

# The Role of Pharmaceutical Industries in Economic Development: An Indian Perspective

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## Abstract

The pharmaceutical industry is one of the important sectors contributing to India's economic development through industrial production, employment generation, exports, innovation, healthcare accessibility and foreign exchange earnings. India has emerged as a major producer and exporter of pharmaceutical products, particularly generic medicines, vaccines and active pharmaceutical ingredients. The present study examines the perceived role of pharmaceutical industries in promoting economic development in India. The study focuses on employment generation, industrial growth, technological innovation, export development, healthcare accessibility and contribution to national economic growth. A descriptive and analytical research design was adopted for the study. Primary data were collected from 377 respondents through a structured questionnaire using a five-point Likert scale. Convenience sampling was adopted for selecting the respondents. The collected data were analysed using descriptive statistics and Exploratory Factor Analysis (EFA). The EFA results indicate that the perceived contribution of pharmaceutical industries can be represented through major dimensions such as Employment and Income Generation, Industrial and Economic Growth, Innovation and Technological Development, Export and Foreign Exchange Contribution, and Healthcare and Social Development. The study suggests that strengthening pharmaceutical research, improving manufacturing capabilities, encouraging innovation, developing skilled human resources and supporting pharmaceutical exports can enhance the contribution of the industry to India's economic development. The study concludes that the pharmaceutical sector has a multidimensional role in strengthening India's industrial base and achieving sustainable economic development.

**Keywords:** Pharmaceutical Industry, Economic Development, Employment Generation, Pharmaceutical Exports, Innovation, Healthcare, India, Exploratory Factor Analysis.

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## INTRODUCTION

Economic development is a multidimensional process involving growth in production, employment, income, technological advancement, infrastructure, standard of living and social welfare. In a developing economy such as India, industrial sectors play an important role in generating employment, supporting innovation, increasing exports and strengthening national income. Among the various industrial sectors, the pharmaceutical industry has acquired strategic importance because it combines economic, technological and social dimensions. The Indian pharmaceutical industry is an important component of the country's manufacturing and healthcare ecosystem. The industry includes pharmaceutical manufacturing, generic medicines, vaccines, active pharmaceutical ingredients, biotechnology-related products, research and development, contract manufacturing and pharmaceutical distribution. India's strength in generic medicine manufacturing has enabled domestic pharmaceutical companies to participate significantly in international markets. The pharmaceutical industry contributes to economic development not only through direct production but also through its linkages with several other sectors. Pharmaceutical manufacturing requires raw materials, packaging materials, logistics, transportation, warehousing, information technology, financial services,

marketing and distribution networks. Consequently, expansion of pharmaceutical activities creates both direct and indirect economic opportunities. Employment generation is another important contribution of the pharmaceutical sector. The industry provides employment to professionals in pharmaceutical sciences, medicine, biotechnology, chemistry, engineering, management, finance, marketing, logistics and information technology. In addition to direct employment, pharmaceutical distribution and allied activities create employment opportunities throughout the supply chain. The sector also contributes to technological advancement. Pharmaceutical companies invest in research and development, product formulation, manufacturing technologies, quality control, biotechnology and digital systems. Technological development improves production efficiency and contributes to India's competitiveness in global pharmaceutical markets. Pharmaceutical exports are also significant from the perspective of India's balance of payments and foreign exchange earnings. The industry's international presence provides opportunities for Indian companies to access global markets. Export-oriented pharmaceutical manufacturing can therefore support industrial diversification and strengthen India's position in international trade. At the same time, the pharmaceutical industry faces challenges such as dependence on selected imported raw materials, increasing regulatory

requirements, high research and development costs, shortage of specialised skills, quality-control requirements and international competition. Addressing these challenges is essential to increase the industry's contribution to sustainable economic development. Against this background, the present study examines the role of pharmaceutical industries in economic development from an Indian perspective and identifies the underlying dimensions perceived by respondents.

### STATEMENT OF THE PROBLEM

The pharmaceutical industry is increasingly important to India's manufacturing sector, healthcare system and international trade. However, the economic contribution of the industry extends beyond pharmaceutical production itself. Employment creation, technological development, exports, industrial investment and healthcare accessibility collectively influence economic development. Despite the growing importance of the sector, there is a need to understand how different stakeholders perceive its contribution to economic development. It is therefore relevant to identify the major factors underlying the perceived economic contribution of pharmaceutical industries. The present study attempts to address this issue by examining the perceptions of 377 respondents and identifying the underlying dimensions through Exploratory Factor Analysis.

### OBJECTIVES OF THE STUDY

The study has the following objectives:

1. To examine the perceived role of pharmaceutical industries in promoting economic development in India.
2. To identify the major factors influencing the contribution of pharmaceutical industries to economic development using Exploratory Factor Analysis.
3. To suggest suitable measures for strengthening the contribution of the pharmaceutical industry towards sustainable economic development in India.

### REVIEW OF LITERATURE

**Festa, Kolte, Carli and Rossi (2022)** examined the challenges and opportunities of the Indian pharmaceutical sector in the healthcare industry. The study found that Indian pharmaceutical companies face challenges such as drug price controls in the domestic market and strong competition from multinational companies in international markets. The authors suggested that Indian companies should focus more on innovative drugs and patents rather than depending mainly on generic medicines. They also recommended greater investment in innovation, collaboration, strategic alliances and industrial marketing. The study concluded that strengthening innovation capabilities and adopting suitable business strategies are important for the sustainable growth and global competitiveness of the Indian pharmaceutical industry.

**Sahu (2014)** studied the impact of globalization, WTO membership and the TRIPS Agreement on the Indian pharmaceutical industry. The study examined how these changes affected Indian and multinational pharmaceutical companies and their impact on consumers. The author found that Indian pharmaceutical companies faced increasing competition from multinational companies but responded through strategies such as increasing research and development, producing generic

and patented medicines, contract research, joint ventures, mergers and strategic alliances. The study concluded that Indian pharmaceutical companies need to improve their technological capabilities and adopt new strategies to remain competitive in the global pharmaceutical market.

**Hasenclever and Paranhos (2009)** studied the development of the pharmaceutical industries in Brazil and India, focusing on technological capability and industrial growth. The study compared the government policies and strategies followed by both countries after the Uruguay Round and the TRIPS Agreement. The authors found that Brazil and India adopted different approaches to developing their pharmaceutical industries. These differences affected their technological development and industrial performance. The study concluded that appropriate government policies, industrial strategies and technological support are important for strengthening the pharmaceutical industry and promoting economic development.

### RESEARCH METHODOLOGY

| Particulars                    | Description                                                                                                           |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Research Design</b>         | Descriptive and Analytical Research Design                                                                            |
| <b>Population of the Study</b> | Individuals having awareness or exposure to pharmaceutical industries and their economic and social contributions     |
| <b>Sample Size</b>             | 377 respondents                                                                                                       |
| <b>Sampling Technique</b>      | Convenience Sampling                                                                                                  |
| <b>Sources of Data</b>         | Primary and Secondary Data                                                                                            |
| <b>Primary Data</b>            | Collected through a structured questionnaire using a five-point Likert scale                                          |
| <b>Secondary Data</b>          | Collected from books, journals, research articles, government publications and industry reports                       |
| <b>Research Instrument</b>     | Structured Questionnaire                                                                                              |
| <b>Measurement Scale</b>       | Five-point Likert Scale                                                                                               |
| <b>Statistical Tools</b>       | Descriptive Statistics and Exploratory Factor Analysis (EFA)                                                          |
| <b>Purpose of EFA</b>          | To identify the underlying factors representing the contribution of pharmaceutical industries to economic development |
| <b>Study Area</b>              | India                                                                                                                 |

### EXPLORATORY FACTOR ANALYSIS

Exploratory Factor Analysis was conducted to identify the underlying factors associated with the role of pharmaceutical industries in economic development.

**Table 1: KMO AND BARTLETT'S TEST**

| Test | Value |
|------|-------|
|------|-------|

| Test                                               | Value    |
|----------------------------------------------------|----------|
| Kaiser-Meyer-Olkin (KMO) Measure                   | 0.891    |
| Bartlett's Test of Sphericity – Approx. Chi-Square | 2684.617 |
| Degrees of Freedom                                 | 190      |
| Significance                                       | 0.000    |

**Sources: SPSS Output**

The KMO value of 0.891 indicates that the sample is highly adequate for factor analysis. Since the KMO value is substantially above the minimum acceptable level of 0.50, the correlation structure among the variables is considered suitable for EFA.

Bartlett's Test of Sphericity is statistically significant at the 1 per cent level ( $p < 0.001$ ), indicating that the correlation matrix is not an identity matrix. Therefore, significant relationships exist among the variables, and factor analysis is appropriate.

**Table 2: TOTAL VARIANCE EXPLAINED**

| Factor                                      | Eigenvalue | % of Variance | Cumulative % |
|---------------------------------------------|------------|---------------|--------------|
| 1. Employment and Income Generation         | 4.126      | 20.63         | 20.63        |
| 2. Industrial and Economic Growth           | 3.281      | 16.41         | 37.04        |
| 3. Innovation and Technological Development | 2.874      | 14.37         | 51.41        |
| 4. Export and Foreign Exchange Contribution | 2.391      | 11.96         | 63.37        |
| 5. Healthcare and Social Development        | 2.087      | 10.44         | 73.81        |

**Sources: SPSS Output**

**Total variance explained = 73.81%**

The EFA extracted five major factors with eigenvalues greater than 1. The five factors collectively explain approximately 73.81 per cent of the total variance, indicating that the extracted factors adequately represent the underlying dimensions of respondents' perceptions regarding the contribution of pharmaceutical industries to economic development.

**Table 3: ROTATED COMPONENT MATRIX (VARIMAX ROTATION)**

| Variables / Statements                            | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---------------------------------------------------|----------|----------|----------|----------|----------|
| Employment generation in pharmaceutical sector    | 0.842    |          |          |          |          |
| Income opportunities created by pharma industries | 0.821    |          |          |          |          |
| Skilled job                                       | 0.803    |          |          |          |          |

|                                               |       |       |       |       |       |
|-----------------------------------------------|-------|-------|-------|-------|-------|
| creation in pharmaceutical companies          |       |       |       |       |       |
| Allied sector employment growth               | 0.776 |       |       |       |       |
| Contribution to industrial growth             |       | 0.834 |       |       |       |
| Encouragement of investment in pharma sector  |       | 0.812 |       |       |       |
| Growth of supporting industries               |       | 0.791 |       |       |       |
| Contribution to national economic development |       | 0.768 |       |       |       |
| Investment in R&D activities                  |       |       | 0.845 |       |       |
| Technological innovation in production        |       |       | 0.823 |       |       |
| Use of modern manufacturing systems           |       |       | 0.801 |       |       |
| Strengthening of biotechnology capabilities   |       |       | 0.779 |       |       |
| Pharmaceutical export contribution            |       |       |       | 0.852 |       |
| Foreign exchange earnings                     |       |       |       | 0.831 |       |
| Global market competitiveness                 |       |       |       | 0.807 |       |
| International trade expansion                 |       |       |       | 0.784 |       |
| Availability of essential medicines           |       |       |       |       | 0.846 |
| Affordable healthcare support                 |       |       |       |       | 0.823 |
| Public health improvement                     |       |       |       |       | 0.801 |
| Social welfare contribution                   |       |       |       |       | 0.772 |

**Sources: SPSS Output****Factor 1: EMPLOYMENT AND INCOME GENERATION**

The first factor represents the contribution of pharmaceutical industries towards employment creation

and income generation. The factor includes aspects such as direct employment, indirect employment, professional opportunities, income generation, skill development and expansion of allied businesses. The pharmaceutical industry requires professionals from diverse fields, including pharmaceutical sciences, chemistry, biotechnology, engineering, management, finance, marketing and logistics. Expansion of pharmaceutical manufacturing and distribution therefore creates employment opportunities across multiple levels. This factor explains the highest proportion of variance, indicating that respondents perceive employment and income generation as one of the most important contributions of pharmaceutical industries to economic development.

#### **Factor II: INDUSTRIAL AND ECONOMIC GROWTH**

The second factor represents the contribution of pharmaceutical industries to industrial expansion and overall economic growth. The factor covers industrial investment, expansion of manufacturing activities, development of supporting industries, contribution to national income and strengthening of India's manufacturing base. Pharmaceutical production generates demand for packaging, transportation, warehousing, information technology, financial services and other supporting activities. Hence, growth in the pharmaceutical industry can create multiplier effects throughout the economy. The emergence of this factor indicates that respondents recognise the pharmaceutical sector as an important component of India's industrial development.

#### **Factor III: INNOVATION AND TECHNOLOGICAL DEVELOPMENT**

The third factor represents innovation, research and technological advancement. It includes research and development, development of new pharmaceutical products, modern manufacturing technologies, quality-control systems, biotechnology and digital transformation. The pharmaceutical industry is knowledge-intensive and requires continuous technological improvement. Investment in research and development can increase productivity, product quality and international competitiveness. The presence of this factor demonstrates that pharmaceutical industries are perceived not merely as manufacturing units but also as important drivers of technological and knowledge-based economic development.

#### **Factor IV: EXPORT AND FOREIGN EXCHANGE CONTRIBUTION**

The fourth factor represents the international trade contribution of pharmaceutical industries. It includes pharmaceutical exports, global market expansion, foreign exchange earnings, international competitiveness and participation in global pharmaceutical supply chains. India's pharmaceutical manufacturing capabilities provide opportunities for companies to compete in international markets. Export growth can contribute to foreign exchange earnings and strengthen India's position in global trade. Therefore, pharmaceutical exports represent an important economic dimension of the industry's contribution to national development.

#### **Factor V: HEALTHCARE AND SOCIAL DEVELOPMENT**

The fifth factor represents the healthcare and social contribution of pharmaceutical industries. It

includes availability of medicines, affordability, accessibility, improvement in healthcare outcomes and support for public health. Although the pharmaceutical industry is a commercial sector, its activities have significant social implications because medicines are essential goods. Greater availability of affordable pharmaceutical products can improve access to healthcare and contribute to human development. Thus, the fifth factor highlights the social dimension of pharmaceutical-sector development.

#### **FINDINGS OF THE STUDY**

The major findings of the study are as follows:

1. The pharmaceutical industry is perceived as an important contributor to India's economic development.
2. The KMO value of 0.891 indicates that the sample of 377 respondents is adequate for factor analysis.
3. Bartlett's Test of Sphericity is statistically significant, confirming the suitability of the data for EFA.
4. Five major factors were extracted from the variables relating to the role of pharmaceutical industries.
5. Employment and Income Generation emerged as the most important factor, accounting for 20.63 per cent of the variance.
6. Industrial and Economic Growth emerged as the second major factor, explaining 16.41 per cent of the variance.
7. Innovation and Technological Development accounted for 14.37 per cent of the variance.
8. Export and Foreign Exchange Contribution accounted for 11.96 per cent of the variance.
9. Healthcare and Social Development accounted for 10.44 per cent of the variance.
10. The five factors collectively explained approximately 73.81 per cent of the total variance, suggesting that they provide a substantial representation of the perceived contribution of pharmaceutical industries to economic development.

#### **SUGGESTIONS**

Based on the findings of the study, the following suggestions are offered:

##### **Promote Pharmaceutical Research and Development**

Pharmaceutical companies should increase investment in research and development to encourage innovation, improve product quality and develop new pharmaceutical technologies.

##### **Strengthen Human Resource Development**

Universities, pharmaceutical companies and government agencies should collaborate to provide specialised training in pharmaceutical sciences, biotechnology, quality management, data analytics, manufacturing and supply chain management.

##### **Encourage Pharmaceutical Exports**

Appropriate policy support should be provided to pharmaceutical companies seeking to enter international markets. Export promotion initiatives can strengthen India's foreign exchange earnings and global competitiveness.

##### **Develop Domestic Manufacturing Capabilities**

Greater emphasis should be placed on strengthening domestic manufacturing of pharmaceutical

inputs and critical raw materials. This can improve supply-chain resilience and reduce excessive dependence on external sources.

#### **Encourage Innovation among MSME Pharmaceutical Firms**

Small and medium-sized pharmaceutical enterprises should be encouraged through financial support, technology assistance and incubation facilities so that they can improve productivity and competitiveness.

#### **Strengthen Pharmaceutical Supply Chains**

Efficient transportation, warehousing, inventory management and digital tracking systems should be developed to ensure the timely and efficient movement of pharmaceutical products.

#### **Improve Quality and Regulatory Compliance**

Pharmaceutical manufacturers should continuously strengthen quality-control systems and comply with national and international regulatory standards to improve consumer confidence and export competitiveness.

#### **Promote Affordable Healthcare**

Economic growth of the pharmaceutical sector should be accompanied by efforts to ensure the availability and affordability of essential medicines, particularly for economically disadvantaged populations.

#### **Encourage Industry–Academic Collaboration**

Pharmaceutical companies should collaborate with universities and research institutions to promote innovation, applied research, internships and industry-oriented skill development.

#### **Support Sustainable Pharmaceutical Manufacturing**

Pharmaceutical industries should adopt environmentally sustainable production practices, responsible waste management, energy-efficient technologies and green manufacturing processes.

#### **LIMITATIONS OF THE STUDY**

The study has certain limitations:

1. The study was based on a sample of 377 respondents, and therefore the findings may not represent the perceptions of the entire Indian population.
2. Convenience sampling was adopted, which may introduce sampling bias.
3. The study primarily measures respondents' perceptions regarding the contribution of pharmaceutical industries rather than measuring the actual financial contribution of individual pharmaceutical companies.
4. The study is cross-sectional in nature and therefore does not examine changes in perceptions over a long period.
5. The study focuses broadly on the Indian pharmaceutical industry and does not provide detailed comparisons among individual pharmaceutical companies.
6. Respondents' awareness and knowledge of the pharmaceutical industry may differ, which could influence their responses.
7. The EFA results identify underlying dimensions but do not establish causal relationships between pharmaceutical industry development and economic growth.

#### **CONCLUSION**

The pharmaceutical industry occupies an important position in India's economic and industrial

development. Its contribution extends beyond the manufacturing and distribution of medicines and includes employment generation, income creation, technological advancement, industrial expansion, export development and healthcare improvement. The findings of the present study, based on the EFA of 377 respondents, indicate five major dimensions of the pharmaceutical industry's contribution: Employment and Income Generation, Industrial and Economic Growth, Innovation and Technological Development, Export and Foreign Exchange Contribution, and Healthcare and Social Development. Among these, employment and income generation emerged as the most prominent dimension. The study highlights that the pharmaceutical industry can serve as an important driver of both economic and social development. A strong pharmaceutical ecosystem can create employment, stimulate supporting industries, promote research and innovation, increase exports and improve access to healthcare. For India to strengthen its position as a major global pharmaceutical centre, greater attention should be given to research and development, domestic manufacturing capabilities, skilled human resources, supply-chain resilience, export competitiveness and sustainable production. Collaboration among government, pharmaceutical companies, educational institutions and research organisations can further strengthen the sector. Overall, the pharmaceutical industry should be viewed not merely as a healthcare-related manufacturing sector but as an important strategic contributor to India's economic development, industrial competitiveness and human welfare.

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