenditure per capita among the bottom 40 per cent of the population in urban India					23.83					13.35	
Palma Ratio of Household Expenditure in Rural India	0.79								0.92		
Palma Ratio of Household Expenditure in Urban India	0.92								1.41		
Percentage of elected women over total seats in the State/UT (Lok Sabha elections)			23.08								14.39
Percentage of population in the lowest two wealth quintiles			25.2								40
Percentage of SC/ST seats in State Legislative Assemblies						21.98					28.35
Percentage of Scheduled Caste Sub Plan fund utilised		82.75								77.67	
Percentage of seats held by women in Panchayati Raj Institutions (PRIs)			49.96								45.62
Percentage of Tribal Sub Plan fund utilised		89.04								82.98	
Proportion of SC/ST persons in state legislative assemblies					21.98					28.33	
Proportion of seats held by women in Panchayati Raj Institutions					32.9					46.14	
Rate of total crimes against SCs (per 1,00,000 SC population)						34.8					22.8
Rate of total crimes against STs (per 1,00,000 ST population)			3.6								7.9
Ratio of transgender to male Labour Force Participation Rate (LFPR)				0.39	0.39	0.39			0.64	0.64	0.64
Scheduled Caste Sub Plan fund utilised (%)	82.75								77.67		
Tribal Sub Plan fund utilised (%)	89.04								82.98		
SDG11											
Deaths due to road accidents in urban areas (per 1,00,000 population)			6.07								12.2

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Houses completed under Pradhan Mantri Awas Yojana (PMAY) as a percentage of net demand assessment for houses	9.65	58.23							3.32	31.01	
Installed sewage treatment capacity as a proportion of sewage created in urban areas (%)		0.74	56.89							0.38	38.86
Percentage of MSW processed to the total MSW generated (SBM(U))			86.7								68.05
Percentage of individual household toilets constructed against target (SBM(U))			138								105
Percentage of urban households living in katcha houses						1.3					0.8
Percentage of urban households living in slums		2.78								5.41	
Percentage of urban households with drainage facility			92.6								87.6
Percentage of wards with 100% door to door waste collection (SBM(U))	100	100.9	100						73.58	90.99	96.77
Percentage of wards with 100% source segregation (SBM(U))			83.9								78.03
Percentage of waste processed		79								56	
Urban households living in slums (%)	2.78								5.41		
Waste processed (%)				23					24.8		
SDG12											
Hazardous waste generated per 1,000 population (Metric tonnes/Annum)						50.12					8.09
Installed capacity of grid interactive bio power per 10 lakh population (MW)					0.12	1.12				0.76	7.62
Municipal Solid Waste (MSW) treated against MSW generated		24.48								20.75	
Per capita fossil fuel consumption (in kg.)						351.4					157.3
Per capita hazard waste generated					0.04					0.01	
Percentage ground water withdrawal against availability					63.89					63.33	
Percentage of BMW treated to total quantity of BMW generated			100								86.91
Percentage of wards with 100% source segregation		71.41								67.76	
Percentage use of nitrogenous fertilizer out of total N,P,K, (Nitrogen, Phosphorous, Potassium)		71.27	71.03							64.49	64.39
Plastic waste generated per 1,000 population (Tonnes/Annum)						5.3					2.54
Quantity of hazardous waste recycled/utilized to total hazardous waste generated (%)			33.1								44.89
Ratio of processed quantity of hazard waste sent to recycle to hazard waste generated		0.03								0.04	

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
SDG13											
CO2 saved from LED bulbs per 1,000 population (Tonnes)		66.1	62.16							28.74	28.24
Disability Adjusted Life Years (DALY) rate attributable to air pollution (per 1,00,000 population)			3102								3469
Disaster preparedness score as per Disaster Resilience Index			27								19.2
Installed capacity of solar power as proportion of installed grid interactive renewable power		25.23								24.3	
Number of human lives lost per 1 crore population due to extreme weather events			10.7		36.04					16.03	15.44
Percentage of renewable energy out of total installed generating capacity (including allocated shares)					31.69	34.51				35.22	36.37
SDG14											
Average marine acidity (pH) measured at representative sampling stations in the shore zone		7.93	8.01								
Coastal Water Quality Index		43									
Mean shore zone coastal water quality- Biochemical Oxygen Demand (BOD) (mg/l)*			0.73								
Mean shore zone coastal water quality-Total Nitrogen (TN) (µmol/l)*			25.62								
Percentage increase in area under mangroves		2.98	3.25								
Percentage increase in use of nitrogen fertilizers in the coastal states								-5.8			
Percentage of available potential area developed under aquaculture		1.21	10.79								
SDG15											
Change in estimated population of wild elephants over 5-year period (%)									19.53		
Change in forest area from 2015 to 2017 (%)				0.02					0.21		
Combined 15.1+15.2		11.61	11.09							24.39	24.56
Decadal change in extent of water bodies within forests from 2005 to 2015 (%)	19.43	19.43							18.24	18.24	
Forest cover as a percentage of total geographical area				7.52	7.52	7.57			21.54	21.54	21.67
Number of cases under Wildlife Protection Act (1972) per million hectares of protected area			7								15
Number of wildlife crime cases detected and reported annually		17								239	
Percentage increase in area of desertification		1.83	1.83							1.98	1.98

Goal wise Indicators	Gujarat								National Aggregate		
	Better than National Aggregate			Not better than National Aggregate			Omitted				
	2018	2019	2020	2018	2019	2020	2018	2019	2018	2019	2020
Percentage of area covered under afforestation schemes to the total geographical area			0.9								0.51
Percentage of degraded land over total land area						30					27.77
Tree cover as a percentage of total geographical area		4.09	3.52							2.85	2.89
SDG16											
Births registered (%)	98.7	98.76	92						88.3	86	89.3
Cases under Prevention of Corruption Act and related sections of IPC per 10 lakh population		0.23				3.74				0.32	3.17
Cognizable crimes against children per 1,00,000 population			22.7								33.2
Estimated reported corruption crimes per 1 crore population				1677.2					34.01		
Murders per 1,00,000 population	1.8	1.52	1.5						2.4	2.22	2.2
No. of courts per 1,00,000 population	17.84	17.84	2.28						12.83	12.83	1.85
Number of missing children per 1,00,000 child population			6.96								16.41
Number of victims of human trafficking per 10 lakh population		0.03	0.32							0.46	4.95
Percentage of population covered under Aadhaar	95.5	95	100						89.5	88.8	93.24
Proportion of population subjected to physical, psychological or sexual violence in the previous 12 months		16.48								33.12	
Reported cognizable crimes against children per 1 lakh population	17.6	19.1							24	28.9	

RELATIONSHIP BETWEEN MONETARY POLICY AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM INDIA

Dr. Bhargav Pandya*

ABSTRACT

Purpose: *The basic objective of the paper is to examine how monetary policy variables affect economic growth in an Indian context.*

Design/Methodology: *The study considers broad money, inflation rate and real interest rate as monetary policy variables and per capita gross domestic product as a proxy for economic growth. Step-wise regression analysis is applied to study the association between dependent variables and an independent variable.*

Findings: *The results of the study suggest that broad money is significantly associated with per capita Gross Domestic Product (GDP). Inflation and real interest rates are not statistically significant in explaining variation in per capita GDP.*

Implication: *The main implication of the study is that as the money supply increases, there is a corresponding increase in economic growth.*

Keywords: *Economic Growth, GDP, Monetary Policy, Broad Money, Inflation, Real Interest Rate*

** Assistant Professor, Faculty of Management Studies, The Maharaja Sayajirao University of Baroda*

1. INTRODUCTION

Central banks all over the world use monetary policy as an instrument to regulate the money supply and the cost of credit. The monetary policy primarily aims at achieving price stability by containing inflation and consequently contributes to boosting economic growth along with job creation. Achieving these multiple objectives simultaneously calls for an appropriate monetary policy framework. Whenever a central bank reduces its policy rate, it usually results in a drop in the interest rate, which results in increased borrowing by individuals and corporations, helping boost the consumption expenditure and private investment that culminates into a rise in economic growth as captured in terms of Gross Domestic Product (GDP). In this sense, monetary policy action does seem to have an impact on economic growth, although with some lag.

In India, the Reserve Bank of India has been tasked with the responsibility of maintaining inflation around 4%, allowing for a 2% deviation on either side. The Reserve Bank of India primarily uses monetary policy tools to ensure enough money supply in the economy to propel economic growth and increase liquidity. Historically, it has been observed that monetary policy indirectly affects economic growth. In an inflationary phase, the central bank hikes policy rate to suck the excessive money flowing into the economy. This will increase the cost of borrowing for corporations and reduce the credit off-take, which, in turn, reduces the inflationary pressure. Of late, the monetary policy committee has substantially reduced the repo rate to inject enough liquidity into the system.

From the macroeconomic perspective, it is quite imperative to investigate how monetary policy action affects the growth of the economy. Against this backdrop, this paper aims to analyse how monetary policy ratios influence economic growth. In the following pages, we discuss the literature review, research methodology, results of the study and conclusion.

2. LITERATURE REVIEW

1. Khabo and Harmse (2005) using Ordinary Least Squares(OLS) regression estimated that money supply and inflation cause change in economic growth in the case of South Africa.

Ali, Irum and Ali (2008) analysed how fiscal and monetary policies affect economic growth in South Asian countries. The results suggest that money supply notably affects economic growth in the short and long run.

Nouri and Samimi (2011) attempted to investigate how monetary policy affected economic growth in Iran during 1974–2008. In their study, they found that money supply M2 significantly affects GDP.

Mohamadpour, Behravan and Espahbodi (2012) examined the association between monetary policy and economic growth in Malaysia. The study finds that measures of money supply, i.e., M1, M2 and M3 have significant long-term impacts on GDP.

Onyeiwu (2012) investigated the influence of monetary policy on the economy of Nigeria during the period 1981–2008. The study used an OLS method to examine the relationship between monetary policy and economic growth. In this study, it was observed that the money supply exhibited a positive relationship with the GDP growth and balance of payment and a negative relationship with the inflation rate.

Kareem et al. (2013) attempted to analyse the impact of fiscal and monetary policy instruments on economic growth in the context of the Nigeran economy during the period 1999–2008. Using regression analysis, they examined the association between real GDP and monetary and fiscal variables. In their study, they found that broad money and recurrent government expenditure had a positive association with real GDP. On the contrary, narrow money, interest rate, inflation and capital expenditure demonstrated a negative relationship with real GDP.

Abou (2014) tested how the money supply and GDP moved together in Baharin. The study demonstrates that there is a neutral impact of realmoney supply on real GDP growth.

Havi and Enu (2014) examined how fiscal and monetary policy influenced the economic growth of Ghana, covering a period from 1980 to 2012. They applied the OLS method to measure the relationship between fiscal and monetary policy variables on economic growth. They considered money supply, labour and capital as monetary policy variables and real GDP as a measure of economic growth. Their study revealed that the money supply and the capital stock had a positive impact on real GDP, whereas labour was negatively related to real GDP.

Precious and Palesa (2014) assessed the impact of monetary policy on economic growth in South Africa during the period from 2000 to 2010. They reported that money supply, exchange rate and repo rate were not significant predictors of economic growth, whereas inflation was found to be a significant predictor.

Adigwe, Echekoba and Onyeagba (2015) analysed the impact of monetary policy on the

economic growth of Nigeria. Using the ordinary least square method, they examined the relationship between the money supply and GDP, as well as between the money supply and inflation rate. The results of their study revealed that the money supply had a positive impact on GDP and a negative impact on the inflation rate.

Lut and Moolio (2015) attempted to analyse the impact of monetary policy on economic growth in Cambodia. The study finds that monetary policy has a positive impact on economic growth but the impact was not much strong.

Marshal (2016) examined the link between money supply and economic growth in Nigeria. The study finds that changes in money supply explain changes in real GDP.

Victoria et al. (2016) using OLS regression found that the exchange rate, interest rate and money supply have a significant impact on the Nigerian economy.

Dingela and Khobai (2017) assessed the impact of broad money supply and economic growth. In the context of South Africa over the period 1980–2016. Their study found that there was a significant relationship between money supply and economic growth in the short and long run.

Behera (2016**)** examined the impact of multiple macroeconomic variables on the GDP of India. The study suggests that the money supply has a positive impact on GDP growth in India.

Srithilat and Sun (2017) conducted an empirical study to measure the impact of monetary policy on the economic growth of the context of the Lao People's Democratic Republic during the period from 1989 to 2016. Their findings indicated that money supply, interest rate and inflation rate hurt real GDP in the long run. On the other hand, the real exchange rate showed a positive impact on real GDP.

Akalpler and Duhok (2018) applied the OLS method to investigate the impact of monetary policy on the economic growth of the Malaysian economy. The results of their study concluded that inflation, interest rate and money supply were positively associated with economic growth.

Twinobury and Odhiambo (2018) investigated the impact of monetary policy on economic growth in the context of Tanzania. They used money supply and interest rates as proxies of monetary policy and regressed them against economic growth. Their study revealed that monetary policy did not impact economic growth in the long term, regardless of the proxy

used to gauge the monetary policy. Their study also highlighted that money supply, as a measure of monetary policy, was negatively related to economic growth.

Sagar and Koli (2019) studied the influence of monetary policy on GDP in the Indian context. The study finds that interest rate, money supply M2 and inflation have no impact on GDP.

Mugableh (2019) demonstrated that real interest rate and money supply have a positive impact on economic growth in the short run and long run, excluding the inflation rate.

3. RESEARCH METHODOLOGY

The main objective of the paper is to empirically analyse the relationship between money supply and economic growth.

Following Mohamadpour, Behravan and Espahbodi (2012); Kareem et al. (2013); Adigwe, Echekoba and Onyeagba (2015); Victoria et al. (2016); Srithilat and Sun (2017); Akalpler and Duhok (2018); Sagar and Koli (2019) and Mugableh (2019), we develop the following theoretical framework to accomplish research objective.

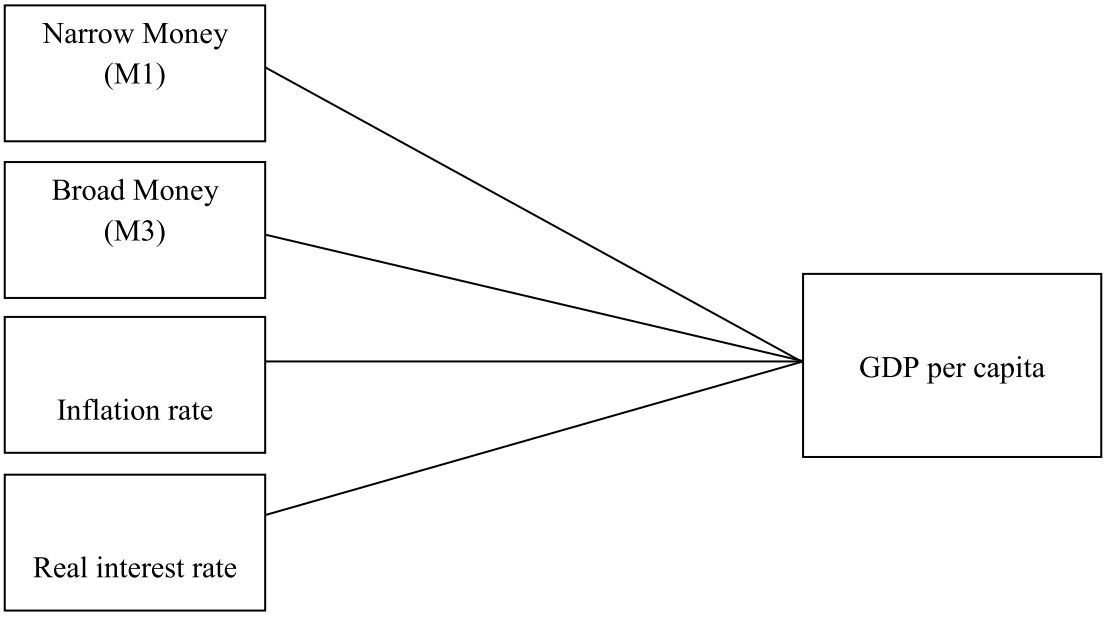


Figure 1: Theoretical framework

Variables of the Study:

Dependent Variable

Gross Domestic Product

Following Dingela and Khobai (2017), GDP per capita in constant terms was considered as a dependent variable. GDP per capita is measured in terms of local currency.

Independent Variables

Narrow Money (M1): Narrow money is the total of currency notes held by the public, all demand deposits with banks and other deposits of banks kept with the Reserve Bank of India. It is expressed in rupees in crores.

Broad Money (M3):

Broad money is the most quoted and popular measure of the money supply. It is measured as M1 plus net time deposits of all banks in the country. It is measured in rupees in crores.

Inflation Rate (INF):

Inflation measures a general rise in the price level. Annual inflation based on the consumer price index was considered for the study.

Real Interest Rate (RINTR):

The real interest rate represents the difference between nominal interest rates and inflation.

Data Collection:

Data relating to narrow money and broad money were collected from the official website of the Reserve Bank of India. Data on GDP, inflation rate and real interest rates were culled from the World Bank website. The study covers the period ranging from 1977–78 to 2018–19.

Results and Discussion

To test the relationship between the dependent and independent variables, the regression model was performed.

$LOGGDP_t = \alpha + \beta_1 LOGM1_{t-1} + \beta_2 LOGM3_{t-1} + \beta_3 LOGINF_{t-1} + \beta_4 LOGRINTR_{t-1} + \varepsilon_t$

where

LOGGDPt = logged value of GDP in period t

$LOGM1_{t-1}$ = logged value of narrow money in period t-1

$LOGM3_{t-1}$ = logged value of broad money in period t-1

$LOGINF_{t-1}$ = logged value of inflation rate in period t-1

$LOGRINTR_{t-1}$ = logged value of real interest rate in period t-1

ε_t = error term

Before running a regression, we performed a normality test to check the normality of the variables under study. Table 1 presents the results of this test. The Kolmogorov-Smirnov test results suggest that all variables are found to be normal. ($p>0.05$).

Table 1: Tests of Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
LOGGDP	.105	**39**	**.200***	**.942**	**39**	**.046**
LOGM1_1	.085	39	.200*	.945	39	.057
LOGM3_1	.078	39	.200*	.954	39	.112
LOGINF_1	.136	39	.065	.951	39	.089
LOGRINTR_1	.120	39	.169	.896	39	.002

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Stepwise multiple regression was run to examine the relationship between dependent and independent variables. Table 2 presents the model summary.

Table 2: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989[a]	.979	.978	.07340

a. Predictors: (Constant), LOGM3_1

b. Dependent Variable: LOGGDP

Only broad money entered in the regression model, and the model was arrived at in step 1, indicating that other independent variables failed to enter the model. As can be seen, the model predicts that 97.9% variation in per capita GDP is explained by broad money (R-squared = 97.9%). The results are consistent with Saxena and Bansal (2019) who found a positive relationship between money supply and economic growth in the Indian context. In their study, they found that broad money (M3) explains a 94.6% variation in GDP. Our results are also consistent with Behera (2016) who found that money supply had a positive impact on GDP in India.

Ogunmuyiwa and Ekone (2010) using OLS regression found that money supply is inversely related to GDP. Our results contradict these findings and suggest a positive relationship between the money supply and GDP.

Our results are consistent with Khabo and Harmse (2005); Mohamadpour, Behravan and Espahbodi (2012); Onyeiwu (2012); Havi and Enu (2014); Adigwe, Echekoba and Onyeagba (2015); Marshal (2016); Victoria et al. (2016); Dingela and Khobai (2017); Akalpler and Duhok (2018) and Mugableh (2019) who also found a positive association between money supply and economic growth.

Table 3: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.294	1	9.294	1724.964	.000[b]
	Residual	.199	37	.005		
	Total	9.493	38			

a. Dependent Variable: LOGGDP

b. Predictors: (Constant), LOGM3_1

The F-test shows the results of the goodness of fit of the regression model. As can be seen from Table 3, the regression model is found to be statistically significant ($F = 1724.964$, $p<0.05$).

Table 4: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.979	.089		78.295	.000
	LOGM3_1	.271	.007	.989	41.533	.000

Table 4 represents the results of the t-test. As can be observed, broad money is statistically significant in explaining variation in economic growth. ($t = 41.533$, $p<0.05$). The result indicates that a one percent change in broad money results in a 0.271 percent change in per capita GDP. The results are consistent with Kareem et al. (2013) who also found a positive relationship between broad money and GDP.

Table 5: Excluded Variables[a]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	LOGM1_1	-1.189[b]	-1.979	.055	-.313	.001	686.474	.001
	LOGINF_1	-.020[b]	-.775	.443	-.128	.906	1.104	.906
	LOGRINTR_1	-.002[b]	-.080	.937	-.013	.820	1.220	.820

a. Dependent Variable: LOGGDP

b. Predictors in the Model: (Constant), LOGM3_1

The table represents the results of excluded variables. Narrow money (t = -1.979, p>0.05), inflation rate (t = -0.775, p>0.05) and real interest rate (t = -0.080, p>0.05) were insignificant in explaining variance in per capita GDP. Saxena and Bansal (2019) found that inflation has a positive impact on the GDP of India. Our results contradict their findings, suggesting that inflation was not significantly associated with GDP. Our results are also consistent with Sagar and Koli (2019) who found no relation between inflation and GDP in India. Our results are also inconsistent with Akalpler and Duhok (2018) who found that the inflation rate and interest rate are positively associated with GDP. Kareem et al. (2013) and Srithilat and Sun (2017) reported a negative relationship between inflation and GDP. Srithilat and Sun (2017) found a negative relationship between the interest rate and GDP. The results of our study contradict these studies, indicating no impact of interest rate and inflation rate on GDP.

CONCLUSION

The study attempted to analyse the relationship between monetary policy and economic growth in the Indian context. The results of the study suggested that broad money had a significant positive impact on economic growth, whereas inflation and interest rates were insignificant in explaining variation in economic growth. This supports the findings of several studies conducted earlier. The main implication of the study is that as the money supply rises, there is a corresponding increase in economic growth, supporting the hypothesis that the money supply does impact GDP in a positive manner. The study

underscores the importance of increasing the money supply by monetary policy authorities to boost economic growth by ignoring inflation and real interest rates.

REFERENCES:

1. Abou, E. 'Testing the Relationship between Money Supply and GDP in Bahrain'. *International Journal of Economics, Commerce and Management*, vol. 2, no. 5, 2014, pp. 1–16.

2. Adigwe, P., et al. 'Monetary Policy and Economic Growth in Nigeria: A Critical Evaluation', *IOSR Journal of Business and Management*, vol. 17, no. 2, 2015, pp. 110–19.

3. Akalpler, E., and D. Duhok. 'Does Monetary Policy Affect Economic Growth: Evidence from Malaysia'? *Journal of Economic and Administrative Sciences*, vol. 34, no. 1, 2018, pp. 2–20.

4. Ali, S., and A. Ali. 'Whether Fiscal Stance or Monetary Policy Is Effective for Economic Growth in Case of South Asian Countries? '. *The Pakistan Development Review*, vol. 47, no. 4, 2008, pp. 791–99.

5. Behera, J. 'Dynamics of Inflation, Economic Growth, Money Supply, and Exchange Rate in India: Evidence from Multivariate Analysis'. *Quarterly Journal of Econometrics Research, Conscientia Beam*, vol. 2, no. 2, 2016, pp. 42–54.

6. Dingela, S., and H. Khobai. *Dynamic Impact of Money Supply on Economic Growth in South Africa- an ARDL Approach*. 2017, https://mpra.ub.uni-muenchen.de/82539/1/MPRA_paper_82539.pdf.

7. Havi, E., and P. Enu. 'The Effect of Fiscal Policy and Monetary Policy on Ghana's Economic Growth: Which Policy Is More Potent'. *International Journal of Empirical Finance*, vol. 3, no. 2, 2014, pp. 61–75.

8. Kareem, R., et al. 'Analysis of Fiscal and Monetary Policies on Economic Growth: Evidence from Nigerian Democracy'. *Current Research Journal of Economic Theory*, vol. 5, no. 1, 2013, pp. 11–19.

9. Khabo, V., and C. Harmse. 'The Impact of Monetary Policy on the Economic Growth of a Small Open Economy: The Case of South Africa'. *South African Journal of Economic and Management Sciences*, vol. 8, no. 3, 2005, pp. 348–62.

10. Lut, M., and P. Moolio. 'The Impact of Monetary Policy on Economic Growth in Cambodia'. *Journal of Management for Global Sustainable Development*, vol. 1, 2015, pp. 40–63.

11. Marshal, I. 'The Link between Money Supply and Economic Growth in Nigeria: An Econometric Investigation'. *IIARD International Journal of Economics and Business Management*, vol. 2, no. 3, 2016, pp. 42–51.

12. Mohamadpour, B et al. 'Study of Association Between Monetary Policy And GDP: An Econometric Perspective In Malaysia', *Australian Journal of Basic and Applied Sciences*, 6(8), 2012, pp.307-315

13. Mugableh, M. 'Does Monetary Policy Affect Economic Growth In Jordan? Evidence From Ordinary Least Square Models', *International Business Research*, Vol.12, no. 1,2019, pp. 27-34

14. Nouri, M and Samimi, A. 'The Impact of Monetary Policy on Economic Growth in Iran', *Middle-East Journal of Scientific Research*, vol. 9, no. 6,2011, 740-743

15. Onyeiwu, C. 'Monetary Policy and Economic Growth of Nigeria', *Journal of Economics and Sustainable Development*, vol. 3, no. 7,2012, pp. 62-70

16. Ogunmuyiwa, M. and Ekone, A. 'Money Supply - Economic Growth Nexus In Nigeria', *Journal of Social Science*, vol. 22, no. 3,2010, pp. 199-204

17. 'Average monetary aggregates' Reserve Bank of India, no date, https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!2

18. Precious, C. and Palesa, M. 'Impact of Monetary Policy on Economic Growth: A Case Study Of South Africa', *Mediterranean Journal of Social Sciences*, vol. 5, no. 15,2014, pp. 76-84

19. 'Average Monetary Aggregates' Reserve Bank of India https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!2

20. Sagar, S. and Koli, L.'A Study of Monetary Policy and Its Impact on GDP Performance with Reference to Indian Economy'2019,__https://easychair.org/publications/preprint_open/Dfv3

21. Saxena, H. and Bansal, P.' Relationship Between Economic Factors and Economic Growth' Proceedings of 10th International Conference on Digital Strategies for Organizational Success, 2019, https://ssrn.com/abstract=3319961

22. Srithilat, K. and Sun, G. 'The Impact of Monetary Policy On Economic Development: Evidence From Lao PDR', *Global Journal of Management and Business Research,* vol. 17, no. 2,2017, pp. 9-15

23. Templeton, G. (2011), A Two-Step Approach for Transforming Continuous Variables to Normal: Implications and Recommendations for IS Research, *Communications of the Association for Information Systems,* 28(1), 41-58

24. Victoria et al. 'Monetary Policy and Its Effectiveness on Economic Development in Nigeria', *International Business Management*, vol. 10 no.22, 2016, pp. 5336-5340

25. Real interest rate (%) - India, Word Bank (no date). https://data.worldbank.org/indicator/FR.INR.RINR?locations=IN

26. Inflation, consumer prices (annual%)-India Word Bank (no date)., https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=IN

Guidelines to Contributors

1. Original research papers, articles, case studies, executive experience sharing, and book reviews on business and areas connected with management are welcome.
2. Two copies of the typescript, typed in double space on A4 size paper with adequate margins on all sides, should be submitted. The first page should have the title of the paper and name(s) of author(s) with institutional affiliation. The second page should start with the title of the paper, followed by text. Name(s) of author(s) should not appear anywhere in the text.
3. A soft copy of the typescript in PC compatible MS Word document format should be emailed to the editor at: nujbms.im@nirmauni.ac.in
4. The length of the paper including tables, diagrams, illustrations, etc, should not exceed 20 double-spaced pages. Short communications, book reviews, case studies / executive experience, sharing, etc. should not exceed five double-spaced pages.
5. The typescript should be accompanied by an abstract in about 100 words along with a declaration that the paper has not been published or sent for publication elsewhere.
6. All tables, charts, graphs, figures, etc. should be kept to the minimum. They should be given on separate sheets with sources indicated at the bottom.
7. All notes should be numbered consecutively and should appear as endnotes. These should be kept to the minimum. Notes in tables should be appropriately marked, and sources should appear at the bottom of the table.
8. References should be placed at the end of the text and should follow the author-date system. In the text, references should appear as (Bhagwati, 2000) or (Rao, 1974) etc. Multiple references to the same author for the same date should be displayed by suffixing a, b, c, etc. to the date (e.g. Rao 1974a, 1974b).
9. The style of referencing should be as follows:
   Books: Robbins, Stephen P, and Coulter, Mary (2002). *Management*. New Delhi: Pearson Education.
   Papers in journals: McGregor, D. (1957), "Uneary Look at Performance Appraisal," Harvard Business Review, 35 (1), 89-94.
10. All contributions will be subjected to peer review. The decision of the editorial committee will be final. Papers not accepted for publication will not be returned.
11. The author (or the first author if there is more than one author) of the published paper will receive a complimentary copy of the issue in which the paper appears along with 10 reprints.
12. Typescripts and all editorial correspondence should be addressed to:

Dr. Pradeep Kautish
Chief Editor
Nirma University Journal of Business and Management
S.G.Highway, Ahmedabad 382 481, Gujarat, India
Tel: +91 79 71652000, +91 2717 241900-4
Email: nujbms.im@nirmauni.ac.in
Website: www.nirmauni.ac.in

Nirma University Journal of Business and Management Studies is devoted to promoting research in business and management studies. A key objective is to equip practising managers and potential ones to make better decisions in their professional lives. It welcomes research based articles and cases in diverse areas of management. The journal aims to engage rigorously with practices, concepts and ideas in the field of management and emphasizes on providing managerial insight to a wide audience.

NIRMA UNIVERSITY
INSTITUTE OF MANAGEMENT
NAAC ACCREDITED 'A+' GRADE

NIRMA UNIVERSITY JOURNAL OF BUSINESS AND MANAGEMENT STUDIES

Institute of Management, Nirma University
Sarkhej Gandhinagar Highway, Ahmedabad 382481, Gujarat, India
Tel: +91 79 71652000, +91 2717 241900-4
Email: nujbms.im@nirmauni.ac.in
Website: www.nirmauni.ac.in