EXPLORING THE FINANCIAL PERFORMANCE OF SELECTED PHARMACEUTICAL COMPANIES THROUGH THE ALTMAN'S Z-SCORE MODEL

A dissertation

Submitted to the

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in partial fulfilment of the requirements for the degree of

MASTER OF COMMERCE

by

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1.1 INTRODUCTION

Pharmaceutical drugs are discovered, developed, manufactured, and distributed by the pharmaceutical industry. The pharmaceutical industry is rapidly expanding at the moment. Everyone is concerned about public health, so the government has strictly regulated the pharmaceutical industry. The UN Millennium Development Goals specifically identify the pharmaceutical sector as a driver of economic growth. Health is said to be both a cause and an effect of economic development. The economy's most capital-intensive and technologically sophisticated sector is this one. Because its products are essential in easing the suffering of those who are ill, it is known as the "lifeline" industry. Generating millions of jobs and rising export revenues, significantly improves the health of any economy. This industry stands out because the products it manufactures are unique and cannot be replicated or substituted easily.

The pharmaceutical industry is one of the most analysis-intensive industries in the world, and it makes a significant contribution to health care. This is also known as the life-saving trade because it plays an important role in relieving the pain of sick people. The pharmaceutical industry is also a significant contributor to any country's wealth by employing a large number of people.

The pharmaceutical sector in India makes a considerable contribution to exports and has tempting investment opportunities. A substantial number of people across the world receive affordable and low-cost generic medicines from an Asian country, which also runs several plants that comply with Good Manufacturing Practice (GMP) standards US Food and Drug Administration (USFDA) and World Health Organization (WHO). India is ranked third in volume and fourteenth overall in terms of usefulness. This trend may be linked to the rising demand for Indian pharmaceutical products in global markets, due to their more affordable costs. Therefore, India is progressively referred to as the ‘pharmacy of the world’, and it will export its pharmaceutical product globally.

For the past fifty years, Indian pharmaceutical firms have prospered in meeting domestic needs and achieving first place in the global prescription drugs landscape. Due to a variety of market segments, including generic drugs, vaccines, and other products, the Indian pharmaceutical company now holds 85% of the Indian market and 15% of the global market in 2020, compared to 5% in India and 95% globally in 1969.

As a result of the established domestic manufacturing base and low labor costs, India becomes a global hub for pharmaceutical manufacturing, and the industry is characterized rapidly. This becomes possible through stable infrastructure, rising analysis, development processes, and financial and non-financial incentives. This sector's expansion has been fuelled by the steady advancement of science and technology. The pharmaceutical industry has been swept up in the event of new products, innovative processes, and additional production systems, just like other industrial sectors. Modern science and technology have accelerated the discovery and development of novel prescription medicines with fewer side effects and improved medicinal effects. By engaging in innovative analysis and showing interest in technological advancements to meet the population's medical needs, the pharmaceutical industry contributes significantly to the development of vaccines and medicines for preventing disease, treating diseases, and improving quality of life.

The goal of this sector is to supply medicine to take care of health or infections and cure diseases of the people. The pharmaceutical industry covers several subsectors related to drug creation, manufacturing, and marketing by pharmaceutical producers, marketers, and biotechnology companies. To prevent, treat, or decrease a variety of illnesses, pharmaceutical medicines, and vaccines are developed, produced, and promoted as therapies for patients. Health supplements reduce the likelihood of falling ill and provide the daily requirements for vitamins and minerals. The majority of medications tested for use in humans underwent pre-clinical development, clinical trials, safety policy research, or monitoring to determine their security and efficacy before being approved and entering the market.

The Creation And Evaluation Of New Drugs:

New medicines must first be tested and trialed before being prescribed by doctors and used by patients. Drugs are tested in laboratories and on animals to answer basic safety questions. Humans are used to testing drugs to ensure their safety and effectiveness. Before deciding whether or not to approve a drug or device, FDA review teams thoroughly examine all submitted data.

This allows for the detection of drugs in the following stages:

- **Safety:** This is a critical and crucial stage because some medicines can be poisonous and have side effects that adversely impact users.

- **Effectiveness:** Effectiveness is a measure of how well a drug responds to an illness or alleviates symptoms.
- **Dosage:** This varies and must be carefully monitored because an overdose can be dangerous.

Three Primary Phases Of Testing Are As Follows:

- **Preclinical trials** use computer simulations and lab-grown human cells to evaluate drugs. This allows for the testing of both effectiveness and potential negative effects. Numerous substances fail this test as they damage cells or don't seem to work.
- Drugs that pass the first stage are **tested on animals** in later stages. The chemical is given to the animals in a specific amount, and the animals are then closely monitored for any negative effects.
- The **third stage** of research involved using medicines authorized for use in animal testing, known as human clinical trials. They are tested on healthy volunteers to ensure their safety. The treatment's safety and effectiveness are then evaluated in patients with the disease. The medicine is first given in low doses, and if this is safe, the amount is gradually increased until the optimal dosage is found.

Drug trials are clinical research studies that are conducted on human participants to evaluate the effectiveness and safety of various medicines. Drug trials are conducted to assess existing pharmaceuticals that require additional research and comparison, as well as to search for novel and improved treatments for the prevention and treatment of a variety of medical problems.

India's thriving pharmaceutical industry has a long and illustrative history of innovation and global distribution of life-saving medicines at the most competitive prices. The COVID-19 pandemic has demonstrated that India is not only a pioneer but also distributes drugs to every part of the world that requires them. India is the world's largest supplier of low-cost generics, vaccines, and affordable medicines, and it is one of the most important producers of medicine in both value and volume terms, with the second-highest number of Food and Drug Administration (FDA)-approved medicine-producing plants.

However, the COVID-19 pandemic has not only highlighted India's pharmaceutical trade's strengths, but has also examined many key government initiatives to boost investment in

the sector following the pandemic, such as the creation and promotion of bulk drug-producing units, and production-joined incentive schemes.

This introduction chapter seeks to give a fundamental grasp of how the industry operates. It should be noted that the terms medicine, pharmaceutical, medicines, and drug are frequently used interchangeably, depending on the context.

1.2 WHAT DOES INDUSTRY MEAN?

Industry denotes economic activities, which are linked with the translation of resources into useful goods. The word industry is used for activities involving mechanical appliances and technical skills.

1.3 WHAT DO PHARMACEUTICALS MEAN?

“Pharmaceuticals” refers to the medicines and substances intended to be used for or in the dealing of diseases of human beings or animals, and comprises such components as described in subsection (b) of Section 3 of the Drugs and Cosmetics Act, 1940.

1.4 WHAT IS THE PHARMACEUTICAL INDUSTRY?

The pharmaceutical industry's primary activities are thought to be medicine discovery, development, and production. It is widespread, involving research, chemicals, regulation, and government involvement. However, regional differences in the characteristics of the pharmaceutical industry can be observed.

The pharmaceutical industry contributes to innovative research and technological advancements to meet the population's complex healthcare needs, which plays a significant role in the development of vaccines and medicines for the treatment of various ailments, which enhances the quality of life of humans.

1.5 BRIEF HISTORY OF MEDICINES

People have been using "drugs" to treat illness and disease for over 3000 years. A small number of pharmaceuticals with both plant and animal origins were documented in China around 1100 BCE, and by the end of the 16th century, at least 1900 different medicines were in use. Plants, animals, and minerals were used to develop medicines in ancient India. They were developed empirically by a small group of knowledgeable individuals. Typically, information about such a healthcare system was kept private within a family. There were no well-established scientific approaches to drug standardization at that time.

The Arabic or Unani-Tibbi systems of medicine flourished during the Muslim era, while the Indian system of medicine declined. Furthermore, India has a long history of pharmacy. Ayurveda and Yoga are considered to be the most important subjects in Indian medicinal applications. Ayurveda and yoga have histories dating back over 5000 years. The information was gathered from several sages and monks who used herbal medications to treat a variety of illnesses and wounds. It should be noted that in Indian society, there is no distinction between a doctor and a pharmacist at that time. As a result, it laid the groundwork for all of our country's early physicians to experiment with the drugs they thought would be most beneficial to the patient's body.

In India, the majority of people follow a vegetarian diet during that time. Vegetarianism was practiced to avoid contracting diseases from animals, as evidenced gathered over some time. Indians were aware that contact with dead animals can spread viruses and bacteria, which are the primary cause of the majority of illnesses. As a result, vegetarianism and fasting became more popular in India; it was one of the methods used to discourage people from eating raw meat. People now value this technique because it protects us from certain diseases from the time we are born.

1.6 KEY CONTRIBUTORS IN MEDICINE AND PHARMACY

- **Charak**

  Acharya Charak, who was born around 300 BC, is regarded as the father of Indian medicine. He made an important contribution to the ancient Indian Ayurvedic system. He composed "Charaak Samhita," known as the Ayurvedic encyclopedia. He also attempted to name all 360 animal and plant species known to science at the time.

- **Sushruta**

  Sushruta, the "Father of Surgery," performed complicated facial plastic operations. In the year BC, before the invention of microscopes and scanning devices, he performed surgery in dentistry, ophthalmology, obstetrics, and gynecology. In his book "Suhrutha Samhita," Sushruta documented his observations of the effects of over a thousand plant medicines on his diverse patients.

- **Sir Ram Nath Chopra**

  Sir Ram Nath Chopra was India's most famous scientist and physician. He was a member of the Indian Medical Service. He was named "Father of Indian

Pharmacology" in recognition of his achievements in the pharmaceutical industry and his dedication to making India a drug-producing nation.

1.7 FATHER OF PHARMACY IN INDIA

On March 6, 1902, Mahadeva Lal Schroff, the father of Indian pharmacy, was born in Darbhanga, Bihar. Despite his lack of formal pharmacy training, he helped to establish and guide India's pharmaceutical education and industry to success. In 1932, while working as a professor at Banaras Hindu University, Schroff proposed establishing a distinct area of pharmaceutical sciences for the first time in India. Prof. Schroff established the M. Pharm program at BHU in 1940. Various locations in India gradually began to offer pharmacy education. He left BHU in 1943 to become the chief chemist and research officer at Birla Brothers.

He was given the title "Father of Pharmacy Education in India" for his tremendous efforts to spread awareness of this course across the nation and convince more and more students to sign up for it. He revolutionized pharmacy education in India by making it available to all students across the country.

1.8 POST-INDEPENDENCE ERA OF THE PHARMA INDUSTRY

Independence Day honors India's independence, but the pharmaceutical industry also owes a lot to this day! The Indian pharmaceutical industry changed and expanded significantly after independence. Understanding the history of the pharmaceutical industry and the current battle between generic and branded medicines is critical. Over the last 75 years, the Indian pharmaceutical industry has undergone numerous changes, ranging from significant changes in the regulatory framework to the introduction of the Pharma Franchise.

India's pharmaceutical industry has grown from near-nil to a global leader in the development of premium generic medicines. The Indian pharmaceutical industry was estimated to be worth around Rs. 10 crores in 1947, the year of independence. 99% of pharmaceutical patents in India were held by foreign companies at the time.

In 1949, the Indian government formed the Justice Bakshi Tek Chand Committee to review the country's patent laws and recommended that sections 22, 23, and 23A-G of the Patents and Designs Act, 1911, should be amended similarly to the United Kingdom Acts of 1919 and 1949 to prohibit the misuse or abuse of patent rights in India.

The Central Drug Research Institute is one of the National Research Centre networks that the CSIR (Council of Scientific and Industrial Research) regulates. The CSIR was established in 1951 to advance general drug research and the evaluation and standardized use of medicines. On March 9, 1948, India's first central pharmacy council was established to oversee the educational standards of the industry. To advance drug research as well as the evaluation and standardization of medicines using accepted techniques, the Central Drug Research Institute Lucknow was founded in 1951. It is one of the networks of national research facilities managed by the CSIR.

A committee was formed in 1954 as a result of the Pharmaceutical Inquiry Report, which recommended that foreign businesses operating in India establish manufacturing facilities. As a result of these recommendations, the Indian government established Hindustan Antibiotics Ltd. in Pimpri and two Indian Drugs and Pharmaceutical Ltd. branches in Hyderabad and Rishikesh. The Government appointed the Justice N. Rajagopala Ayyangar Committee in 1957 to investigate the possibility of revising the Patent Law. In 1959, the report proposed drug patenting as a process rather than a product. It became the first patent law of independent India in 1970. The Act was finally put into effect on April 20, 1972.

In 1975, there were over 2500 small-scale units in operation, with 116 organized units registered or licensed under the industry. There were 26 units in the organized sector with foreign equity of 50% or less, compared to 25 units with more than 50% foreign equity. The production activity in the sector has been increasing. The total turnover for bulk pharmaceuticals was estimated to be in the range of Rs 75 crores at that time. The annual R&D budget was only Rs. 4.5 crores, or about 1.1% of total revenue.

The Hathi Committee was established in 1975 to investigate the pharmaceutical industry. The committee's recommendations directly impacted how Indian drug policy was developed. DPCO managed drug pricing by authorizing a markup that included profits of 40% for life-saving prescriptions, 55% for essentials, and 100% for less important pharmaceuticals.

Local businesses played a limited role before independence. The Bengal Chemicals and Pharmaceutical Works was established in 1901 by Acharya P. C. Ray. Aspirin and quinine salts were replaced by synthetic pharmaceuticals such as chemotherapeutics, alkaloids, etc. Unichem, Chem Pharma, Calcutta Chemicals, Zandu Pharmaceutical Works, etc. are a few examples of the Chemical Industries and Pharmaceutical Industries.

In 1952, foreign multinational corporations held 38% of the market, while Indian businesses held 62%. Before the implementation of patent rules in 1970, the foreign MNC market share reached 68%. Foreign multinational corporation's market share fell from 50% in 1980 to 23% in 2004 when compared to indigenous pharmaceutical companies.

By 1990, India was self-sufficient in the production of bulk pharmaceuticals. Foreign medicine producer's market share of the domestic Indian market had fallen to less than 20% by 2005. This occurred because no legislative safeguards were in place to protect their medicines. When MNCs withdrew from the Indian market, local businesses blocked access to it.

The Indian pharmaceutical industry has improved its research and production capabilities thanks to the 35 years of protection provided by the Patent Act, enabling many of its top companies to move up the value-added chain. There are many large, medium-sized, and small businesses in India's pharmaceutical industry, making it one of the most competitive in the world. Additionally, it is very dispersed, with more than 20,000 domestic production units.

Following economic liberalization and as the world began to become more globalized, India joined the WTO in 1995. To make the TRIPS agreement legally binding, India had to ratify it. The Indian Patent Act undertook three significant revisions in preparation for this adoption. Roche was the first company to receive a patent for its Pegasys hepatitis-C medicine. TRIPS was adopted by the majority of World Trade Organization signatory members, but it was in stark contrast to the Indian Patent Act of 1970. To prepare for this adoption, the Indian Patent Act went through three major revisions: The Patent (Amendment) Act of 1999, the Patent (Amendment) Act of 2002, and the Patent (Amendment) Act of 2005.

When technological advancement does not occur at the same rate in developing countries as compared to developed countries, resulting in high prices and limited access to medical care, the hypothesis falls apart. In theory, patenting encourages innovation by increasing competition and increasing demand for more advanced technological capabilities.

To compensate the loss borne by TRIPs compliance in sales, India's top pharmaceutical companies have increased generic drug exports to the United States and Western Europe. They have also formed alliances with foreign pharmaceutical companies through mergers

and acquisitions, research and development agreements, and other business arrangements. Pharmaceutical exports from India increased from USD 600 million in 1995 to more than $3.7 billion in 2005, accounting for more than 61% of industry revenue. This was made possible because India postponed TRIPS implementation, giving the domestic industry time to develop and compete with global firms.

After 2005, governments began focusing on cluster development through public-private partnerships. In October 2006, approximately 32 pharmaceutical and biotech Special Economic Zones (SEZs) were granted formal in-practice approval. Twenty of them were devoted to the pharmaceutical industry, and twelve to biotechnology.

The National Institute of Pharmaceutical Education & Research (NIPER) was established by the Government of India to address the long-standing need for a central body for higher education in pharmaceutical sciences. The first NIPER was established in 1998, and six more were established in 2007 in Hyderabad, Ahmedabad, Hajipur, Kolkata, Guwahati, and Rae Bareli.

After 2005, several MNCs turned to contract manufacturing and research services (CRAMS), co-marketing alliances, and outsourcing of research and clinical trials to reduce expenses and shorten "time to market" for new pharmaceuticals. India has risen to the top of the list of international pharmaceutical companies.

On July 2, 2008, the Ministry of Chemicals and Fertilizers established the Department of Pharmaceuticals to focus on the development of the pharmaceutical industry. The department regulates activities related to the pricing and availability of affordable medicines, R&D, and intellectual property rights.

Global innovators obtained 302 drug patents from the Indian Patent Office in October 2008. Pharmaceutical MNC's market share in the local pharmaceutical industry is expected to rise from 25% in 2008 to 35% by 2015. Novarti's rural project Arogya Parivar benefited 25 million people in over 18,000 villages.

The US FDA had approved 72 ANDAs (An abbreviated new drug application) by June 2010 for the top 20 pharmaceutical corporations in India and their affiliates. The largest R&D spender between 2009 and 2010 was Ranbaxy Laboratories and Daiichi Sankyo

Company, with $102 million. Balaglitazone, a brand-new chemical from Dr. Reddy's Laboratories, is India's first locally created molecule to enter a Phase III trial.

After the Prof. CK Kokate committee submitted its report, the government outlawed 344 FDCs (Fixed Dose Combination) in March 2016 and later added 5 more to the list. Legal challenges were filed by Pfizer, Procter & Gamble, Abbott, Sanofi, Lupin, and Dr. Reddy's Labs. In December 2016, the Delhi High Court overturned the Centre's decision. Following the Health Ministry's appeal to the Supreme Court, the latter directed DTAB (Drug Testing Advisory Board) to determine what would happen to these medicines in December 2017. However, pharmaceutical companies like Pfizer, Procter & Gamble, Abbott, Glenmark, Sanofi, Cipla, Lupin, and Dr. Reddy's swiftly filed legal challenges in several courts against the ruling. The SC further decided that because 15 of the 344 medicines on the original list have been produced in India since before 1988, the government could not ban them from using reported in the TAB report.

The Department of Pharmaceuticals, the Ministry of Chemicals and Fertilizers, and the Government of India introduced the Jan Aushadhi Scheme in November 2008. As of May 2014, only 80 "Jan Aushadhi Stores" were open in a few states. The government has maintained its goal of opening 10500 PMBJPs (Pradhan Mantri Bhartiya Janaushadhi Pariyojna) across the country by 2025. In the fiscal year 2020-21, sales of Rs. 665.83 crores were made, saving the public's expense approximately Rs. 4,000 crores. The government renamed the "Jan Aushadhi Scheme" the "Pradhan Mantri Jan Aushadhi Yojana" in September.

In March 2018, the Pradhan Mantri Jan Arogya Yojana (PMJAY), an ambitious initiative taken to reform the Indian health system, was launched. Its objectives include safeguarding the financial well-being of 500 million of the country's most vulnerable citizens who fall into poverty each year due to medical expenses.

The online retail industry generated INR 38.15 billion in sales in 2020 and is expected to generate INR 317.87 billion by 2026. Online pharmacies offer 10-20% discounts over retail or offline pharmacies. Online gamers save money on expenses such as real estate, inventory, employee wages, utilities, middlemen, and so on. Thus, they can offer heavy discounts to attract more customers and increases their revenue.

In 2020, the retail pharmacy industry in India was worth INR 1,783.83 billion, and it is expected to grow at a CAGR of 12.02% to INR 3,078.46 billion by 2026. The organized retail pharmacy business is expected to reach INR 370.39 billion by 2026.

India maintained its reputation as the "Reliable Pharmacy of the World" by exporting medicines such as hydroxychloroquine and paracetamol to over 150 countries. In January 2021, India launched the world's largest vaccination campaign to protect 300 million priority populations from coronavirus illness (COVID-19). The Indian government initially investigated two vaccinations, COVAXIN and COVISHIELD, and provided them free of charge to large populations. So far, the National Vaccination Drive has distributed 93.78 million second doses and 12.07 million precaution doses which is a noticeable achievement.

1.9 PHARMA SECTOR: PART OF THE HEALTHCARE INDUSTRY

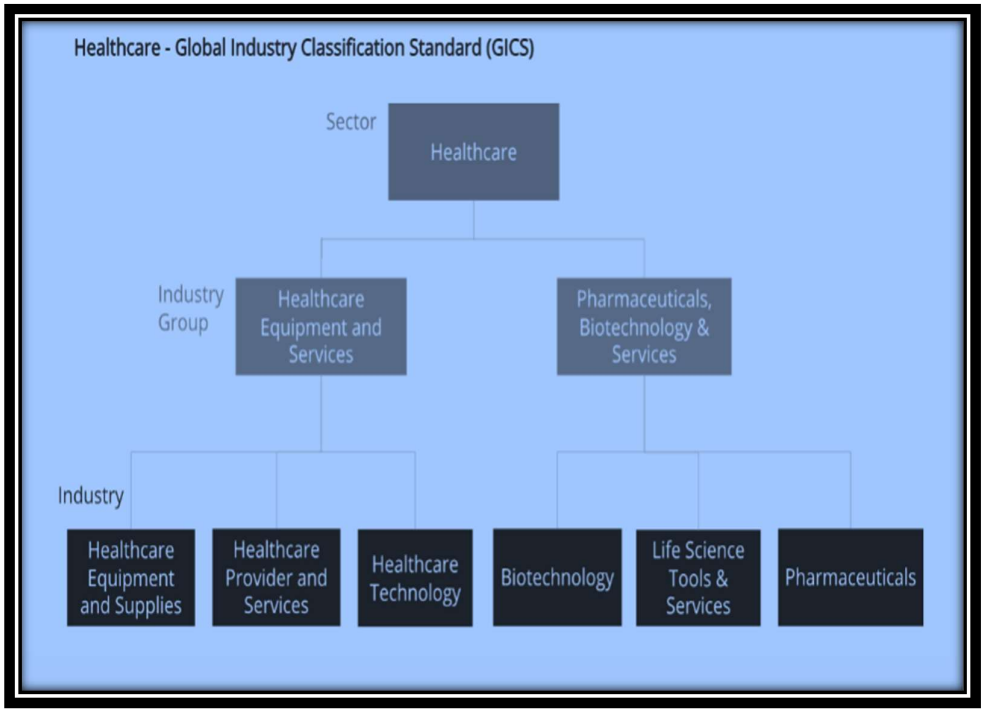
Healthcare Industry

The medical sector, also known as the healthcare sector, offers products and services to treat patients in a curative, preventive, rehabilitative, or palliative manner. Businesses that deal with the prevention, diagnosis, treatment and rehabilitation of illnesses are included in the healthcare sector. Healthcare has emerged as one of India's most important industries, both in terms of revenue and employment. Hospitals, clinical devices, scientific trials, outsourcing, telemedicine, medical tourism, medical health insurance, and clinical equipment are all part of healthcare. The healthcare industry needs to start prioritizing investing in people as the main metric for success. Many pharmaceutical companies now have their service agencies reach out to the vulnerable population as a result of the many new opportunities that technology has created for serving people. The Indian healthcare sector is rapidly expanding as a result of improved coverage, services, and increased spending by both public and private players. The Indian healthcare sector was expected to triple, growing at a 22% CAGR between 2016 and 2022 to reach US$ 372 billion in 2022, up from US$ 110 billion in 2016.

The following are the main departments of the healthcare industry:

1. Healthcare services and facilities
2. Medical devices, equipment, and hospital supplies manufacturers
3. Medical insurance, medical services, and managed care
4. **Pharmaceuticals & Related Segments**

Figure 1.1 Pharma Industry- Part Of the Healthcare Industry



(Source: https://corporatefinanceinstitute.com)

Figure 1.2 Current Scenario Of India's Healthcare Industry

(Source: https://www.ibef.org)

1.10 TYPES OF PHARMACEUTICAL COMPANIES

The pharmaceutical industry discovers, develops, and manufactures medicines that benefit society's health and well-being. Pharma companies come in a variety of shapes and sizes, but they all work to improve the health and well-being of the general public. Pharmaceutical companies create new therapies and medicines in a variety of ways.

The U.S Bureau of Labor Statistics notes that there are three main categories of pharmaceutical firms:

- **Mainline**

  There are numerous drugs available on the market from major, well-respected pharmaceutical companies like Pfizer and Novartis. These well-known pharmaceutical companies have numerous production facilities, as well as multiple internationally renowned research and development facilities.

- **Research and development**

  Smaller research and development pharmaceutical firms may not have any approved medicines on the market, but they still prioritize research activities like clinical trial observation. The mainline companies that need additional research support may also use research and development companies as subcontractors.

- **Generic**

  Several drugs on the market are no longer covered by patents. Following the expiration of the patent, generic pharmaceutical companies reintroduce these medicines as less expensive alternatives. Furthermore, by focusing less on R&D, these pharmaceutical companies contribute to the more affordable distribution of patent-expired medicines.

1.11 TYPES OF PHARMACEUTICAL PRODUCTS

Important pharmaceuticals made from natural materials include vaccines, steroid hormones, human blood plasma fractions, and antibiotics. Previously obtained from natural sources, vitamins are now frequently created in laboratories. Various pharmaceutical formulations are produced by specialized pharmaceutical companies. Besides that, these formulations use different active ingredients, injectables, and additives. Here is a look at the most prevalent categories of pharmaceutical products that pharmaceutical companies concentrate on.

- Parenteral Formulations
- Topical Medicines

- Oral drugs
- Novel Drug Formulations
- Oncological Formulations
- Modified Release Formulations

1.12 NEED OF PHARMACEUTICAL COMPANIES

For thousands of years, pharmaceuticals have been used to treat illnesses. Today, demonstrating the safety and effectiveness of an active pharmaceutical ingredient is a multibillion-dollar global business. As a result, we will look at some of the industry's remarkable initiatives as well as the importance of pharmaceutical firms to society. Plants and herbal remedies were used to treat a wide range of illnesses and injuries in the early days. Today, there is a multibillion-dollar global industry dedicated to demonstrating a compound's safety and effectiveness and getting it from the lab into the hands of patients who require it.

1. Medicine lengthens life expectancy

The pharmaceutical industry is largely responsible for the increase in life expectancy for both men and women. Pharmacological advancements were said to be responsible for 73% of the overall rise in life expectancy between 2000 and 2009 in 30 developing and high-income countries. The average global life expectancy has risen from 32 years in 1900 to approximately 72 years today, more than doubling as a result of medical advances.

2. The sector works to eliminate and eradicate illnesses

The ultimate goal of developing therapies is disease eradication, which benefits ecosystems worldwide.

3. Lowering pain and suffering

Many medicines work directly to treat illnesses, but they can also be used to control discomfort by reducing pain, symptoms, or the side effects of other treatments. According to a WHO study, people who are in constant pain are four times more likely to suffer from depression or anxiety, and they are also twice as likely to have difficulty working.

4. Vaccines A cost-effective lifeline

Vaccines save not only millions of lives by preventing disease, but they also save money. Vaccines are widely regarded as a cost-effective public health measure that reduces healthcare costs and improves immunity power. According to the WHO,

every dollar spent on childhood vaccines saves the United States more than $10 in illness treatment costs.

5. Shorter hospital stays

50 years ago, an Eight-day hospital stay was the standard in the United States. Patients may recover faster as a result of innovation and improved access to healthcare. Many diseases can now be treated with medicines rather than invasive procedures and therapies. The average hospital stay in the United States today is only 4-5 days. The ability to discharge patients more quickly has reduced the burden on the healthcare system and healthcare personnel.

6. Millions of people work in the sector

Pharmaceutical companies support millions of jobs worldwide. In the United States, the biopharmaceutical industry employs over 800,000 people from a variety of backgrounds, including manufacturing, technical support, and scientific research. According to estimates, the company employs over 4.7 million people in the United States, both directly and indirectly. Pharmaceutical companies require highly qualified and educated workers.

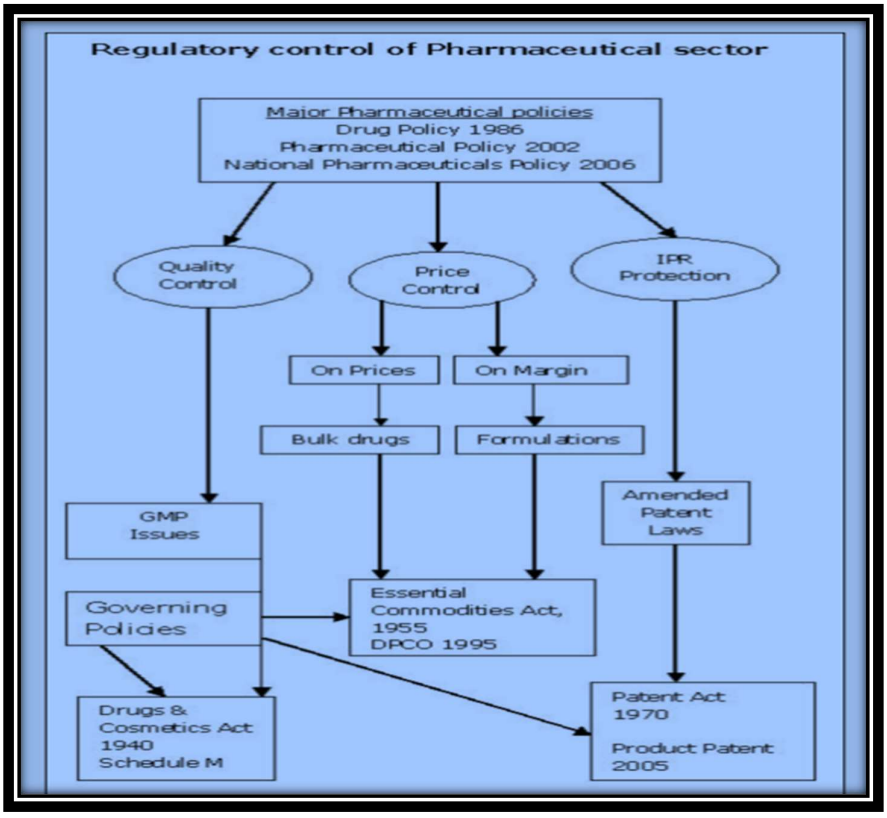
7. Pharmaceutical businesses stimulate the world economy

The pharmaceutical industry is an important part of the global economy, as well as a driving force behind medical advancement through research, development, and the introduction of new medicines that enhance people's health and quality of life around the world. The sector experienced record growth in 2019, totaling an estimated $1.3 trillion.

1.13 GOVERNING BODY OF THE PHARMA INDUSTRY

To guarantee that users receive accurate and reliable information, a regulatory framework is required. Numerous regulatory organizations that oversee patents, drug safety, quality, and the price of medicine are part of this sector. Governmental agencies use regulations to enact laws. They are significant because they establish the boundaries of what is acceptable and unacceptable in business. Pharmaceutical regulation aims to guarantee the quality, safety, and effectiveness of the medicines available to the patients. In order to improve the state of people's health, regulations must be in place for both innovations and products that are already on the market.

Figure 1.3 Regulatory Body In Pharma Sector



(Source: https://cuts-ccier.org/)

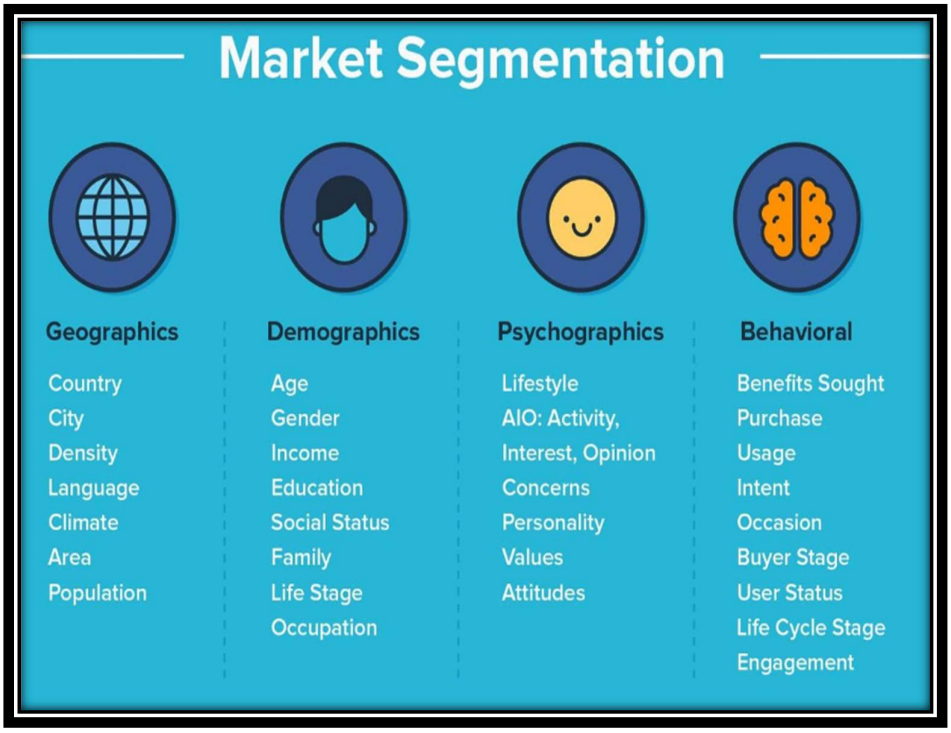
1.14 THE PHARMACEUTICAL MARKET SEGMENTATION

Sorting is a subset of segmentation, which is the systematic organization of objects. After objects have been grouped into discrete groups (segments) based on the predetermined criterion. So that, specific actions can be taken easily.

Similarly, the market segmentation includes categorizing customers. The procedure entails segmenting the market of potential customers and clients based on traits such as interests or wants to focus on marketing messages, methods, and campaigns. In the pharmaceutical industry, individuals with comparable characteristics are categorized into similar groups called segments.

Market segmentation is the practice of categorizing prospective customers and consumers into groups based on characteristics such as demands or interests. Market segmentation, both within and outside of the pharmaceutical industries, is widely accepted to fall into four categories: demographic, psychographic, behavioral, and geographic.

Figure 1.4 Segments of the Pharmaceutical Market



(Source: https://www.orientation.agency/)

1.15 MARKET SIZE

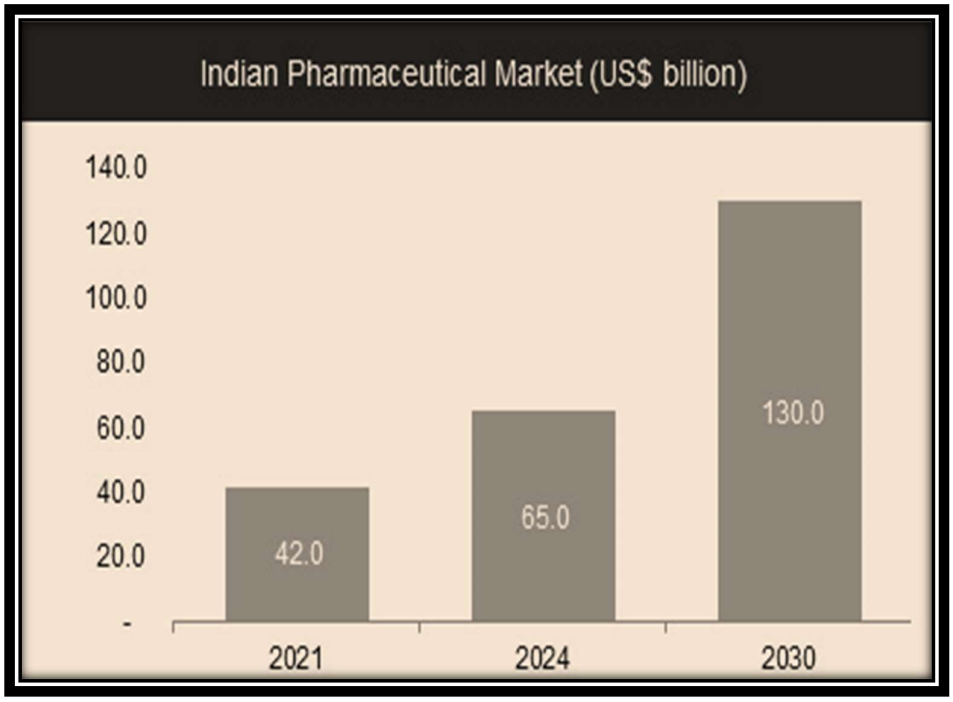
The domestic market is expected to grow three times faster in the coming decade, according to the Indian Economic Survey 2021. The Indian pharmaceutical industry meets approximately 50% of the world's demand for various vaccines, as well as 40% of the US market for generic drugs and 25% of the UK market for all medicines. The domestic pharmaceutical industry consists of 10,000 manufacturing facilities and 3,000 pharmaceutical businesses. India's domestic pharmaceutical market was worth $42 billion in 2021, and it is expected to grow to $65 billion by 2024, and then to US $120-130 billion by 2030.

The biotechnology industry in India encompasses biopharmaceuticals, bio-services, bio-agriculture, bioindustry, and bioinformatics. The Indian biotechnology market was worth $70.2 billion in 2020, and by 2025, it is anticipated to reach $150 billion.

The medical device market in India was projected to generate US$10.36 billion in revenue in FY20. the is anticipated to grow at a 37% CAGR (Compounded Annual Growth Rate) from 2020 to 2025 to reach USD 50 billion. As of August 2021, CARE Conditions anticipates that India's pharmaceutical industry will expand at an average annual rate of

11% over the following two years, reaching a value of more than US $60 billion. India supplies about 60% of the world's demand for vaccinations and 20% of the volume of all generic drugs produced worldwide. Globally, the pharmaceutical industry in India is worth $42 billion dollars The demand for pharmaceuticals in India increased to 17.7% annually in August 2021 from 13.7% in July 2020. India Ratings & Research predicts that the Indian pharmaceutical profit will increase by over 12% year over year in FY22.

Figure 1.5 Anticipation of Revenue Of the Indian Pharmaceutical Market



(Source: https://www.ibef.org/)

1.16 ROLE PHARMACEUTICAL INDUSTRY IN INDIAN GDP

The Indian pharmaceutical industry excels in a variety of areas, including contract research, manufacturing, clinical research, and vaccine research & development. Global pharmaceutical companies outsource these tasks, which helps the industry to grow rapidly. This suggests that the Indian pharmaceutical industry has a promising future.

Pharmaceutical companies contribute significantly to Indian GDP in the following ways:

- India is one of the world's most advanced pharmaceutical industries, ranking fourth globally in terms of sales volume.
- The pharmaceutical industry in India is estimated to be worth $6 billion in near future.
- The industry is growing at a 13% annual rate.

- The Indian pharmaceutical industry meets approximately 70% of the domestic demand for bulk medicines.
- The Indian pharmaceutical industry produces 20% to 24% of the generic medicines which are used worldwide.
- Patent medicine sales would increase in the national pharmaceutical market.
- The Indian pharmaceutical industry will generate US $43 billion in sales over the next ten years. Health services would change as a result of the expansion of medical infrastructure, which would boost the pharmaceutical sector's growth.
- India has lower labor and inventory costs than other countries, and multinational corporations that invest in research and development in India may be able to reduce their costs by up to 30% to 50%.
- A research chemist's salary in the United States is five times that of one in India.
- India spends nearly half as much money as the United States on pharmaceutical manufacturing.
- Clinical trials in India are one-tenth the price of those in the United States.
- In India, research costs one-eighth of what they weigh in the United States.

1.17 INVESTMENTS AND RECENT DEVELOPMENTS

India's pharmaceutical sector is significant in the global pharmaceutical industry. In this regard, the industry has recently seen a significant increase in investments and developments.

- In June 2022, Cipla partnered with the Drugs for Neglected Diseases initiative (DNDi) to advertise the take-off of a 4-in-1 antiretroviral treatment for children residing with HIV in South Africa.
- The Indian medicines and drugs sector entered accretive FDI worth US$19.41 billion in March 2022.
- Medical Device industry is anticipated to reach US$ 50 billion by 2030 raising at a CAGR of 15%.
- Sun Pharma and SPARC entered into a license agreement in November 2022 for the US commercialization of phenobarbital for injection.
- Glenmark becomes the First Company in India to launch Teneligliptin Dapagliflozin Fixed medicine Combination in October 2022.

- In October 2022, Lupin inked an agreement to acquire two inhalation brands from Sunovion Pharmaceuticals Inc.
- Glenmark launches Indacaterol Mometasone Embedded-Dose Combination Medicine for Asthma in India as the first pharmaceutical company.
- In June 2022, FDI in the Indian pharmaceutical industry totalled US $19.90 billion.
- In May 2022, Sun Pharmaceutical Industries Limited through one of its wholly possessed subsidiaries plans to launch Bempedoic Acid under the brand name Brillo, in India for reducing low-viscosity lipoprotein (LDL) cholesterol.
- In May 2022, Dr. Reddy's Laboratories enters into an exclusive partnership to commercialize novel patch Tegoprazan in India & choose arising markets.
- Dr. Reddy's Laboratories Ltd. and Medicine Health signed a contract in April 2022 to promote the launch of medical cannabis products in Germany.
- In March 2022, Themis Medicare Ltd, advertised the approval of its antiviral medicine VIRALEX by the medicine Controller General of India (DCGI).
- Over the next ten years, India's healthcare system could benefit from an additional $200 billion in added value thanks to the National Digital Health Blueprint.
- In October 2021, India launched a Clinical Data and perceptivity (CDI) division to further strengthen its universal presence and manage data-related angles of its clinical trials.
- In September 2021, the Indian government contributed US$ 4 billion to pharmaceutical and medical diligence.
- Uniza Group, an Ahmedabad-based pharmaceutical company, and Lysulin Inc. (a US-based company) signed a partnership agreement in August 2021 to offer Lysulin, a nutritional product, to Indian consumers.
- In May 2021, Indian Immunological Ltd. (IIL) and Bharat Immunological and Biologicals Corporation (BIBCOL) signed a technology transfer agreement with Bharat Biotech to develop the vaccine locally to upheave India's vaccination drive.
- The Union Cabinet has made it clear that it supports changing the current Foreign Direct Investment (FDI) policy in the pharmaceutical industry to permit FDI up to 100% under the automatic route for manufacturing medical devices, subject to certain restrictions.

1.18 PHARMACEUTICAL EXPORTS FROM INDIA

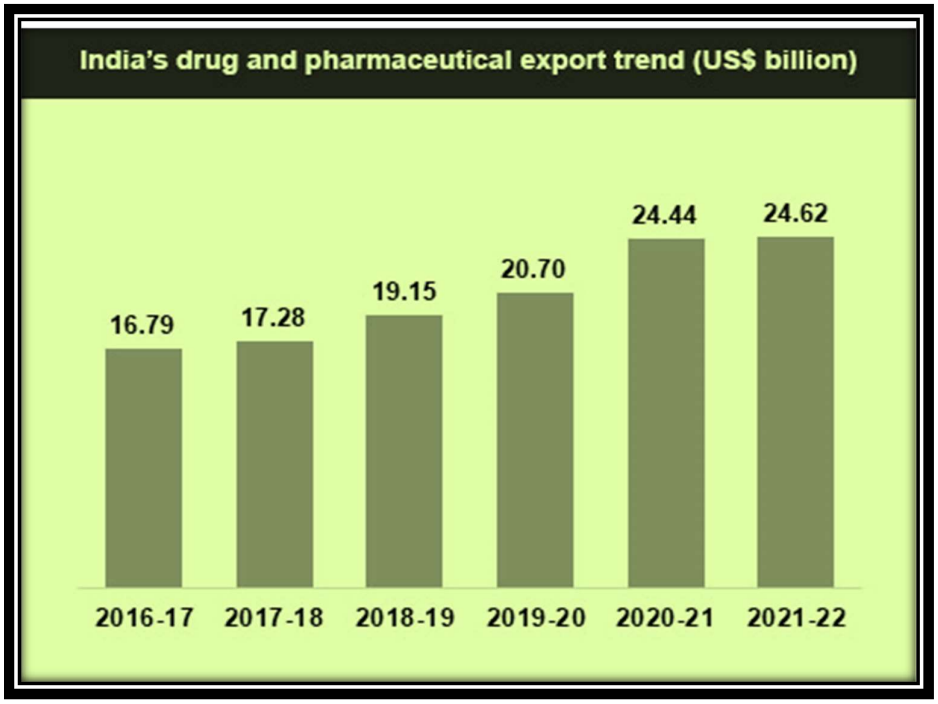
All sizes of businesses can benefit financially from exporting. In comparison to non-exporting firms, sales generally increase more quickly, more jobs are created, and employees make more money.

The United States has a reputation for providing high-quality, cutting-edge products and services, excellent customer support, and ethical business practices. India plays an important part in the global pharmaceuticals and vaccine manufacturing industry. Exports are a major driver of economic growth in any economy. It may have an impact on a country's GDP, exchange rate, inflation rate, and interest rates. The value of the nation's pharmaceutical exports in 2021–22 was US$ 24.62 billion. Exports increased by 18% YoY in 2020–21, reaching $24.4 billion.

Following are the key points related to pharmaceutical exports from India:

- The crucial USP of the Indian Pharmaceutical Industry is affordable price and high quality and because of this, India is known as the "Pharmacy of the World".
- One of the major accomplishments of the Indian Pharma Industry is access to affordable HIV medicines.
- Formulations and Biologics constituted the major portion of India's exports with a share of 73.31% followed by medicine intermediates and bulk drugs.
- This robust performance was achieved despite the global supply chain disturbances, lockdowns, and lower manufacturing.
- In March 2022, India exported US$ 2.4 billion worth of medicines and drugs, a 23% increase from US$ 1.97 billion in February 2022.
- USA, UK, South Africa, Russia, and Nigeria are India's top five export destinations.
- India played a crucial role during the Covid-19 pandemic and demonstrated its capability to be a consistent and dependable pharma supplier to the world indeed during the time of crisis.
- As the country is one of the biggest vaccine exporters, about 65%- 70% of the World Health Organization (WHO) vaccine requirements are sourced from India.
- From April 2022- September 2022, exports of medicines & drugs and exports of Medicinal and Pharmaceutical products stood at US $4066.86 million.

Figure 1.6 Pharmaceutical Exports in Recent Years

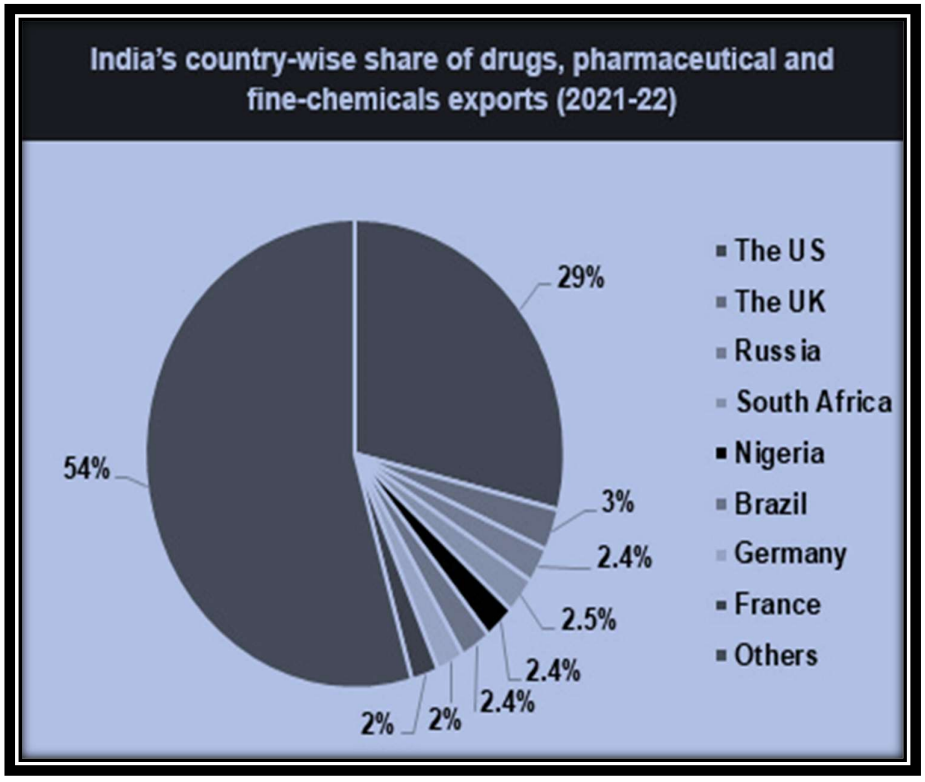


(Source: https://www.ibef.org/)

Export Destination

India exports pharmaceuticals to North America, Africa, the European Union, Latin America and the Caribbean (LAC), the Middle East, Asia, and other European regions. NAFTA, Europe, and Africa account for nearly two-thirds of India's exports. The top five export destinations for the Indian pharmaceutical industry in 2021-22 were the United States, the United Kingdom, South Africa, Russia, and Nigeria. During 2021-22, the United States, the United Kingdom, and Russia are among the top three importers from India, with respective shares of 29%, 3%, and 2.4%. In fiscal year 21-22, India exported pharmaceutical products to the following countries: the United Kingdom (US$ 704.5 million), South Africa (US$ 612.3 million), Russia (US$ 597.8 million), and Nigeria (US$ 588.6 million). Over the last three years, India's pharmaceutical exports to the United States increased at a CAGR of 6.9%. Furthermore, it grew at a CAGR of 3.8% in the UK and 7.2% in Russia over the same period. The number of USFDA-approved facilities stood at 741 as of August 2021. Furthermore, the number of ANDAs won by Indian enterprises until December 2020 was 346. Due to the Covid-19 pandemic, USFDA examinations were not conducted in the last few years; however, the examinations have begun and are expected to increase Indian exports to the US.

Figure 1.7 Country Wise Export



(Source: https://www.ibef.org/)

1.19 CORONAVIRUS IMPACT ON PHARMA SECTOR

The COVID-19 pandemic abruptly forced businesses to operate differently in the pharmaceutical industry, as well as in many other sectors. Manufacturing of pharmaceuticals and biopharmaceuticals faced a number of difficulties in 2022, including issues with formulation and delivery, a lack of skilled labor, and compressed timelines. Integration of advanced technologies is one potential solution to these challenges.

- Almost every sector of the Indian economy has been significantly impacted by the COVID-19 pandemic.
- Supplies chain, the lockdown's restricted connectivity had a major impact on human movement, the transportation of essential products and services, occupation, and the distribution of a variety of commodities.
- According to Dr. P.D. Vaghela, secretary of the Department of Pharmaceuticals (DoP), keeps in close contact with the business community, states, and other departments via email, and WhatsApp groups. A control room was set up in the DoP, the National Pharmaceutical Pricing Authority (NPPA), and video

conferences (VCs) to understand their problems and address them as soon as possible.

- Due to the concern about buying addictive pharmaceuticals, the Indian Pharmaceutical Market increased to 8.9% in March 2020, but it declined by 11% in April and 9% in May.
- In a short period, Indian pharmaceutical companies boosted their research and production of drugs that are effective in treating COVID-19 illness.
- US-based Gilead Lores signed a contract with 6 Indian Pharma Companies to make and market Remdesivir in 127 countries after receiving approval to manufacture and supply re-purposed medicines following studies to curb the outbreak.
- The current vaccine development competition will also bring attention back to the importance of preventive health over restorative health.
- The PM-CARES Fund has been awarded INR 100 crore by the Indian government to help the effort to create a COVID-19 vaccine.
- Dr. K. Vijay Raghavan, Principal Scientific Advisor to the Government of India, claims that over 100 vaccine attempts have been made worldwide, of which about 30 have been in India. Given that demand for these would likely increase in the future years.
- India's comparative advantage in a post-coronavirus world order can heavily rely on it becoming a major supplier of global public goods and services (such as in healthcare, education, and tech-support capacity for innovation).

  <u>In the current scenario, India’s strong advantage lies in:</u>

  - Supporting the ecosystem for research and development while boosting pharmaceutical exports.
  - Investing in the expansion of auxiliary businesses and large-scale pharmaceutical product manufacture.
  - Improving access to secondary and tertiary healthcare that is both good and cheap.
  - Increasing India's "soft power" by assisting other developed and developing countries in boosting their capacities and by sharing technological expertise with them.

1.20 KEY ISSUES IN THE PHARMACEUTICAL INDUSTRY

The employment situation and overall stability of the economy depend heavily on the pharmaceutical sector. The pharmaceutical industry has a long history of helping a lot of people. The market share of Indian pharmaceutical companies worldwide has grown. News about the pharmaceutical industry is crucial not only in developed nations but also in India, where the sector is expanding. But in recent years, issues facing pharmaceutical firms have surfaced. The employment situation and overall stability of the economy depend heavily on the pharmaceutical sector. However, it faces ongoing challenges that call into question the viability of many laboratories.

So, the following are the problems that the pharmaceutical business is facing:

- **Creating new medicines**

  While the pharmaceutical industry has identified numerous treatments, combating new and incurable diseases such as Alzheimer's and cancer is becoming increasingly difficult. Top academics and experts are constantly working on better ways to address health issues. Pharmaceutical companies encounter more issues as they grow in success. Customers are calling for more choices, better medications, and more affordable medications. Additionally, as consumers become more aware of and demand more affordable treatments, therapies, and prescriptions, the pharmaceutical industry is subject to fierce commercial competition.

- **Educated payer**

  Nowadays, consumers have more options than ever before to help them make wise choices. Prior to the internet, it was challenging to compare and gather data; now that it is easy, customers can easily find what they want. These people also look into the financial costs of demand reduction and the statistics of pharmaceutical companies, which causes additional problems for the sector.

- **Scientific productivity has dropped**

  There has been a significant lack of consistency in medicine developed over the last ten years. Most major pharmaceutical companies are incapable of conducting fruitful research, resulting in sub-standard diagnostics. Significant increases in scientific output will be required to recover from this decline in medical production.

- **Marketing and management**

  Another major source of concern for the sector is the vicious and competitive loop of marketing and management.

- **IP Rights can be tricky**

  Intellectual property rights and patent protection are still difficult to enforce in developing nations. Several markets also grant generic medicine makers preferential treatment, making things more difficult for research-focused enterprises.

- **Supply chain breakdowns**

  We find it difficult to believe that a hospital would advise a patient that their course of treatment must be delayed due to medicine shortages or that they are simply unavailable due to logistical issues in the pharmaceutical industry. Unfortunately, due to issues with the pharmaceutical supply chain, this is the world we currently inhabit. It should be noted that these issues existed before the current pandemic, and the financial difficulties confronting the pharmaceutical sector facing shortages.

- **Purchase of software**

  Even though pharmaceutical company executives are constantly looking for ways to improve their operations, technological issues can occasionally cause delays that affect the entire pharmaceutical industry. As a result, they changed their strategy and made the best use of the resources available to them to reduce the difficulties in their pharmaceutical supply chain. Despite the fact that we are in a global digital era, businesses still need to spend money on monitoring software to boost productivity. You can use such software to determine where your product is in the supply chain.

- **Higher transparency**

  Increasing openness has long been a source of disagreement. Research and development is a tried-and-true method for learning more about processes, the people who work on them, and how outcomes are achieved. Furthermore, there was an obvious public interest in and support for the pharmaceutical industry throughout the pandemic, so it was critical to make this known to everyone. While keeping patient identification information private, much effort has been made to share more information about clinical studies. The findings of these trials are extremely valuable. It paves the way for significant advances in science and medicine.

- **The dangers of self-medicine**

  More and more people appear to believe that they know more than physicians. According to studies, self-medicine via Google is at an all-time high, increasing the use of OTC medicines.

1.21 RECENT TECHNOLOGY TRENDS IN PHARMA INDUSTRY

Artificial intelligence and machine learning are essential components of today's pharmaceutical industry, and they will play an increasingly important role in healthcare areas such as diagnostics, epidemiology, and even patient contact.

- **Machine learning and Artificial intelligence**

  Artificial intelligence is becoming increasingly common in the healthcare industry. The market for AI in healthcare is expected to be worth $31.3 billion by 2025. It will grow at a rate of more than 40% per year. The pharmaceutical industry benefits from AI and ML because they offer reasonable data analysis and forecasting potential. Compared to pharma lab employees, artificial intelligence can process enormous amounts of data more quickly and accurately. As a result, pharmaceutical companies can improve the efficiency and standard of their goods.

- **Cloud computing**

  Cloud computing is a recurrent trend for companies across numerous industries. This innovation makes the pharmaceutical sector's work more productive. Due to its scalability, data analysis capabilities, and additional available improved information security, you can store a sizable amount of patient data.

- **Huge data**

  Big data usage is popular in the world of pharmaceutical information technology. Analyzing these data sets can be very advantageous for pharmaceutical companies. Big data analytics can help with pharmaceutical research and the creation of more potential pharmaceuticals. It is possible to create customized medicines by analyzing genomic data. Examining indicators such as average material costs, total medicine spending, and so on can also help to cut costs.

- **Precise medicine**

  Precise medicine is a new development in healthcare. Examining a patient's DNA and lifestyle provides a novel approach to identifying, treating, and avoiding diseases. By 2024, the market for precise medicine will be worth more than $96

billion. The prevalence of bioinformatics, which enables data analysis and highly individualized prescriptions and treatments, is largely to blame for this growth.

- **Blockchain technology**

  Blockchain technology has the potential to significantly benefit the pharmaceutical industry in a variety of ways. For beginners, this invention enables the development of efficient systems for manufacturing and delivering medicines. It also aids in data analysis, which improves medicine development outcomes.

- **Online Learning**

  Employees in the pharmaceutical industry can learn about the most recent developments through digital training. Examples of these include software for keeping track of the electronic administration of medications or an electronic signature. You can implement and expedite some processes in your pharmaceutical company using this technique.

- **Digital therapeutics**

  Patients are treated using digital gadgets and software that is based on scientific research. It lessens or ends drug use. And yet, it is one of the most recent developments in medical technology.

1.22 CURRENT SCENARIO OF THE PHARMA INDUSTRY

Currently, India is the world's largest supplier of generic medicines. The Indian pharmaceutical industry meets more than half of the world's demand for various vaccines, as well as 40% of the US market for generic drugs and 25% of the UK market for all medicines. By volume and value, India is the third-largest pharmaceutical producer in the world. About 10,500 manufacturing facilities and 3,000 pharmaceutical companies make up the domestic pharmaceutical industry. India is a major player in the global pharmaceutical industry. Additionally, the nation has a sizable pool of scientists and engineers who could take the industry to new heights.

Indian pharmaceutical companies currently supply more than 80% of the antiretroviral medicines required to treat AIDS (Acquired Immune Deficiency Syndrome) around the world. In the next ten years, the domestic market is anticipated to triple, according to the Indian Economic Survey 2021. By 2021, $65 billion was projected for the Indian pharmaceutical market, followed by $120 billion by 2024. Biopharmaceuticals, bio-services, bio-agriculture, bioindustry, and bioinformatics are all a part of India's

biotechnology industry. The Indian biotechnology market was worth 64 billion dollars in USD in 2019, and by 2025, it is anticipated to reach 150 billion dollars.

In FY20, India's medical equipment market was worth $10.36 billion. The market is expected to grow at a 37% CAGR from 2020 to 2025, reaching $50 billion cording to CARE Ratings, India's pharmaceutical industry will grow at a rate of 11% per year for the next two years, reaching a value of more than USD 60 billion by August 2021.

The Ministry of Health and Family Welfare received Rs. 73,932 crores (USD 10.35 billion) in the Union Budget 2021–22, while the Department of Health Research received Rs. 2,663 crores (USD 365.68 billion). With Rs. 37,130 crores ($5.10 billion), the government supported the "National Health Mission." A six-year investment of Rs. 64,180 crores would be needed for the PM Atmanirbhar Swasth Bharat Yojana (USD 8.80 billion). Increased by Rs. 2,122 crores (USD 407.84 million) (USD 291.39 million), the Ministry of AYUSH now has Rs. 2,970 crores (USD 407.84 million).

From FY21 to FY30, the Department of Pharmaceuticals launched a PLI scheme to promote domestic manufacturing by establishing greenfield plants with a minimum domestic value addition in four distinct "Target Segments" with a total expenditure of Rs. 6,940 crores (USD 951.27 million). This was done to achieve self-sufficiency and reduce reliance on imports of the country's critical bulk drugs.

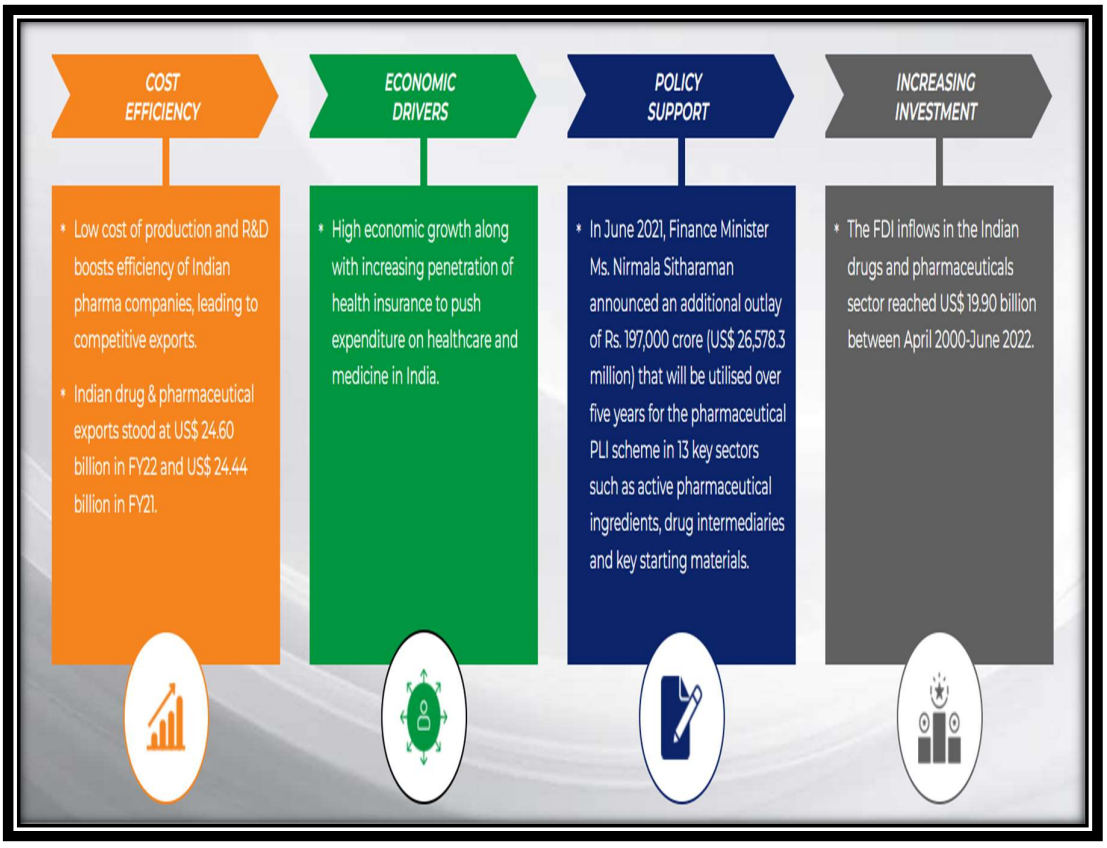
The finance minister, Ms. Nirmala Sitharaman, declared in June 2021 that an additional expenditure of Rs. 197,000 crores (USD 26,578.3 million) would be made for the pharmaceutical PLI scheme in 13 crucial sectors, including active pharmaceutical ingredients, drug intermediaries, and crucial starting materials.

According to an announcement made by Union Health Minister Mansukh Mandaviya in August 2021, the development of anti-coronavirus vaccines by new Indian pharmaceutical companies is expected to begin in October or November 2021. This action is expected to significantly boost the national immunization campaign.

Three pharmaceutical parks would be built there, the Punjab government announced in February 2021. A 1,300-acre pharmaceutical park project with a $1,800 crore budget has been proposed for Bathinda (USD 245.58 million). Wazirabad, Fatehgarh Sahib has received a greenfield project proposal, and Rajpura is getting a second medical park worth Rs. 180 crores (USD 24.56 million).

Moreover, the prime minister envisioned creating an entrepreneurial culture that would position India as a global leader in the development of novel drugs and medical devices. He stated that policy interventions are decided after extensive consultation with all relevant parties. He stated that India's large population of scientists and technologists has the potential to uplift the sector to new heights. In his speeches, the Indian Prime Minister frequently referred to the idea that the entire world is a family as the nation's goal. And the pharmaceutical industry is proving that it is correct. The pharmaceutical industry is a skill-based industry that will require trained pharmaceutical experts to expand in the future. All of the changes in the industry and Indian policy will increase job opportunities. A few multinational pharmaceutical corporations are also establishing headquarters in India to meet regulatory and clinical trial requirements, which is aiding domestic hiring.

Figure 1.8 Current Scenario Of the Pharma Industry



(Source: https://www.ibef.org)

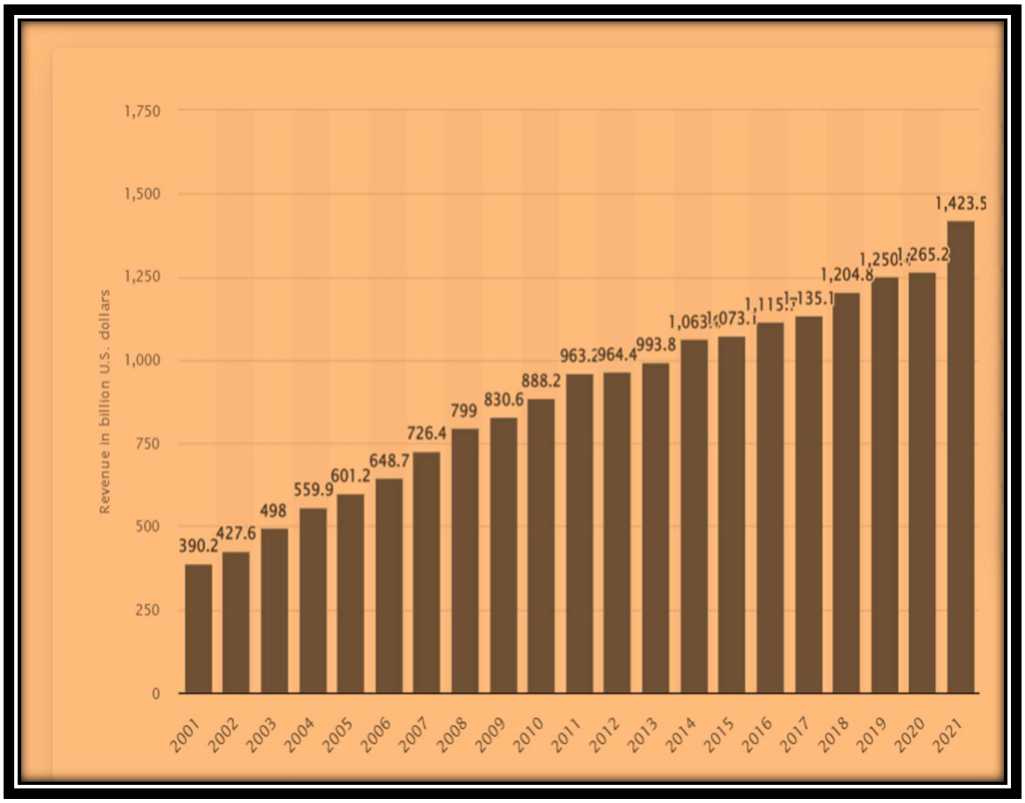
1.23 PHARMACEUTICAL MARKET: WORLDWIDE REVENUE

In recent years, the pharmaceutical industry has grown rapidly. The global pharmaceutical market was worth approximately 1.42 trillion dollars at the end of 2021. This represents a

massive increase over 2001 when the market was only worth 390 billion dollars. The pharmaceutical industry has a significant impact on how people obtain pharmaceuticals and how much they pay for medicines. After the United States, the group of developing markets is now the second-largest market for medicines. Middle and low-income countries such as Brazil, India, Russia, Colombia, and Egypt, may be classified as emerging markets. Despite rising global profits, Latin America accounts for the smallest percentage. Humira, Eliquis, and Revlimid are three of the most widely used pharmaceuticals in today's market. Many of these drugs have been approved for the treatment of various cancers and chronic diseases.

However, some of the most significant spending increases in recent years have been seen in the sales of diabetes and auto-immune medicines. The pharmaceutical industry is in charge of medicine discovery, manufacturing, and distribution. Pharmaceutical sales in the world will reach $1.42 trillion in 2021 as a result of the market's rapid expansion over the last two decades.

Figure 1.9 Revenue Of The Worldwide Pharmaceutical Market From 2001 To 2021

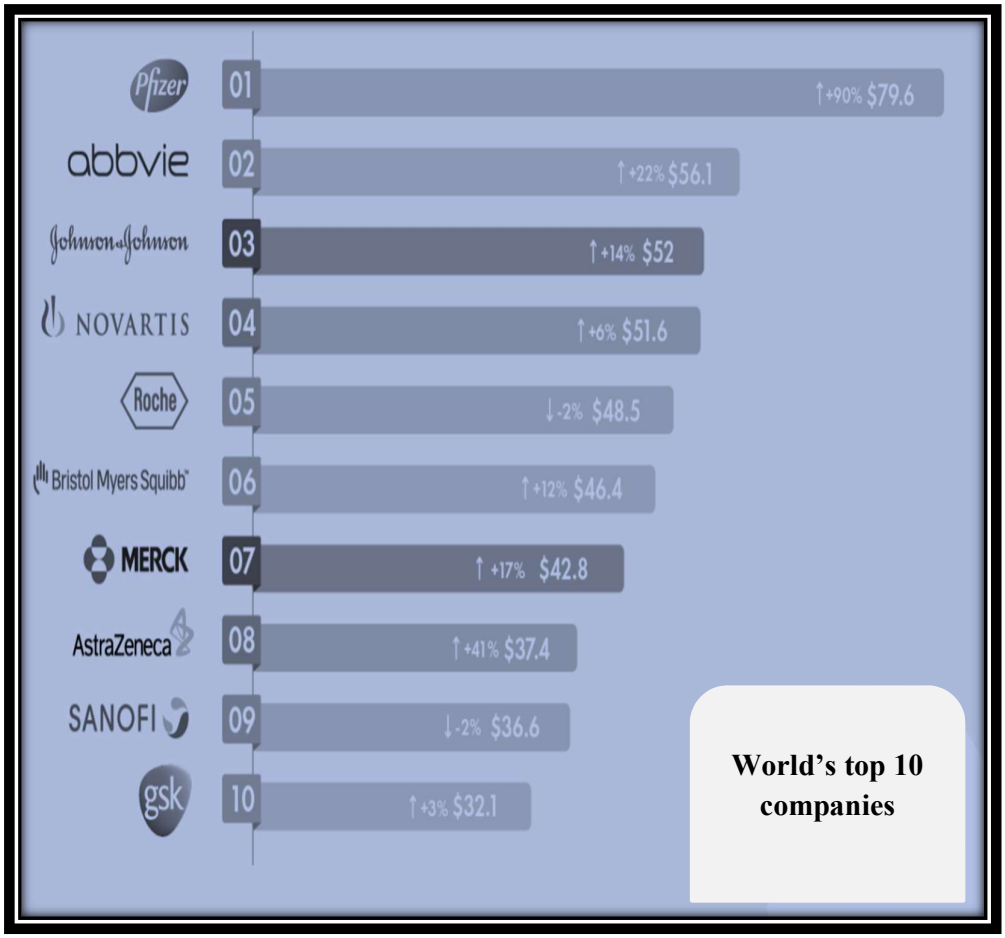


(Source: https://www.statista.com/)

The pharmaceutical market has a global presence, but the world's biggest markets are the US and Europe.

Despite recent growth in China and India, the United States and Europe continue to lead in life science consumption and development, particularly in the pharmaceutical sector. Because of the strong funding prospects and demand for goods and devices in those regions, the largest pharma businesses on Proclinical's list of the top ten pharma companies by revenue are based in the United States and Europe. Patents protect innovative candidates and treatments for dangerous diseases in these two locations, and open systems allow public pharmaceutical businesses to introduce their goods after extensive testing.

Figure 1.10 Top 10 Pharmaceutical Companies In The World (2022)



(Source: https://www.proclinical.com/)

1.24 INDIAN PHARMA SECTOR: SWOT ANALYSIS

The pharmaceutical industry is a significant economic sector with a large customer market. This sector is known for discovering, developing, and manufacturing usable medicines. Pharma companies must adhere to a set of laws that govern the entire process. SWOT analysis in the pharmaceutical sector will aid in industry analysis, allowing one to make the necessary improvements. It also shows what preventative measures should be

implemented to improve the sector. Understanding the SWOT analysis of their company or industry is critical for management executives. A SWOT analysis of the pharmaceutical sector demonstrates to upper management what the sector excels at, what needs to be improved, where growth is possible, and what preventative measures are necessary to safeguard shareholder or company value.

S- STRENGTH

India produces pharmaceuticals that are more efficient and at lower manufacturing costs than those made by other nations. India has a thriving industrial sector that is well-known. Due to technological advancements, India now employs a highly skilled workforce. In addition, a diverse environment is advantageous to the sector.

W- WEAKNESS

Despite the relaxation of FDI restrictions, industry, and government must address the lack of investment in research and development. A significant issue is the lack of collaboration between industry and academia. In comparison to other household expenses, healthcare costs appear insignificant. The pharmaceutical industry is facing competition from the production of low-cost, substandard medicines.

O- OPPORTUNITY

The company is expected to expand rapidly due to improved export prospects. Moreover, a surge in generic drug exports to developed countries is expected. India has a lot of potential to grow and become a global clinical trial hub. India is also expected to have a significant global impact on pharmaceutical research and development (R&D).

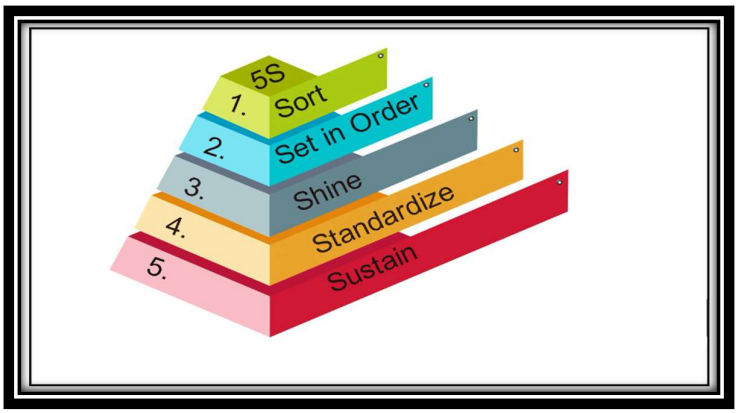
T- THREATS

The product patent policy is one of the biggest obstacles for domestic businesses. The industry needs to put more effort into R&D to address this threat. The Drug Price Control Order issued by the Indian government placed excessive demands on product prices, which had an impact on the profitability of pharmaceutical companies. Small businesses are threatened by the new MRP-based excise duty structure.

1.25 '5S' IN THE PHARMACEUTICAL INDUSTRY

5S is a system for organizing workplaces to ensure that work is done effectively, safely, and efficiently. This method emphasizes putting everything in its proper place and keeping the workplace tidy, which makes it easier for people to do their jobs without wasting time or risking injury. The 5S methodology has spread beyond manufacturing and is now used in a variety of sectors, including government, health care, and pharmaceuticals. It can also be applied in the knowledge economy where media, software, and information replace tangible goods.

Figure 1.11 5 "S" Of Pharma Industry



(Source: https://i.wp.com/pharmastate.academy)

Sort

- Reduce the number of items to save time when searching for something.
- Eliminate any potential confusion caused by extraneous things.
- Make inspection easier.
- Increase the quantity of usable space that is accessible.
- Remove barriers to improve safety.

Set in Order

- It arranges all necessary materials in the best location for them to serve their purpose in the workplace.
- Make the process simple and efficient.
- Set up workstations such that all tools and equipment are nearby, accessible, and arranged logically according to the type of job being done. The frequently used components should be placed closest to the workspace, with components placed according to their purposes.

Shine

- It includes routine sweeps, cleans, and inspects the workspace, equipment, and machinery.
- Lowers waste, increases production process efficiency and safety, and eliminates mistakes and faults.
- Keep the workplace comfortable and safe.
- Maintain a tidy and pleasant working environment.
- Every day, or at another appropriate (high frequency) cleaning interval, clean the workspace and equipment.

Standardize

- Standardize the procedures used to arrange, clean, and sort the office.
- Establish schedules and processes to make sure the first three "S" practices are repeated.
- Make sure each person is aware of their part in the cleaning, organizing, and categorizing.
- Use pictures and visual controls to assist maintain the proper order.

Sustain/Self-Discipline

- Maintain the developed processes through employee discipline.
- Likewise means "do without being told."
- Make sure the 5S method is applied.
- Set up training events.
- Conduct routine audits to verify that all outlined standards are being followed and executed.
- When possible, put improvements into practice. Input from the workforce can be very helpful in identifying improvements.

1.26 CONCLUSION

The pharmaceutical industry in India is significant in every way. India ranks third in the world in terms of output volume and fourteenth in terms of value. The country is the world's leading manufacturer of vaccines and the largest supplier of generic drugs, accounting for 20% of the total supply. India has a robust network of over 10,500 manufacturing facilities and over 3,000 pharmaceutical businesses, as well as the most US FDA-approved pharma plants outside of the United States.

The rise in pharmaceutical R&D spending, technological developments, increased attention to the healthcare needs of emerging nations, the rise in the aging populations, and the infection rates rate of chronic diseases are some of the major factors fuelling the growth of the pharmaceutical manufacturing market.

The Indian pharmaceutical industry offers 60,000 generic products in 60 therapeutic applications. Some of the key sectors are generic pharmaceuticals, over-the-counter medicines, API/bulk medicines, vaccines, contract research, and manufacturing, biosimilars, and biologics.

- The approval of incentives of INR 21,940 crore ($3 billion).
- Market size is anticipated to reach $65 billion by 2024 and over $130 billion by 2030.
- 11–12% is the predicted growth rate (2020-2030).
- Manufacturing costs are 33% less expensive than in Western markets.

Indian pharmaceutical companies produce 60% of the world's vaccines and 20% of their generic medicines and have achieved global success due to their low prices and high quality.

100% Foreign Direct Investment (FDI) is permitted in the pharmaceutical sector under the automatic route for greenfield pharmaceuticals. In the pharmaceutical industry, 74% is permitted automatically, and the remaining 26% is permitted with government permission.

The pharmaceutical industry is a branch of the healthcare industry that deals with medicines. The industry is divided into subfields concerned with drug development, product development, and marketing. Pharmaceutical producers, pharmaceutical marketers, and biotechnology companies fall under these more or less interdependent subfields. The primary goal of the pharmaceutical industry is to provide medicines that aid in the prevention of infections, the maintenance of health, and the treatment of ailments. Because this industry has a direct impact on the global population, several international governmental bodies monitor effects such as medicine’s safety, patents, quality, and pricing.

<u>Following are some of those authoritarian individuals:</u>

- World Health Organization (WHO)
- US Food and Drug Administration (FDA)

- Medicines and Healthcare Products Regulatory Agency (MHRA)

In the exploration, there is a web of regulations. The pharmaceutical industry controls every stage of the life cycle of a drug, including marketing authorization, generic competition, and patent expiration. Laws apply to all physicians, wholesalers, retailers, and manufacturers in the pharmaceutical industry.

Pharmaceutical industry regulators keep an eye on a variety of drug-related issues:

- Quality
- Quantity
- Research and development incentives
- Pricing
- Patents
- Safety
- Market Flow

According to the FDA (US Food and Drug Administration), American consumers have access to the world's safest and most advanced pharmaceutical system. The main consumer watchdog in this system is the FDA's Centre for Medical Evaluation and Examination, which assesses new medications before they are released onto the market. The facility makes sure that both name-brand and generic medications are effective and that their health advantages outweigh any known drawbacks.

The pharmaceutical industry is a significant source of income for the economies of any nation. The Indian pharmaceutical industry has demonstrated great potential and is steadily expanding.

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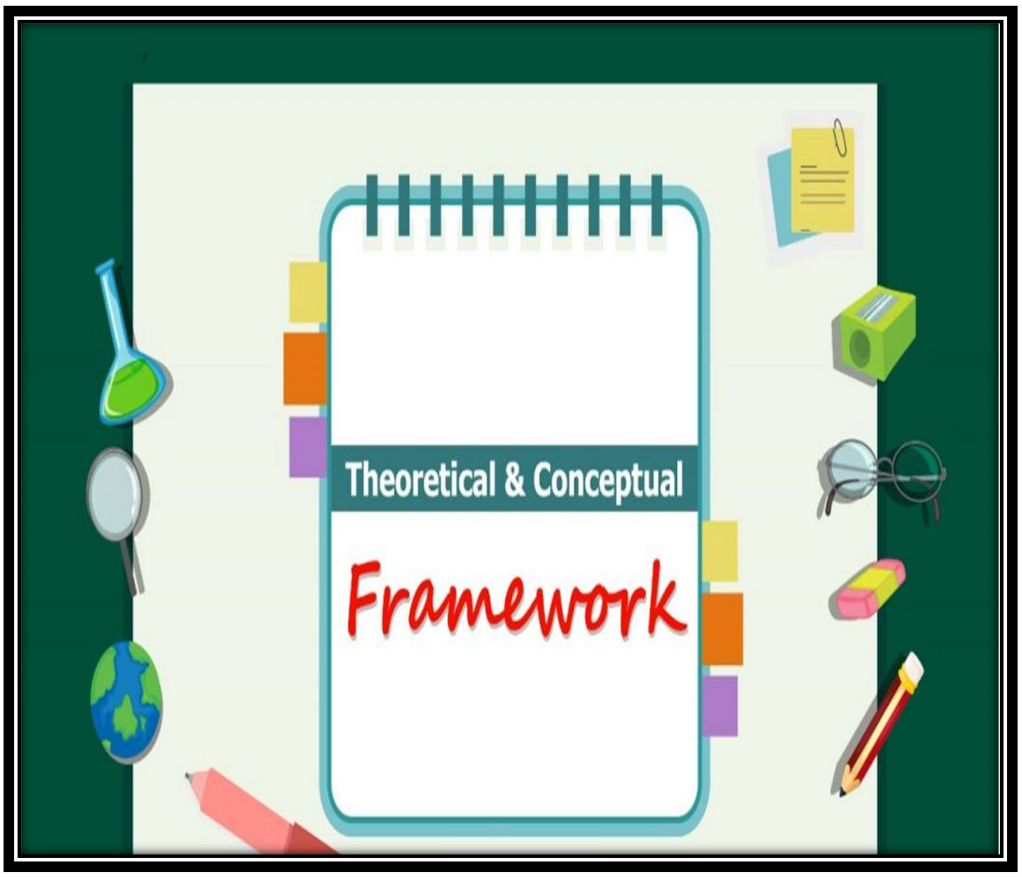
CHAPTER 2

CONCEPTUAL FRAMEWORK OF THE ALTMAN'S "Z-SCORE" MODEL & SAMPLE PROFILE OF COMPANY



CHAPTER 2

INDEX

2.1 INTRODUCTION

A conceptual framework is an analytical tool for organizing and comprehending research. It can be used for projects, analysis, and dissemination of findings within the organization. A conceptual framework portrays what you hope to discover from your research. It outlines the most important aspects of your research and demonstrates how they are related to one another. A conceptual framework is a written or visual representation of how certain variables should be related to one another. Theory construction is the process of developing a logical system of concepts and ideas to describe how a phenomenon works.

The conceptual framework can help all researchers, but qualitative studies require it the most. In these investigations, the researcher frequently seeks to comprehend the complexities of human behavior. The conceptual framework can help in determining the critical elements that must be investigated to respond to a research topic. Adopting a conceptual framework may help you in organizing the novel concepts you come across while conducting research in a new field. If you are conducting mixed-method research, use several conceptual frameworks to help you understand the various perspectives of your data. When working with large amounts of data, a conceptual framework can help you in identifying the most important variables and relationships. It could be useful for clarifying your ideas as you present your research to others.

Financial reporting requires the use of the conceptual framework, which is a crucial instrument. It establishes a link between various financial statements and their components. This speeds up problem resolution and aids in the timely and accurate preparation of financial reports. The financial analysis reflects the evaluation of an entity’s financial performance. It demonstrates the organization's progress under the current leadership. It is a critical tool for assessing the entity's overall health for the specified period and in comparison, to peers. Business governance, profitability trend, fund flow analysis, cash flow analysis, and ratio analysis are generally used to examine financial data.

Evaluation of a performance is a quantitative and qualitative measure of how well an entity has performed in comparison to its objective and peers. Researchers have conducted numerous types of research using various methods to analyze a firm’s financial data, but no common ground on the optimal performance criterion has been reached. Finance analysis is becoming increasingly important as industry, trade, and commerce expand. Markets establish sector wise financial performance standards and criteria to evaluate

performance and its aid in decision-making processes for benchmarking competitiveness. The information revolution brought about by globalization has necessitated the evaluation and treatment of massive amounts of data to convert them into information that will aid in good decision-making.

A business is defined as any initiative that aims to generate profit. As a result of the ability to predict whether a business will succeed or fail before it happens, numerous hypotheses have been spread. As a result of business failure, numerous studies on bankruptcy predictions have been conducted. Declaring bankruptcy affects both businesses and individuals in the modern world. Currently, the bankruptcy issue is a serious concern. Business bankruptcy is an unquestionable declaration of a company's inability to continue with its current business activities in light of its existing financial obligations.

During the financial crisis of 2008 and 2009, linked defaults and bankruptcies created a major risk in the banking industry, which harmed the whole global economy. As a result, accurate forecasting of company failure may be critical and of great interest to a wide range of relevant financial actors.

2.2 THE CAUSES OF CORPORATE FAILURE

A corporation is an organization whose shareholders elect a board of directors to manage its operations.

The term "corporate failure" refers to a company that ceases operations due to an inability to generate enough profit or revenue to cover operating expenses. It happens as a result of poor management, incapacity, and misguided marketing strategies. Corporate failure occurs when a company is unable to align itself with the path of growth and development in order to fulfill both its legal and financial commitments.

Corporate failure is a global phenomenon that affects both developed and developing countries. However, compared to a developed economy, the failure rate of businesses in emerging economies is higher. It is difficult to pinpoint the precise cause of corporate bankruptcy due to differences in social, economic, and political environments across countries, as well as accounting standards and capital structure. The recent collapse of the bitcoin exchange FTX is a prime example. This is the most recent example of a corporation failing as a result of intentional fraud or reckless risk-taking, and when FTX fell in November 2022, the larger cryptocurrency market was also heavily affected.

The following are the reasons responsible for corporate failure:

- **EBITDA falls short of interest**

  When an organization's EBITDA (Earnings before Interests and Taxes and Depreciations and Amortizations) falls below its interest costs, it is in financial trouble. Fixed-cost debt is substituted for owner equity in the financial leverage process to increase equity returns. As a company's debt-to-equity ratio rises in its capital structure, it becomes less financially stable and more risker than one with no or lesser debt. Whether a company has enough capital to pay for its anticipated future activities is referred to as capital adequacy. The ability to raise additional debt or stock must be effective if the company's capital is insufficient. The most common definition of a corporation's debt capacity is the maximum amount of debt that can be effectively assumed and repaid from ongoing operations.

- **Company image**

  Trying to project a high-profile image by renting expensive office space and designing a stunning logo and website won't do much to benefit your business. The most crucial guideline for any company's success is to keep overhead costs low, especially when it's first getting started. You may go out of business very quickly due to high overhead costs brought on by website maintenance costs. The capacity to adjust to new trends and ideas is essential for maintaining a successful business.

- **Ineffective business planning**

  Before receiving loans or financial assistance, many new businesses need to create a business plan to show to a bank. The amount of time and effort put into these activities determines their success. The company is likely to face difficulties as a result of insufficient planning or inaccurate information that served as the foundation for the strategy. For example, if a company conducts minimal market research and expects to sell 2,000 units per month in the first year but only sells 500, it will soon be cursed.

- **Demand forecasting**

  Sales declines could be a sign that the product, the pricing, or another element of the marketing mix is deceptive. Sometimes a rival offering a superior product or service results in a drop-in sale. If the economy is struggling, people might not have enough money to buy the company's goods or services. The business needs to be aware of shifting consumer preferences, technological advancements, and vogue

trends that could lower product demand. Demand may decrease for reasons outside of the company's control. It might be brought on by a shift in the nation's economic situation.

- **Uncontrolled growth**

  Uncontrolled business growth may also lead to its eventual downfall if not properly managed. Obesity is a concern, both for one's health and business. Proper planning is required even for a growing company. For successful expansion, a competent management team, a flexible organizational structure, effective procedures, and controls are required.

- **Rise in costs or lack of control over costs**

  Several factors could drive up production costs. A company may have to spend money to comply with new regulations or standards, salary, the cost of raw materials may have increased, and so on. A company may frequently prepare for and account for such changes, but if the costs rise suddenly, the company may be caught off guard and face insolvency.

- **Improper cash flow maintenance**

  This is frequently the primary cause of business failure for many small and newly established businesses. A problem occurs when the revenue generated by sales is insufficient to cover the costs of manufacturing. It is essential to keep in mind that having the funds available to pay debts when they are due is more important than simply making enough money to cover bills over a year. You also risk losing relationships with your business partners if you miss your credit timeframes. As a result, you may receive poor service or lose the client altogether.

- **Other factors**
  - Managerial inefficiency is a significant common cause of a firm's suffering. It is a fundamental issue with the company's poor management.
  - Running out of cash and other liquid assets is the primary cause of bankruptcy.
  - Increased debt investment is a factor in company failure.
  - Deregulation of industries implies that regulated sectors are not protected.
  - Due to the fact that not all businesses have the resources or opportunities to adjust to the ongoing change and restructuring brought on by the development of new products, technologies, and innovation, increased

international competition may have a negative effect on some industries. Therefore, this increased global competitiveness may lead to an increase in insolvency.

2.3 MEANING OF FINANCIAL DISTRESS

The "inability of a corporation to satisfy its financial obligations as they mature" is a definition of financial distress (Beaver, 1966)[6].

Financial trouble comes in two ways:

- Debt restructuring
- Default on debt payments

Debt restructuring is a method management uses to reduce the risk of default when faced with financial distress (Andrade & Kaplan, 1998)[6].

A company can be deemed to be in crisis when management is exploring debt restructuring to prevent more defaults (Brown et al., 1993)[6].

2.4 EXPLANATION OF BANKRUPTCY AND RELATED TERMS

When filing for bankruptcy, people who are unable to pay their debts can start over by either creating a repayment plan or selling assets to pay off their debts. Bankruptcy laws also protect businesses in financial distress.

Failure isn't an unexpected occurrence, according to Outecheva.N. (2007)[6]; rather, it's an entire life cycle of firm failure that constantly increases in various stages. Before teetering on total disaster, a company goes through various stages. As time goes on, these insolvency phases become much harsher, and every stage of the company's life cycle is connected to various elements. Therefore, the study of the failure forecast has become important in this regard. If the company believes that the aforementioned is moving toward the total bankruptcy stage according to the insolvency life cycle, it will take impulsive protective measures to maintain its solvency. Early recognition of financial crises can help businesses avoid incurring significant insolvency costs.

Costs associated with corporate failure are typically classified as direct and indirect. When a company is in financial trouble, it focuses solely on survival while simultaneously losing its most valuable employee. The cost of this procedure is referred to as an indirect cost. While all of the advisory services come under direct costs such as accountant fees, attorney

fees, legal costs associated with filing court documents, restructuring consulting services, etc. The company's goodwill expenditures while winding up also increase the direct cost. Direct costs rise in direct proportion to winding up procedure time.

According to Warner, J.B. (1977)[2], the average direct cost a company incurs as a result of a financial crisis is 4% of the company's value one year before failure. By direct cost, we mean the payment of legal fees, professional service fees, trustee's fees, and so on.

According to Higgins (2007)[2], financially troubled organizations that attempt to reduce marketing research budgets and R&D costs frequently end up with less favorable loan terms and are more vulnerable to aggressive rival tactics.

Financial difficulties may lead to a corporation's bankruptcy, which could harm the economy and have several other negative consequences, including a decrease in tax revenue to the government. Before going bankrupt, a company must go through several tough situations. To avoid a bankruptcy scenario, it is critical to identify specific events that can be used as early warning signs.

Altman and E. Hotchkiss (2006)[2] identify four fundamental terms:

- Bankruptcy
- Default
- Insolvency
- Failure

This is distinct from how they are used in formal contexts. Dun and Bradstreet continue to use business failure as the starting point for justifying failed business ventures. This term refers to voluntarily leaving a business with outstanding guarantees, foreclosing on the property, or executing a court order, all of which result in a loss to creditors, according to Dun & Bradstreet. Technical insolvency can occur when a company lacks the liquidity to meet its current obligations.

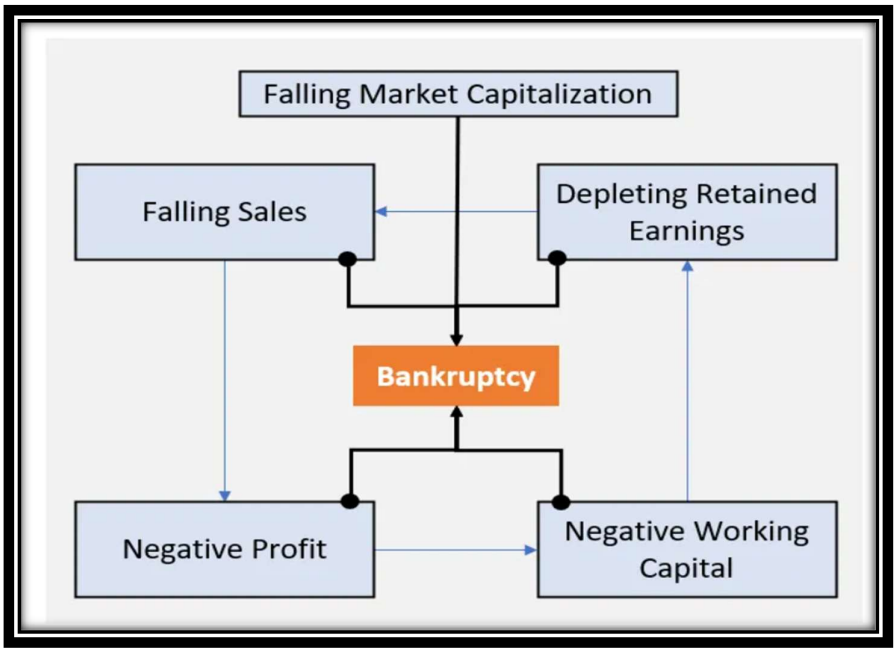
Default is another term commonly associated with commercial bankruptcy. Aside from technical issues, there is always a legal default in the debtor-creditor relationship. If the debtors violate the contract's terms, it is considered a technical default and is punishable by law. Because it involves an urgent situation, liquidation in the context of financial difficulty is risky. This is evident when the fair value of the company's assets is less than the sum of its liabilities. As a result, the company's performance suffers.

A thorough valuation investigation is required for the detection of technical distress. In a legal sense, the term "bankruptcy" is synonymous with “insolvency”.

5 Largest bankruptcy cases of the last 20 years

1. Lehman Brothers
2. Washington Mutual
3. WorldCom
4. General Motors
5. CIT Group, INC

Figure 2.1 How Does Bankruptcy Occurs?



(Source: https://getmoneyrich.com)

According to Altman (2000)[2], the early warning indicators should be evaluated and comprehended to estimate and escape financial insolvency and avoid bankruptcy. From the company’s perspective, bankruptcy has costs that are both direct and indirect, and it has an adverse impact on all shareholders. There is no safeguard against spotting financial hardship and insolvency if there are no earlier warning indications.

Due to this scenario, indirect and direct costs significantly rise, making it difficult for the organization to improve its financial position.

2.5 NEED FOR BANKRUPTCY PREDICTION MODEL

The need for a bankruptcy prediction model stems from the fact that bankruptcy can have major consequences for both businesses and their stakeholders. Bankruptcy can result in the loss of assets, the closure of operations, and the loss of jobs for businesses. Bankruptcy can result in the loss of investments and the non-repayment of loans for stakeholders such as shareholders and creditors.

A bankruptcy prediction model can be used to identify companies that are likely to fail before they do. Investors, creditors, and other stakeholders can then use this information to make more informed decisions about the companies in which they are involved. For example, investors may choose to sell their shares in a company that is in danger, whereas creditors may choose to renegotiate the terms of their loans. A bankruptcy prediction model can also be used by businesses themselves as a tool for early detection of financial distress and taking preventive measures to avoid bankruptcy.

In a nutshell, the main advantage of a bankruptcy prediction model is that it can be used to identify and mitigate the risks associated with bankruptcy, thereby reducing the negative impacts on businesses and their stakeholders.

2.6 BANKRUPTCY PREDICTION MODELS

A stage of a company's financial downturn known as financial distress can eventually result in bankruptcy if left unchecked. Before that happens, a financial difficulty raised within a company can be investigated. The sooner financial hardship is recognized, the better it is for the organization’s management to implement changes right away. As a result, businesses must assess in order to forecast the likelihood of impending financial difficulty and take appropriate action.

Alternatives for dealing with financial difficulties include:

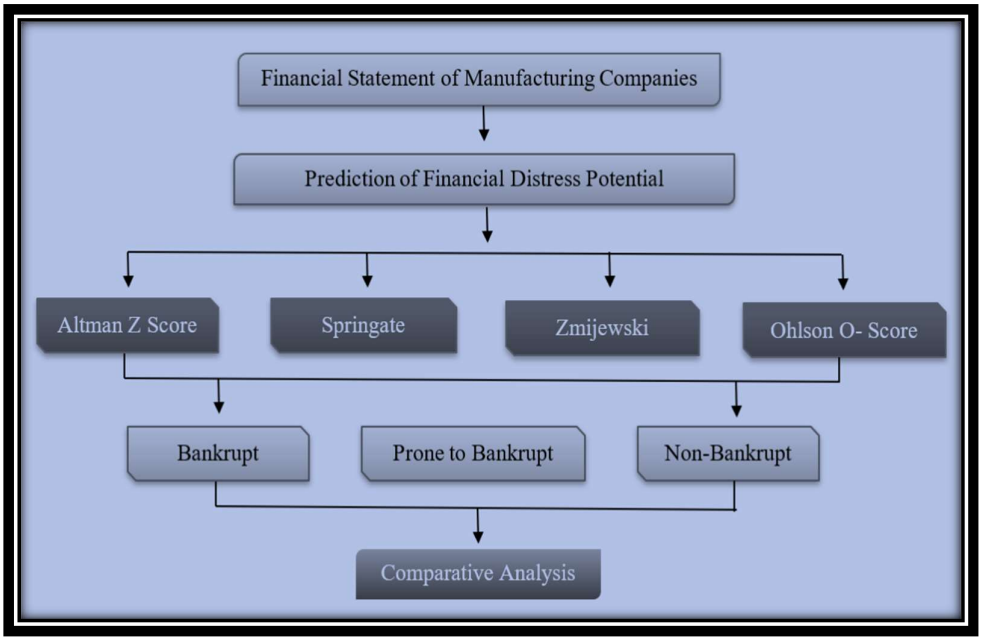
1. If the problem is not too serious and the company only has a temporary problem, an internal remedy is used by requesting a debt maturity extension and lowering the bill amount.
2. When a problem is drastic, a formal solution is implemented; the creditor requires security guarantees, so they reorganized the capital structure to become a respectable capital structure and liquidated the company if it couldn't continue, which would entail selling its assets.

For bankruptcy analysis, there are several models available, here we will understand the Altman, Zmijewski, Springate, and Ohlson models.

Springate Model

- Gorgon L.V. Springate created the model in 1978. Following Altman's method, Springate employs step-wise multiple discriminate analysis to select 4 of the 19 widely used financial ratios to distinguish between companies that are safe or bankrupt.
- The Springate Model is written as follows:
  S = 1.03X1 + 3.07X3 + 0.66X6 + 0.4X5
- If the cut-off value of S is less than 0.862, it is bankrupt; if S is between 0.862 and 1.062, it is not bankrupt; and if S is greater than 1.062, it is safe or in a healthy position.[5]

Figure 2.2 Framework of Different Financial Distress Prediction Models



(Source: https://eprajournals.com/IJMR/article/2262/)

Zmijewski Model (X-Score)

- In order to find a reason for bankruptcy, Zmijewski (1983) reviewed the findings of twenty years of prior research. A few financial ratios were chosen from the previous study.
- F-test indicators such as Rate of Return, liquidity, leverage, turnover, fixed payment coverage, trends, firm size, and stock return volatility are used to distinguish

between healthy and unhealthy companies. Between 1972 and 1978, they sampled up to 75 bankrupt companies as well as 3573 healthy companies.

- The model developed by Zmijewski is as follows:
  X-score = -4.3 - 4.5X7 + 5.7X8 - 0.004X9
- Cut-off at zero (0). If the X-Score falls below the cut-off point, the company is in good shape. Unfortunately, the corporation is in financial difficulty because the X-Score exceeds the cut-off point.[5]

Ohlson Model (O-Score)

- Dr. James Ohlson of the New York University Stern Accounting Department proposed the multi-factor Ohlson O-score for forecasting bankruptcy in 1980, in contrast to the Altman Z-score.
- The Ohlson O-score is a 9-factor linear combination of coefficient-weighted financial ratios that can be easily obtained or extrapolated from the periodic financial disclosure statements of publicly traded companies.
- Two of them are frequently regarded as dummies because they typically have zero values and thus have no effect on the formula.
- When using an O-score to determine the likelihood of a company failing, the exp (O-score) is divided by 1 + exp (O-score). [1]
- The cut-off value for this model is 0.5. If a company's O-score exceeds 0.5, this cut-off is meant to suggest that it will likely experience financial difficulties within the next two years. The company is not likely to be in financial distress if its O-score is less than 0.5.

<u>To check the financial health of selected pharma company's researcher will use Altman's Z-score Model.</u>

- Each model has benefits and drawbacks, and the model chosen will be determined by the specific circumstances and data available.
- The Altman Z-score model is a financial distress prediction model used to predict a company's likelihood of going bankrupt.
- The likelihood of bankruptcy was calculated using a combination of financial ratios and the Altman Z-score model. The model uses ratios such as working capital to total assets, retained earnings to total assets, market value of equity to book value of debt, etc.

Altman used different Ratios in his model. So, the first thing we need to understand is ratio analysis. We obtain ratios while doing the financial statement analysis, so first, we take a look into financial statement analysis.

2.7 FINANCIAL STATEMENT ANALYSIS

The process of examining a company's various financial records in order to make an informed business decision is known as financial statement analysis. External stakeholders use it to evaluate an organization's overall health as well as its operating results and market value. For internal stakeholders, it acts as a monitoring tool for managing funds. Financial statement analysis entails analyzing financial reports to comprehend an organization's financial position.

Key Points

- Internal and external stakeholders utilize financial statement analysis to assess the worth and effectiveness of an organization.
- All businesses are required to produce balance sheets, income statements, and cash flow statements, which serve as the foundation for financial statement analysis.
- Mainly three methods used by analysts to evaluate financial accounts are ratio analysis, vertical analysis, and horizontal analysis.
- Analyzing financial statements enables one to keep track of where money, goods, and services are spent.

  Analysts will typically use three main techniques to analyze a company's financial records.

  - The process of comparing current financial data to previous reporting periods is referred to as horizontal analysis, also known as "trend analysis," and it allows you to see how different financial metrics have changed over time.
  - Second**,** vertical analysis examines various financial statement elements. For instance, a cost item might be stated as a percentage of revenue generated by the business.
  - Third, Line-item data is compared in ratio analysis, which is a crucial part of fundamental equity analysis. Earnings per share, dividend yield, and P/E ratios are a few examples of line item ratio analysis.

2.8 RATIO ANALYSIS

One of the most important and popular techniques for assessing a company's financial health is ratio analysis. The process of evaluating data from one section of a financial report in relation to data from another is known as ratio analysis. The management can use this tool to help them make wise decisions. Understanding the firm's effectiveness and liquidity is useful. Ratio analysis is an accounting technique that uses financial statements such as income and balance sheets to shed light on a company's financial situation.

Meaning

- Financial ratio analysis is the study of how financial information in financial statements relates to one another to better understand the firm's financial performance and condition.
- A ratio is the relationship between two or more items as well as the specified quotient of two mathematical expressions.

You can learn information about a company's health from a variety of ratios.

These are primarily classified as follows:

1. **Profitability ratios:** These ratios shed light on a company's profitability. The return on equity, gross profit ratio, return on equity, break-even point, and return on net assets are a few crucial profitability ratios.
2. **Liquidity Ratios**: A company's liquidity is a key factor in determining its ability to continue operating, and liquidity ratios give information about a company's liquidity. The cash coverage ratio, current ratio, and liquidity index are three of the most crucial liquidity ratios.
3. **Activity Ratios:** Activity ratios reveal how efficiently a company is using its resources. Several important activity ratios include the turnover rates for accounts payable, accounts receivable, inventory, and working capital.
4. **Leverage Ratios**: Leverage ratios reveal how much a company is reliant on debt to stay in business. A few critical leverage ratios are debt to equity, debt service coverage, and fixed charge coverage.

Once a ratio has been calculated for the current period, you can compare it to earlier periods to see how the company has changed over time. It is also possible to compare the ratio to industry standards to see if the company is underperforming or outperforming.

2.9 ALTMAN'S Z-SCORE MODEL

Sample Selection

The initial sample consists of 66 corporations, with 33 companies in each of the two groups. Manufacturers who filed a bankruptcy petition under Chapter X of the National Bankruptcy Act between 1946 and 1965 are included in the bankrupt (distressed) Group 1 companies. The optimum choice would not be 20 years because typical ratios do change over time.

Realizing that this group is not entirely homogeneous (because of variances in industry and size), He made a conscious effort to choose nonbankrupt (non-distressed) businesses. A paired sample of manufacturing companies was selected for Group 2 using a stratified random basis. The companies are divided into groups according to size and industry, with a limit on asset sizes ranging from $1 to $25 million. The average asset size of the businesses in Group 2 ($9.6 million) was slightly higher than that of Group 1, but it didn't seem necessary for the two groups to have the same asset sizes.

The data used in the initial sample test was taken from financial statements that were issued one annual reporting period before bankruptcy. The information came from selected yearly reports as well as Moody's Industrial Manuals. The financial statements had a lead time of about seven and a half months on average.

Variable Selection

Data from the balance sheet and income statement are gathered after the initial groupings are identified and the enterprises are chosen. Due to the vast number of variables that were discovered to be important indicators of business difficulties in previous studies, a list of 22 potentially useful variables (ratios) was compiled for examination. The Ratios are classified into five traditional ratio categories: liquidity, profitability, leverage, solvency, and activity. There are a few "new" ratios in this analysis, and the ratios were selected based on their popularity in the literature and potential usefulness to the study.

The Final Discriminant Function Is As Follows:

$Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5$

Where,

- X1 = Working capital/Total assets,
- X2 = Retained earnings/Total assets,
- X3 = Earnings before interest and taxes/Total assets,

- X4 = Market value equity/Book value of total liabilities,
- X5 = Sales/Total assets

Clarification

Several people have discovered that the model can be more easily specified as Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5. The first four variables (X1-X4) in this formula are replaced with the more commonly used percentage, such as 0.10 for 10%, and the final coefficient is rounded off to equal 1.0. (from 0.99). The model correctly classified 95% of the entire sample with only 6% type I error and 3% type II error, which is truly remarkable

Understanding of The Ratios Used in the Formula

1. **X1- Working Capital/ Total Assets Ratio**

   The working capital/total assets ratio is a measure of the firm's net liquid assets in relation to total capitalization. The difference between current assets and current liabilities is referred to as working capital, whereas total assets include both current and non-current assets. This ratio places a strong emphasis on the liquidity and size of an organization. A company with ongoing operating losses will frequently see its current assets decline in relation to total assets.

2. **X2- Retained Earnings/ Total Asset Ratio**

   Retained earnings are the total of a company's reinvested profits or losses. It can be found in the Shareholders Equity column of the Balance Sheet. Studies show that business failures are much more likely to occur in the early stages of a company's existence because many of these enterprises are still new and haven't had a chance to build up their cumulative revenues. As a result, it stands to reason that new businesses are more likely to default on their financial obligations.

3. **X3- Earnings Before Interest and Tax / Total Assets Ratio**

   This ratio is a measurement of the actual asset productivity of the company, unaffected by taxes or leverage. This ratio appears to be especially appropriate for research on corporate failure because a company's ability to survive in the long run depends on the earning potential of its assets. Additionally, when the total liabilities exceed the fair market value of the company's assets, insolvency in the sense of bankruptcy results. We'll demonstrate how this ratio consistently performs better than other profitability metrics like cash flow.

4. **X4- Market Value of Equity/ Total Liabilities Ratio**

   The market value of equity is the sum of the market values of all equity and preference shares. The total liabilities include all of the firm's current and non-current liabilities. The indicator shows how much the firm's assets can depreciate before the liabilities outweigh the assets and the company goes bankrupt (measured by the market value of equity plus debt).

5. **X5- Total Sales/ Total Assets Ratio**

   The capital-turnover ratio is a common financial measure used to evaluate a company's ability to generate revenue from its assets as well as its management's ability to manage difficult market conditions. The corporation's income statement classifies sales as revenues. Use net sales, after deducting returns, allowances, and discounts. According to Altman, the Z-Score for manufacturers' X5 ratio is extremely significant while being the least significant of the ratios on an individual basis.

Results Two Statement Before Bankruptcy

The second test assesses the model's ability to differentiate between organizations based on information gathered from two statements prior to financial difficulty. The two-year period is overstated because the correctly classified firms' average lead time is roughly 20 months, with two firms having a lead time of only 13 months.

Since bankruptcy is less likely to occur and the warning signs are less obvious, it is understandable that accuracy has decreased. Nonetheless, the 72% accurate assignment indicates that bankruptcy could be predicted two years in advance. Even though the Type II error is slightly higher (6% vs. 3%), this test is still very accurate. Additional tests will be performed to determine how well bankruptcy can be predicted up to five years in advance.

Testing the Model For Further Period Distressed Firm Samples

Altman looked at 110 bankrupt firms from 1976 to 1995, 120 from 1997 to 1999, and 86 struggling businesses from 1969 to 1975 in three additional studies. As a result, he discovered that the Z-Score model was between 82% and 94% accurate with a threshold score of 2.675.

The accuracy of the Z-Score model on samples of troubled enterprises has ranged between 80-90% in repeated tests up to the present, based on data from one financial reporting period prior to the bankruptcy (1999). However, the Type II error (classifying a firm as distressed when it does not go bankrupt) has increased significantly, with as many as 15-20% of all firms and 10% of the largest firms having Z-Scores less than 1.81. Instead of 2.675, he recommends using the lower bond of the zone-of-ignorance (1.81) as the cut-off Z-Score.

Secondary Sample of Non-bankrupt Firms

Up until this point, the sample companies were either selected based on their bankruptcy status (Group I) or based on how closely they resembled Group I in all respects except for their financial health. But what about the numerous businesses that experience temporary profitability issues but do not go bankrupt? An illustration of a Type II error is the bankruptcy classification of a company belonging to this group.

A sample of 66 businesses—33 from each year—is chosen based on net income (deficit) reports from the years 1958 and 1961 in order to conduct the aforementioned test. In the previous three years, two or three of these businesses—more than 65%—had experienced negative profits. The only two criteria used to select the companies were that they were manufacturing businesses that suffered losses in either 1958 or 1961, regardless of the size of their assets.

The findings reveal that 52 of the 66 companies were correctly classified, leaving 14 of them in the category of bankrupt. As a result, 79% of the sample firms were correctly classified by the discriminant model. 10 of the 14 misclassified firms in this secondary sample have Z-Scores between 1.81 and 2.67, indicating that while their bankruptcy is predicted to occur, it is not as certain as it is for the vast majority of bankrupt firms in the initial sample.

Long Range Accuracy

The previous findings provide critical support for the validity of the conclusions drawn from the original firm samples. A suitable extension would be to examine the discriminant model's overall performance over a longer period prior to bankruptcy. In order to answer this question, data from the 33 original company's third, fourth, and fifth years prior to bankruptcy are collected.

For a single data point, one would expect that the relative predictive power of any model would diminish as the advance time increased. This remained true for both the multiple discriminant models and the aforementioned univariate studies.

According to the findings, the Z-Score model is a reliable predictor of failure up to two years before distress, but accuracy drops noticeably as lead time increases. A trend analysis was also performed on each of the individual ratios in the model.

The two main findings of this trend analysis are as follows:

1. All observable ratios show a downward trend as bankruptcy approaches, and
2. The majority of these ratios experienced their most significant change between the second and third years before the bankruptcy.

Altman has tested the Z-Score model for various sample lengths over the last 30 years. The accuracy in each test ranged from 82 to 94% using a cut-off score of 2.67 based on information from one financial statement prior to bankruptcy or default on existing debt. In fact, in the most recent test, based on 120 companies that missed payments on publicly traded debt between 1997 and 1999, the default forecast accuracy rate was 94%. (113 out of 120). Even with a more conservative cut-off of 1.81, the accuracy rate remained impressive at 84%. The original sample's accuracy, which was based on the data used to build the model, is comparable to the accuracy of the 94%, 2.67 thresholds.

Those interested in applying the Z-Score model have probably asked him this question the most often: "What should we do to apply the model to enterprises in the private sector and non-manufacturing sector?

As a result, he created models for both:

1. Non-Manufacturing Market
2. Private Manufacturing Companies

Table 2.1 List Of Altman Models With Relevant Firms

Name	Model	Applicable Firms
Z- Score	1.2X1+1.4X2+3.3X3+0.6X4+0.999X5	Public Manufacturing Companies
Z1- Score	0.717X1+0.847X2+3.107X3+0.42X4+0.998X5	Privet Manufacturing Company
Z2- Score	6.56X1+3.26X2+6.72X3+1.05X4	Emerging Markets/Non-Manufacturing Companies

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

For privately held manufacturing enterprises, the latter two equations (Z1, Z2) are frequently referred to as the Altman model, while the zones of discrimination for companies are given in below table no 2.2.

Table 2.2 Zone-Wise Values

Zones	Z	Z 1	Z 2
Safe Zone	Z > 2.67	Z > 2.9	Z > 2.6
Grey Zone	1.81 < Z < 2.67	1.23 < Z < 2.9	1.1 < Z < 2.6
Distress Zone	Z < 1.81	Z < 1.23	Z < 1.1

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

To calculate the Z-Score, each financial ratio is multiplied by the appropriate coefficient, and the results are then added. A company with a Z-score of -2 is in worse shape than one with a score of 1, so the lower the score, the greater the likelihood of a financial crisis.

Table 2.3 Year-Wise Models And it's Cut Off

Coefficients Variables	Original Model (1968)	Revised Model (1983)	Revised Model (1993)
X1	1.21	0.717	6.56
X2	1.41	0.847	3.26
X3	3.30	3.107	6.62
X4	0.60	0.42	1.05
X5	0.999	0.998	N/A
Cut Off Scores	< 1.81	< 1.23	> 1.10
Non-Bankrupt Firms	> 2.67	> 2.90	> 2.60
Grey Area	1.81 to 2.67	1.23 to 2.90	1.10 to 2.60

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

Limitations And Problems In The Z- Score Model

- A significant limitation of the Z-Score is that it does not account for companies with negative working capital. When working capital is negative, it means that current liabilities exceed current assets. This fact is a strong indicator that the business may be facing serious financial difficulties, which is why it is included in the Altman calculation. This is ambiguous, though, as it can also indicate managerial or business effectiveness. For instance, it might be a company with low inventories and accounts receivable (which means they operate on effectively a cash basis). There is no trustworthy adjustment factor that has been used to eliminate "good" negative working capital companies, as far as we know.
- The Z-Score models have proven to be a reliable tool for predicting corporate failures in a variety of situations and markets. With total asset values ranging between $1 million and $25 million, Altman used data from comparatively small businesses. When predicting financial trouble, the models should only be used for companies that are comparable to those in Altman's samples.

- The model's calculation is dependent on the samples. Thus, such situations might only occasionally provide clear and precise data, casting doubt on the Altman z score's accuracy.
- As the business and financial landscape continues to change, companies are sometimes exposed to different types of risk, which has an impact on profits and aspects. Therefore, making a prediction based on historical data in such situations will not produce the desired outcome.
- Altman z score accuracy is also questioned because it cannot foresee when a company will go out of business. The whole concept gives an idea about predictions only.

SAMPLE PROFILE OF COMPANY

2.10 TOP 10 PHARMACEUTICAL COMPANIES OF INDIA IN 2021-22

Sample: Top 10 pharmaceutical companies listed in the BSE based on "TOTAL NET SALES" in the year 2021-22.

A pharmaceutical company is a commercial organization that creates, markets, and distributes medicines for the medical industry. They can sell both generic and brand-name medicines. The pharmaceutical industry has gained both praise and criticism since its founding at the turn of the 20th century. It has since developed into one of the most lucrative and significant industries worldwide. With a market share of 20% and a bulk density proportion of 3.5% of all pharmaceutical exports, India comes in third place globally as a supplier of generic drugs. India, which accounts for 20% of all international exports, is the world's top supplier of generic medications, satisfying more than 50% of global demand for various vaccinations and 40% of US demand for generic goods.

Table 2.4 Top 10 Pharmaceutical Companies

NAME OF THE COMPANY	NET SALES [RS. CR.]
1. SUN PHARMA	15585.98
2. DR. REDDY'S LABS	14,405.20
3. CIPLA	13091.79
4. LUPIN	11771.67
5. AUROBINDO PHARMA	11287.14
6. DIVIS LAB	8879.82
7. ALKEM LAB	8829.81
8. GLENMARK	8141.58
9. ZYDUS LIFE	7981.90
10. TORRENT PHARMA	9742.32

(Source: https://www.moneycontrol.com/)

2.10.1 Sun Pharmaceutical Industries Ltd.

Table 2.5 Sun Pharma's Basic Information

Founder	Dilip Shanghvi
Established in	1983
Headquarter	Mumbai, Maharashtra, India
Products	Pharmaceuticals, Generic drugs, Over-the-counter drugs, vaccines, diagnostics, etc.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://medicinespatentpool. Sun-Pharma.png)

Vision

Sun Pharma wants to reach people and change their lives around the world as a leading provider of valuable medicines.

Mission

To serve society, Sun Pharma will make the most of its resources such as people, knowledge, and networks by addressing the needs of the communities and thus sparking general development. As a multinational pharmaceutical corporation, the company is convinced that responsibility and business go hand in hand.

Diversified Specialty and Generics Portfolio

- Sun Pharma manufactures and sells a diverse range of pharmacological formulations for both chronic and emergency treatments.
- It offers over 2000 high-quality compounds in a variety of dosage forms, including tablets, capsules, liquids, ointments, creams, and injectables.
- It includes over-the-counter (OTC) medicines, antiretrovirals (ARVs), active pharmaceutical ingredients (APIs), intermediates, and specialist, sophisticated, or technology-intensive items.

- Company sells more than 30 billion doses per year in neuro-psychiatry, cardiology, gastroenterology, antibiotics, diabetology, cancer, ophthalmology, dermatology, urology, nephrology, and respiratory.

Global Footprint

- Sun Pharma is one of the top ten generic drug manufacturers in the United States, and we rank second in the generic dermatological industry in terms of prescriptions.
- It is the largest Indian corporation in emerging markets, with a presence in over 80 markets. South Africa, Brazil, Mexico, Russia, and Romania are some of our important emerging markets.
- Western Europe, Canada, Australia, New Zealand, Japan, and China are just a few of the important markets where it is present.

Milestones

- Sun Pharma launched ILUMYATM (Tildrakizumab injection) in Canada, a medication for people with moderate-to-severe plaque psoriasis.
- It entered the Indian nutrition bar market with the introduction of Revital NXT, the country's first nutrition bar with the benefits of natural ginseng, 16 vitamins and minerals, and triple blend protein.
- It recently celebrated 25 years since our initial listing on the Indian stock exchanges.
- It introduced ILUMYATM for the treatment of plaque psoriasis in Japan.

Recognized in Recent Times

- Sun Pharma received the 2020 Golden Peacock Award for Corporate Social Responsibility.
- In the Pharmaceuticals Sectoral Performance-based category, the company received the Dun & Bradstreet India Corporate Award.
- More than 50% of the world's demand for various vaccinations and 40% of US demand for generic goods are satisfied by India, which accounts for 20% of all international exports.
- It was named the Best Innovative Company of the Year 2021 by the Indo-American Corporate Excellence Awards.
- It was named to the Forbes list of the World's Best Employers for 2020.

- Volini, one of the company's top OTC products, was named to the list of Nielsen BASES Top Breakthrough Innovation Winners for India in 2020.

2.10.2 Doctor Reddy's Laboratories Limited

Table 2.6 Doctor Reddy's Lab's Basic Information

Founder	Kallam Anji Reddy
Established in	1984
Headquarter	Hyderabad, Telangana, India
Products	Pharmaceuticals, generic, over-the-counter, vaccines, diagnostics, contact lenses, and animal health.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://www.cphi-online.com)

Mission and ambitions converge

- Company's employees use creative thinking, willpower, and a desire to improve global health and it is a promise to their patients.
- It began in 1984 with a small investment and a big idea. Because of its manufacturing plants, research and development centres, and global commercial presence, the company now serve over 500 million patients worldwide. The company hopes to triple its influence and interact with more than 1.5 billion patients by 2030.

Culture

Any of the 24,000+ Dr. Reddy's staff members will respond that they come to work every day because good health cannot wait. This serves as both our motto and the driving force behind all of our efforts. It sees healthcare solutions as scientific formulations that may enable patients to live healthier lives, in addition to being a tool to assist patients in maintaining their fitness. And in order to do so, the company promotes a dynamic, sensitive culture.

Five Promises

Five pledges make it clear what the company does, what the company gives, and the commitments company makes to its stakeholders. The company's pledges inspire them to strive for greater levels of excellence while keeping their patient's needs at the forefront of everything the company does.

- Making expensive medicines more accessible;
- Meeting unmet patient needs;
- Assisting patients in better disease management;
- Providing partners with the tools they need to ensure medicines are available wherever they are needed;
- Working together with partners to ensure their success.

Awards

- Outstanding Workplace - Colombia Team

  Dr. Reddy's Colombia deserves to be recognized for receiving the Great Place to Work designation for the second year in a row.
- The best places to work in New Jersey

  As one of the "Best Places to Work in New Jersey," received recognition. The Best Companies Group awarded the prize based on the findings of two studies: an employer survey and an employee satisfaction and involvement survey.
- Top 20 global pharma and biotech employers

  According to Science Magazine, one of the oldest and most prestigious scientific journals, Dr. Reddy is one of the top 20 pharma/biotech employers in the world.

2.10.3 Cipla

Table 2.7 Cipla's Basic Information

Founder	Khwaja Abdul Hamied
Established in	1935
Headquarter	Mumbai, Maharashtra, India
Products	Pharmaceuticals and Diagnostic Products

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://pharmacampus.in/wp)

Mission

Cipla is the preferred partner for global health organizations and stakeholders due to its humanitarian approach to healthcare and commitment to its goal of "Caring for Life."

Business Overview

Cipla, the world's leading pharmaceutical company, is dedicated to producing high-quality branded and generic medicines. Patients and healthcare professionals all over the world have faith in the Company. Cipla as an organization has been built brick by brick on the foundation of care. Its overarching goal has always been, and will always be, the preservation of life. We have expanded our footprint to more than 80 countries and offer over 1,500 medicines in 50+ dosage forms across numerous therapeutic categories, all of which are motivated by the same goals: to be a preferred partner for global health organizations and stakeholders. To make healthcare more accessible globally, it is expanding its footprint in major areas such as India, South Africa, and the United States, as well as the economies of other developing nations. Cipla's efforts have been driven by the desire to make a difference in the lives of patients for more than eight decades. Cipla's

basic goal of "Caring for Life" has inspired and guided our activities for the past 85 years. Cipla, guided by its legacy and humanitarian attitude, has once again been at the forefront of the fight against pandemics such as HIV/AIDS, Bird Flu, Swine Flu, and now COVID-19.

Global Presence

Cipla Australia, headquartered in Melbourne, has a sizable product pipeline that is delivered to the United States, European countries, and Australia. Cipla-manufactured medicine is available to millions of Australians through its network of community pharmacy partners.

Cipla Europe offers a wide range of medicines, including HIV, OTC, anti-infectives, and hospital medicines. It has an immediate presence in Norway, Spain, Germany, and the United Kingdom. It primarily conducts business in the rest of Europe through our licensed partners and channel.

Cipla Sri Lanka, a division of Cipla, is also known as Breath Free Lanka Pvt Ltd. During its 20-year presence in the country, the company has introduced a number of novel and significant products.

Achievements in Recent Years

- Berok Zindagi received the Gold Health Marcom Award for Best Integrated Healthcare Campaign.
- Gold for Best CSR Initiative by a Brand in the Rural Nebulizer Access Program Campaign
- Cipla's Remdesivir receives Gold in the "Covid Care Brand" Category.
- Cipla receives the National Energy Conservation Award 2021 from the Bureau of Energy Efficiency, Ministry of Power, Government of India, in the category of drugs and pharmaceuticals.
- Platinum Award for Sustainability in the Apex India Green Leaf Award 2020 Gold Award for Environmental Excellence for Sikkim Unit I, Unit II, and Goldencross.
- Golden Peacock Global Award for Excellence in Corporate Governance in 2020.
- SAPACE Award 2020 in Strategic HR & Talent Management for Digital Transformation of HR & Talent Management Process.

2.10.4 Lupin Pharmaceutical Limited

Table 2.8 Lupin's Basic Information

Founder	Desh Bandhu Gupta
Established in	1968
Headquarter	Mumbai Maharashtra India
Products	Pharmaceuticals, generic, over-the-counter, vaccines, diagnostics, contact lenses, and animal health.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: http://www.tecksonsteel.com)

Vision & Mission

Lupin takes great pride in its dedication to providing excellent customer service, its commitment to the growth and welfare of its employees, its unwavering focus on quality, and the innovative spirit that drives each of them to look for more efficient ways to complete its work. This culture is motivated and influenced by the company's values.

Background of The Company

The Promise of Caring

- Science has the potential to be a powerful catalyst for change. This faith in science's ability to improve health outcomes and elevate communities guided both founders, Dr. Desh Bandhu Gupta, and Lupin, it was founded in 1968.
- Lupin's production abilities are founded on high-quality technology, with digital being a critical component of our approach. It is invested in factory automation to maintain the highest quality and productivity standards. Lupin can maintain

industry-leading production quality standards thanks to our facilities and the knowledge of the staff who manage them.

- Lupin can distinguish itself from the competition and ensure long-term growth by implementing the best environmental, health, and safety (EHS) procedures available. Lupin's facilities obey GMP regulations and have made significant investments in infrastructure improvement to meet the ever-changing EHS standards.

Global Manufacturing & Presence

“Delivering excellent work & fulfilling our commitment”

Lupin's extensive global production network enables us to provide high-quality goods to its clients anywhere in the world. The company’s manufacturing capital investments enable it to achieve its mission of producing high-quality, low-cost medicines that address unmet patient needs. It is expanding its capabilities and automation as a part of its growth strategy to support our pipeline of sophisticated generics and biotechnology products.

The company’s 15 cutting-edge manufacturing facilities are spread across India, the United States, Brazil, and Mexico. These manufacturing facilities are outfitted with cutting-edge production equipment and are designed to meet all regulatory requirements. National and international authorities frequently inspect its facilities around the clock to ensure compliance and adherence.

Lupin Healthcare, our UK affiliate, offers a variety of premium generic drugs, with a focus on antiretrovirals and oral contraceptives. In January 2019, it has launched its first collection of neuromuscular medicines in the UK market.

Generic Health, a subsidiary of Lupin, is one of Australia's fastest-growing pharmaceutical companies. It is a leading supplier of high-quality generic prescription, injectable, and over-the-counter medicines to pharmacies and hospitals across Australia.

Awards and Recognition in Recent Times

- The Best Pathology Lab (National Category) award went to Lupin Diagnostics at the Economic Times ET Healthcare Awards 2022. Lupin was also acknowledged at the Economic Times Promising Plant Awards 2022 as one of the "Factories of the Future."

- Lupin took home first place in the "Outstanding Diversity Network" category of Business world's Diversity & Inclusion Awards 2022. This award honors the great sense of community and belonging we experience at work.
- Lupin's "Shakti" NCD prevention campaign won Silver at the prestigious India Health and Wellness Summit & Awards for raising awareness about cardiac illnesses among women.
- Lupin receives two awards at the prestigious India Pharma Honors 2021. Patients and healthcare professionals were involved in the first effort, while the CSR team's horticultural cluster program was the main focus in the second.
- Vinita Gupta is one of the top 50 most powerful women in business.
- Excellence in safety, health, and the environment (SHE) Award, 15th CII (Western Region) 2020
- Pharma Company of the Year was named at the CIMS Business Excellence Awards for its innovative marketing strategies.

2.10.5 Aurobindo Pharma Ltd.

Table 2.9 Aurobindo Pharma's Basic Information

Founder	Mr. P.V. Ramprasad Reddy, Mr. K. Nityananda Reddy
Established in	1986
Headquarter	Hyderabad, Telangana, India
Products	Pharmaceuticals, generic, over-the-counter, vaccines, diagnostics, contact lenses, and animal health.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://ehealth.eletsonline.com)

Vision

Aurobindo Pharma wants to be one of the top 25 pharmaceutical companies in the world by 2030.

Mission

Aurobindo aims to become the most valued Pharma partner in the global pharmaceutical community by consistently conducting research, development, and manufacturing a wide range of pharmaceutical products that adhere to the highest regulatory standards.

Business Overview

Mr. P.V. Ramprasad Reddy, Mr. K. Nityananda Reddy, and a small group of dedicated experts founded Aurobindo Pharma in 1986 as a result of a shared vision. The company began in Pondicherry in 1988-1989 with a single unit producing semi-synthetic penicillin (SSP). In 1992, Aurobindo Pharma went public, and in 1995, its shares were admitted to trading on the Indian stock exchanges.

Semi-synthetic penicillins are the company's most popular product, and it also dominates other significant therapeutic fields like gastroenterology, neurosciences, cardiovascular disease (CVD), antiretrovirals, and antibiotics.

The formulation of the industry is divided logically into divisions, with a dedicated team for each of its most important international markets. Aurobindo generated USD 3.3 billion in sales in FY 2020-2021 by leveraging its substantial API and formulation production infrastructure, broad and diverse product offering, and customer trust. Aurobindo's 15 formulations 10 units in India, 3 in the United States, 1 in Brazil, and 1 in Portugal—and 11 API/intermediates units are designed to meet the needs of both established and emerging market prospects. Around 90% of Aurobindo's revenue comes from its global business, which it exports to over 150 countries.

Global Presence

Aurobindo Pharma is well-known as a supplier of generic antiretroviral (ARV) medicines worldwide due to its strong focus on the needs of the client. The company updates its products regularly to meet the changing needs of our customers. In 150 countries, we distribute over 300 medicines in a range of medicinal types. It is developing and establishing its brands as it gains significant power in targeted markets. It has strategic

collaborations with large international pharmaceutical companies to meet their formulation manufacturing needs.

Company Aspire to

- Aurobindo has an extensive global collaboration and connection network. The corporation has carved out a distinct area of interest in the large, regulated market.
- Increase its market share through joint ventures, partnerships, globalization, and greater market penetration in promising markets.
- Develop a diverse range of products through legal means and establish ourselves as a major force in the generics market.
- Establishing itself as a global leader in the production of innovative, high-quality specialized generic formulations.

Recognition in the World in Recent Years

- PCV Phase III clinical trials have begun.
- Purchased nine over-the-counter brands.
- Purchased the portfolio of seven marketed, branded cancer injectables from Spectrum Pharma Inc.
- The first metered dosage inhaler (MDI) application in the United States.
- Signed a legally binding contract to acquire Apotex Inc.'s commercial operations in five European countries.
- Generis was acquired in Portugal, with a focus on specialty pharmaceuticals and distinguishing technology platforms.

2.10.6 Divi's Laboratories Limited

Table 2.10 Divi's Lab's Basic Information

Founder	Murali Divi
Established in	1990
Headquarter	Hyderabad Telangana India
Products	Naproxen, Gabapentin, Dextromethorphan HBr etc.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://divispharma.com)

Vision

The company aims to provide value to all parties involved by producing high-quality generic APIs, custom API synthesis, and nutraceutical ingredients for the global pharmaceutical and nutraceutical industries through sustainable chemistry leadership.

Mission

Divi wants to add value through its core function in the field of chemistry, uphold its core beliefs and serve the local community as well as the public at large through a variety of social initiatives that lay a solid foundation for a better future for all stakeholders as a responsible business.

Company Overview

- Divi's, one of India's biggest pharmaceutical companies, is based in Hyderabad and operates two manufacturing facilities.
- Divi produces the highest-quality products in over 100 countries while upholding the strictest compliance and integrity standards. Divi is the world's leading producer of active pharmaceutical ingredients (APIs), intermediates, and registered starting materials.
- Divi has recently reached the milestone of being one of the top three API producers worldwide and the top API business in Hyderabad.
- To provide customers with high-quality products, Divi's employs 16,500 highly skilled individuals from various departments and 400 scientists.

Business Operations

- A total of 400 scientists work in three R&D centres encompassing functions in two world-class production facilities, one of which is the world's largest API manufacturing facility
- Divi's quality control testing and validation labs have modern analytical tools and testing facilities.
- A sizable workforce of 16,500 people spread across three countries.
- Two large GMP API production facilities produce 100s to 1000s of tonnes of APIs that are exported to over 95 countries.
- More than 2100 people work in the quality assurance and quality control departments to support our Quality System.

Milestones

- When Divi reaches 11,000 employees, it will be one of the top employers in the combined state of Telangana and Andhra Pradesh.
- When Divi reaches this milestone, it will be one of the top three API manufacturers in the world, as well as one of the top API firms in Hyderabad.
- Ten new manufacturing blocks have been introduced.
- TGA's initial inspection; received a certificate for "Premier Trading House" from the Ministry of Commerce & Industry, Government of India.
- CNBC TV 18 India Business Leader Award for First Generation Entrepreneur of the Year.

2.10.7 Alkem Laboratories Limited

Table 2.11 Alkem Lab's Basic Information

Founder	Samprada Singh
Established in	1973
Headquarter	Mumbai Maharashtra India
Products	Pharmaceuticals, generic drugs, over-the-counter drugs, diagnostics, contact lenses, animal health, and vaccines.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://res.cloudinary.com)

Mission

They are committed to supporting and assisting people in living healthier lives by expanding global access to their superior healthcare solutions.

Vision

Alkem Lab's top priority—indeed, their sole priority—is to improve people's lives. The unwavering goal is to make their patients' lives better. Their primary strategy for ensuring this is to find the best collaborative solution for the creation of each product.

Alkem is committed to producing high-quality generic medicines, branded generics, specialized goods, active pharmaceutical ingredients, and nutraceuticals for domestic and international markets.

About Alkem Labs

A single thought generated by the human mind has the potential to produce wonders that can affect entire generations. It has the power to rewrite the rules and alter the course of history. This concept was proposed in 1973 by a group of individuals, who called it Alkem. Because it was so strong and long-lasting, it was comparable to a spark that could ignite a thousand additional ideas. In fact, it did! Looking back on their illustrious four-decade journey, we can see how that one simple idea inspired them to not only establish themselves as one of India's top generic and specialty pharmaceutical companies but also to have a presence in more than 40 countries. Offshore sales generate 29% of their revenue. Furthermore, they have consistently been ranked as one of India's top ten pharmaceutical companies.

Alkem's portfolio includes well-known products such as Clavam, Pan, Pan-D, and Taxim-O, which rank among the top 50 pharmaceutical companies in India. For more than a

decade, its dominance in the anti-infective market has gone unchallenged. Alkem operates 21 manufacturing facilities across multiple cities in both India and the United States. On December 23rd, 2015, Alkem finished its initial public offering (IPO) and was listed on the Bombay Stock Exchange and the National Stock Exchange of India, adding another bragging right to our resume.

Global Presence

It all started with a small step. This preliminary step towards expanding Alkem's global reach resulted in a significant leap for us. Our overseas operations are centred in the United States. During this phase, we have submitted over 125 ANDAs to the US FDA. Move up, Alkem's wholly-owned subsidiary markets and distributes products in the United States.

Other international markets include Australia, Europe, Southeast Asia, Latin America, Africa, and the Commonwealth of Independent States. We market our products in approximately 50 global markets, both directly and indirectly, through our subsidiaries and active partnerships with other companies. Australia, Chile, the Philippines, and Kazakhstan are currently some of our most important markets.

Milestone

- Annual sales from the US market surpassed $200 million in 2018.
- Reached the $1 billion turnover mark in 2019; and
- Plans to open a new formula manufacturing facility in Indore in 2020.
- In 2020, a new biologic/biosimilar manufacturing facility opened in Pune.
- The Pulmocare division entered the Indian respiratory market in 2021.

2.10.8 Glenmark Pharmaceuticals Limited

Table 2.12 Glenmark Pharmaceutical's Basic Information

Founder	Gracias Saldanha
Established in	1977
Headquarter	Mumbai, Maharashtra, India
Products	Innovative [specialty], generics, and over-the-counter business India therapy areas of dermatology, respiratory, and oncology

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://upload.wikimedia.org)

Vision

Glenmark is dedicated to enhancing patient's lives and changing the world for the better. They are always looking for new ways to create a healthy future. They are establishing centres of expertise in oncology, respiratory therapy, and dermatology.

Business Development

Glenmark, having USD 1.48 billion global pharmaceutical income with over 14,000 employees in 50 countries, derives more than 70% of its revenue from overseas markets. Our 80-country presence is backed up by 14 manufacturing facilities spread across four different countries. Glenmark's Generics division serves the markets of the United States and Western Europe. Glenmark's API division works with 16 of the world's top 20 generic drug manufacturers and serves clients in North America, Europe, Japan, Latin America, India, and the ROW.

Global Presence

The company is working on new chemical entities (NCEs) and new biological entities (NBEs). At Glenmark, we look into the limitless potential of science and innovation to create game-changing treatments for the world's patients. Our ongoing R&D investment enables us to discover and advance new therapies that benefit millions of people worldwide. It is home to some of the world's top scientists, who constantly stimulate and accept medical practices and build successful franchisees. At the moment, its portfolio of distinct medicines for oncology, dermatitis, and respiratory conditions is being used to treat a variety of ailments.

Recognition in Recent Years

- The company is ranked among the top 50 generics and biosimilar firms in the world (according to Informa's Generics Bulletin's Top 50 Company Rankings, 2020).

- Glenmark, one of India's Top 20 firms, had the industry's fastest growth rate in March 2021, according to IQVIA MAT.
- Glenmark ranks 11th in the dermatological segment and third in the expectorants segment in Russia, according to IQVIA MAT March 2021.
- Its marketing portfolio includes 171 generic drugs that are approved for sale in the United States.

2.10.9 Zydus Cadila Healthcare Limited

Table 2.13 Zydus Cadila's Basic Information

Founder	Mr. Ramanbhai Patel
Established in	1952
Headquarter	Ahmedabad, Gujarat, India
Products	Pharmaceuticals, generic drugs, over-the-counter drugs, vaccines, diagnostics, contact lenses, animal health

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://etimg.etb2bom/photo/60274751.cms)

Vision

To be the prime provider of healthcare services in the community.

Mission

Using advances in medical science, technology, and best management practices provide high-quality community healthcare solutions.

Business Overview

Located in Ahmedabad, Gujarat, India, Cadila Healthcare Limited (Zydus Cadila) is a global pharmaceutical organisation. It primarily produces generic medications. On the Fortune India 500 list for 2020, it came in at number 100. By 2020, Zydus Cadila, owned by Raman Bhai Patel, will be the seventh-largest company in India. It operates in more than 25 countries and has more than 30 manufacturing facilities in Brazil, the United States, and India. Zydus Cadila conducts research and development for pharmaceuticals, diagnostics, herbal products, skincare products, and other over-the-counter products at 25 pharmaceutical production facilities in India. The business produces active pharmaceutical ingredients in Indian cities like Patalganga, Ankleshwar, and Vadodara.

Zydus' Innovation program, which has 1300 researchers spread across 19 locations, is focused on developing unique medicines for the future. The group is constantly inventing and researching new ideas and concepts, such as NCEs, vaccines, biosimilars, and specialized technologies. The regulated markets of the United States, Europe (France and Spain), and the well-known markets of Latin America and South Africa are crucial to Zydus' global business. In 25 other developing markets around the world, it is also very prevalent. Total sales for the business are Rs. 6500 crores.

Zydus Lifesciences Limited

Zydus Lifesciences Limited, Zydus Pharmaceutical's parent company, is a fully integrated international healthcare provider headquartered in Ahmedabad, India. The organization, which has been around for over 70 years, is driven by a desire to innovate and make a difference in the health and care industries. Zydus Lifesciences is India's fourth-largest pharmaceutical company, with operations in 55 countries including India, the United States, France, Spain, Brazil, Mexico, and South Africa. Zydus Lifesciences, a major pharmaceutical manufacturer, produces formulations, APIs, vaccines, biosimilars, complex medicines, animal health products, and wellness products throughout the pharmaceutical value chain.

Milestone

- In 2022, Cadila Healthcare Limited changed its name to Zydus Lifesciences Limited. The new brand identity of the company combines two purple and teal hearts to represent its commitment to caring and nurturing, as well as research and innovation.

- Zydus Cadila's ZyCoV-D vaccine was approved for emergency use in India in 2021 for adults and children aged 12 and up. It was the world's first plasma DNA vaccine to be approved for human use.
- 2021 - The United States Food and Drug Administration designates Saroglitazar Mg as an important drug used in treating patients with primary biliary cholangitis (PBC).
- 2020 – The USFDA approves Zydus high-speed rail for the treatment of patients with primary biliary cholangitis (PBC) with Saroglitazar Mg.

2.10.10 Torrent Pharmaceuticals Limited

Table 2.14 Torrent Pharma's Basic Information

Founder	Sudhir Mehta, Samir Mehta
Established in	1959
Headquarter	Ahmedabad, Gujarat, India
Products	Pharmaceuticals, generic drugs, over-the-counter drugs, diagnostics, contact lenses, animal health, and vaccines.

(Source: https://www.javatpoint.com/top-10-pharma-companies-in-india)

(Source: https://www.jobriya.in)

Integrity: When the Real Story Comes First

Whether or not someone is looking, doing the right thing at all times and in all circumstances involves both thoughts and deeds. Inner fortitude and dedication are necessary, no matter the outcomes. It entails being true to one's word and taking full accountability for one's deeds.

Business Overview

One of the top pharmaceutical firms in the nation is Torrent Pharma, the parent company of the Torrent Group. The business was the first to introduce niche marketing to India and is now a market leader in the fields of women's, cardiovascular (CV), nervous system (CNS), and gastrointestinal (GI) healthcare (WHC). The business is also heavily involved in the fields of gynaecology, cancer, diabetology, pain management, and anti-infectives.

Due to its best manufacturing facilities, R&D capabilities, extensive domestic network, and significant international presence in over 40 countries, Torrent Pharma has a competitive advantage. Elder Pharma's Indian branded business was purchased by Zyg Pharma in 2015, and the Glochem Industries API factory was purchased by Elder Pharma in 2016. Then, in 2015, Ranbaxy offered minocycline for sale to the US market via an ANDA. Torrent Pharma also has a significant global footprint that spans 40 countries, with activities in developed and emerging markets such as the United States, Europe, Brazil, and the Rest of the World. Its primary focus is on preserving both the qualitative and quantitative components in this quest with the help of our strong manufacturing technologies and manufacturing facilities.

Milestones

- Dr. Reddy's Laboratories Ltd. agrees to sell the brands "Styptovit-E," "Finast," "Finast-T," and "Dynapress" to Torrent Pharma.
- Torrent Pharma enters into a licensing agreement with Medicine Patent Pool to manufacture and market a generic version of Pfizer's oral COVID-19 treatment.
- Boehringer Ingelheim India Private Limited has signed a co-marketing agreement to jointly market the company's anti-diabetic medication and fixed-dose combinations in India.
- Torrent Pharma acquires Curatio Healthcare to strengthen its position in the rapidly expanding dermatology market.
- Torrent Pharma launches molnupiravir products from Ridgeback and MSD in India under the brand name Molnutor. Merck & Co., Inc., Kenilworth, NJ, USA, owns the MSD brand.
- Torrent Pharma and Lilly entered into a voluntary licensing agreement to produce and distribute Baricitinib for Covid-19 in India.

2.11 CONCLUSION

The theoretical framework is the structure that can hold or support the theory of a research study. It introduces and describes the underlying theory of the subject matter. A theoretical framework is used to limit the scope of the relevant data by focusing on specific variables and defining the specific viewpoint (framework) that the researcher will adopt in analyzing and interpreting the data to be gathered. Understanding concepts and variables according to the given definitions, and building knowledge by validating or challenging theoretical assumptions. Additionally, The researcher provided extensive information on the development of the Altman Z-Score model and details on the selected company to which this model would be applied.

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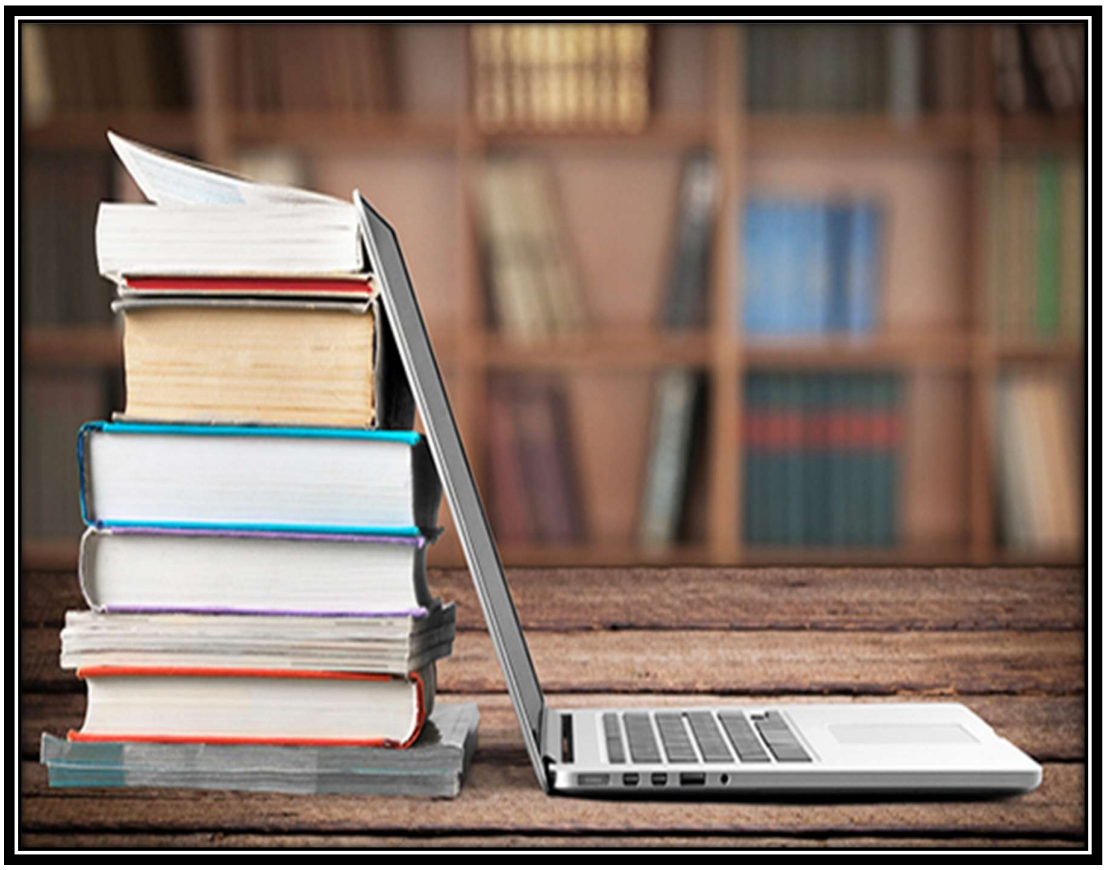
CHAPTER 3

LITERATURE REVIEW



CHAPTER 3

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3.1 INTRODUCTION

The literature review is an essential component of all kinds of research because it compiles and effectively presents the past study on specific issues. The goal of a literature review is to show readers how your research fits into a larger field of study as well as to provide an overview of the sources you used to investigate a specific topic.

The literature review's two main focus areas are as follows:

- Investigate right information
- Evaluate it critically

A literature review examines books, academic papers, journal articles, conference proceedings, and other sources relevant to a field of study or theory to provide a description, summary, and critical evaluation of these works in relation to the research problem under consideration. When you start writing your literature review section, you'll be glad you looked more closely at the research's design and construction because it opens up opportunities for a more significant analysis and interpretation of the research problem.

3.2 WHAT IS A LITERATURE REVIEW?

A literature review is a search and critical evaluation of the body of knowledge on the research problem. It provides the most up-to-date information on the issue or topic the researcher is about to investigate.

- Increases the validity of work by demonstrating familiarity with a body of knowledge.
- Summarizes previous studies and explains how current research relates to them.
- Reading literature reviews allows the researcher to become informed about the state of knowledge in his chosen field, as well as its boundaries and limitations.

3.3 A STEP-BY-STEP GUIDE TO WRITING A LITERATURE REVIEW

1. Problem formulation: What topic or field is being researched, and what are the underlying issues?
2. Literature search: Locating resources relevant to the topic under study.
3. Data evaluation: Identifying literature that contributes significantly to our understanding of the subject.
4. Discussion: About relevant literature findings and recommendations.

3.4 WHAT IS THE PURPOSE OF A LITERATURE REVIEW?

A literature review demonstrates the author's thorough understanding and knowledge of the subject matter. Consider what each piece of work has to say about the research topic under consideration.

- Determine the need for additional research and point the way to addressing it.
- Find new ways to interpret previous work.
- Identify if there are any research gaps in the existing research.
- Reconcile differences between studies from the past that appear to be at odds.
- To avoid wasting time, identify areas of previous research.
- Set your research in the context of the existing body of knowledge.
- It provides context for the research.
- Focuses on what has already been done in a specific field.
- Describes how knowledge in the field has evolved.

3.5 IMPORTANCE OF LITERATURE REVIEW IN RESEARCH

A literature review improves the research's credibility in the following ways:

- Interprets existing literature in light of new developments in the field to aid in establishing consistency in knowledge and the relevance of existing materials.
- It aids in calculating the impact of the most recent information in the field by mapping their knowledge progression.
- It exposes the languages of contradictions between various ideas within the field to establish facts.
- The research gaps identified initially are further investigated to establish the most recent facts and theories to add value to the field.
- The more references to relevant sources it has the more trustworthiness it has with the readers.
- It saves time and money by preventing plagiarism, which saves the scientific manuscript from rejection.
- To sharpen the research focus, evaluating, condensing, and synthesizing the gist in the author's own words is useful.
- Aids in comparing and contrasting the research's originality and uniqueness to that of other existing studies.
- Justifies the need to conduct specific research in a specific field.

The ultimate goal of any literature review is to create a knowledge base of all current information on a specific topic and to identify research gaps in the current circumstance. Additionally, the objective would be to widen the range of research that is available on a particular subject.

The chapter is divided into five phases for a better understanding of the topic that are as follows:

3.6 LITERATURE REVIEW RELATED TO PHARMACEUTICAL INDUSTRY & IT'S CURRENT SCENARIO

(Baljeet Singh, et al., 2023)[8] reviewed top pharmaceutical companies in the article. The global pharmaceutical market is anticipated to reach USD 1.5 trillion by 2023. India holds a significant position in the pharmaceutical industry. India is the largest supplier of generic drugs in the world, accounting for over 20% of all exports. It satisfies more than 40% of the American demand for generic products and 50% of the global demand for vaccines. To the global pharmaceutical industry, the local pharmaceutical market contributes 10% in volume and 2% in value. Pharmaceutical products made in India are exported in large quantities. According to Mr. Sudarshan Jain, General Secretary of the IPA, the Indian pharmaceutical industry is expected to grow to $130 billion by 2030 and become the world's top supplier of pharmaceuticals.

(Sarkar, 2023)[39] explained the macro-environmental pharmaceutical industry factors. The study's goal is to understand the macroeconomic causes of the pharmaceutical business model revolution. Several factors, including technological advancements, new laws, increased drug production costs, and new consumer demands, are expected to cause the pharmaceutical industry to shift. Macroenvironmental elements such as Political, Economic, Social, Technological, Legal, and Environmental factors have an indirect impact on the organization that creates the comprehensive framework for pharmaceutical industry performance, dictating all aspects of market players' behavior. In the conclusion, the author stated that pharmaceutical companies will need to change their business models, participate in mergers, acquisitions and collaborate with venture capitalists, and form partnerships with a variety of market actors in the future.

(Singh K. , 2022)[42] analyzed how the Amended Patent Act will affect the Indian Pharmaceutical Industry. As a result of this act, the Indian pharmaceutical industry now has new directions and frontiers. The purpose of this article is to highlight the changes and deviations that have occurred in the Indian pharmaceutical sector since 2005. As a result of the literature review, it is clear that TRIPS and the Patent Amendment Act of 2005 have had a significant impact on the Indian pharmaceutical sectors in terms of export, raw material import, profitability, and R&D activities. In the conclusion, the author stated that it has been demonstrated that the enforcement of patent rules leads to improved performance, increased exports, and global commercial activities.

(Mittal & Sharma, 2021)[27] have researched the impact of Covid 19 on the pharma & health sector's stock price, the study aims to determine how the pandemic has affected pharmaceutical and healthcare stocks. Daily closing prices of sector-specific indices were used for 233 days, from May 15 to April 24, 2020, to compare various sectors with our test sector based on several different criteria. Private equity firms and venture capitalists looking to invest during a period of uncertain economic conditions. There have been a few studies of this type on the Indian stock market, but this one is unique in that it only looks at companies that are part of the BSE Healthcare index and excludes other firms in the same industry. Moreover, because there are no separate sectoral indexes for pharmaceutical and healthcare companies, this study used the BSE Healthcare index to represent both sectors.

(Reinhardt, Jorge C. Oliveira, & Denis T. Ring, 2020)[36] have conducted research on Industry 4.0's potential development in the pharmaceutical industry. Only 42% of survey respondents claimed to be familiar with 4.0. The majority of respondents with a knowledge score of 4.0 identified with either the Engineering or Automation departments. 82% of established workers with more than 8 years of experience claimed to be familiar with 4.0. Those in vice-president or director roles in the survey reported a 98% certainty of 4.0 awareness. An interesting finding of this research is the discovery of a significant gap in 4.0 knowledge based on seniority, function, and industry. Even though the implementation of 4.0 is playing an increasingly important role in the modernization of the pharmaceutical and biopharmaceutical industries, there are still issues with the holistic integration of 4.0 into organizational culture.

(Martinez-Grau & Alvim-Gaston, 2019)[25] have researched "Powered by Open Innovation: Opportunities and Challenges in the Pharma Sector" Pharmaceutical companies are still struggling to stay competitive, and they rely on external networks to solve scientific problems that are being developed through research. Pharmaceutical companies are eager to collaborate with academic institutions to foster a more innovative environment. Successful open-innovation methods necessitate cultural shifts. Significant internal cultural changes are required to adopt open-innovation methods that should coexist without competing with traditional business practices. High-quality drug development necessarily requires ongoing learning to implement effective collaborations and adopt new operational models.

(Lakdawalla, 2018)[22] has reviewed the economic conditions of the pharma industry. They examine the pharmaceutical economics literature with a focus on its beneficial and guiding implications for pharmaceutical companies' innovation, pricing, and marketing decisions. Today's economic policies include a significant R&D component, which has an impact on the pharmaceutical industry's long-term viability. The researcher has made some slow progress in assessing the effects of pharmaceutical advertising on health outcomes, but more work is needed. While marketing increases overall usage, it is unclear whether this increased usage is of the right kind. One of the most critical matters is what to do about the rapidly increasing cost of prescription medications.

(Panigrahi, Raul, & Gijare, 2018)[31] attempted to examine the liquidity and profitability of the pharmaceutical industry. The study used a sample of five publicly traded pharmaceutical companies for the period of 2011-12 to 2015-16. The statistical tools used in the study, such as the mean, percentage method, standard deviation, ratio analysis, coefficient of variation, etc. The study's primary goal was to examine the firms' profitability and liquidity positions over the course of the investigation and to determine any relationships between them and whether they were consistent with the findings of previous studies. A researcher concluded that a company can be highly profitable if it can convert its operational cash into the same operating cycle. If this is not possible, it will have to borrow money to meet its ongoing working capital needs.

(Maya & Zouhair, 2017)[26] articulated their thoughts on emerging market trends related to the pharmaceutical industry. They stated that the pharmaceutical industry has

a fantastic opportunity in emerging markets. The BRICS and MIST nations' large populations, rising income, and rising life expectancy have been cited as reasons for the shift towards these new markets. According to the researcher, the pharmaceutical industry can make significant profits from these markets as a result of patent expirations and changes in disease patterns, which have resulted in an increase in sales of generic medicines and biosimilars. However, challenges must be considered, such as the drop in oil prices and the poor performance of major pharmaceutical firms.

(Protopapadakis, 2017)[35] conducted a study on "In Defence of Pharmaceutically Enhancing Human Morality" The goal of the study is to improve human morals and judgment to discourage morally bad decisions and encourage morally good ones. In the relatively short time since its emergence, our species has made tremendous advances in knowledge, science, and technology. Moral development has made only a small step forward. What if we could use medicine to accelerate the evolution of our moral character? The Researcher investigates whether physiological moral intervention would harm the autonomy of moral agents. The researcher argued that the moral autonomy justification is neither sound nor persuasive. Moral agents would have a perfect obligation to use pharmaceuticals to improve their moral character, according to Kantian ethics.

(Haleem, Maissa Y.Salem, Faten A. Fatahallah, & Laila E. Abdelfattah, 2015)[13] have shared their thoughts on Quality in the Pharmaceutical Industry. The objective of this literature review is to identify the most important quality standards and procedures in the pharmaceutical industry and arrange these principles and practices into a manual to serve as a road map. A survey of 102 publications was conducted; 46 dealt with general quality practices and 56 directly addressed pharmaceutical quality. Following an examination of the sources' content, the following themes emerged: a. The first research theme is pharmaceutical quality standards. b. The second research topic is current general practices in the pharmaceutical industry.

(Kesic, 2011)[20] presented his view on "Strategic Development Trends in the World Pharmaceutical Industry" The primary goal of this paper is to investigate and evaluate strategic development trends in the global pharmaceutical industry from 1996 to 2006. The researcher intended to employ analytical, comparative, descriptive, and strategic analysis, strategic diagnosis, and strategic early prediction methods. This study was

conducted to determine the development trends of the global pharmaceutical industry during that time. The researcher makes the speculative assumption that the global pharmaceutical industry has been significantly consolidating during that time period, and he wants to know what the primary causes of this development trend are. We discovered that pharmaceutical companies spend the majority of their money on two of their most important and strategic priorities: (1) research and development and (2) marketing and sales.

(Cockburn, 2004)[10] has undergone a study on the pharmaceutical industry's rising research and development (R&D) costs. Companies are partly agreed that the result of changing industry structures, particularly the rise in biotechnology, is responsible for increasing costs. Increased vertical rivalry within the sector, as well as the emergence of a market for biomedical science, are likely to encourage innovation and productivity, but they also carry the risk of encouraging socially inefficient investment and undermining academic science. R&D investment may be more vulnerable to price controls or other cost-cutting measures as innovation becomes more dependent on financially risky businesses and intricate contractual relationships.

3.7 LITERATURE REVIEW RELATED TO THE EVALUATION OF THE FINANCIAL PERFORMANCE OF THE CORPORATE ENTITIES

(Keswani, et al., 2022)[21] have examined "Economic Practices and Financial Performances of Pharma Company in Rural Areas" The study's goal was to explain consumer relations in a rural retail medicine market using the systemic conduct-performance model, as well as potential future policy initiatives for more secure and convenient pharmaceutical access. Data from a study of patent medicine merchants and drug customers were gathered for more than 9 months in 2012 in the northern UK's Benue State Local Government District. To inform drug vendors and prescription drug consumers, semi-structured surveys, in-depth interviews, and extensive purchase observations were used. According to the findings, patent-medicine suppliers were a significant source of primary hospital outpatient health care for residents of local governments. Drugstores have earned a reputation for being dependable suppliers.

(Nworie, Vitalis O. Moedu, Onyali, & Chidiebele Innocent, 2023)[28] have investigated the impact of current asset management on the financial performance of

listed consumer goods companies in Nigeria. The study specifically assessed the impact of debtor turnover ratio, cash ratio, and inventory turnover ratio on the earnings per share of consumer goods companies listed on the Nigerian Exchange Group using a causal-comparative research design. A purposive sampling technique was used to select the twelve consumer goods companies that made up the study's sample participants from a population of twenty-one. Secondary data was gathered from the chosen companies' annual reports and financial statements over ten years, from 2011 to 2020. Since the performance of businesses can be improved by increasing the frequency of debt collection, it was advised that managers of consumer goods firms reduce to a minimum the time it will take between sales of goods and services and the collection of cash.

(Alberto A. López-Toro, Eva María Sánchez-Teba, María Dolores Benítez-Márquez, & Mercedes Rodríguez-Fernández, 2021)[4] have researched how ESGC Indicators affect the financial results of listed pharmaceutical companies. This study reviewed the relationship between environmental, social, governance, and controversy variables and financial results as measured by return on equity (ROE), return on assets (ROA), and Tobin's Q using the listed companies in the Nasdaq US Smart Pharmaceuticals Index as a case study. The analysis was carried out using the partial least squares structural equation model. The findings support the hypothesis that the construct is made up of environmental, social, and governance (ESG) indicators and that the financial ratios mentioned above are positively correlated.

(Oncioiu, et al., 2020)[29] have offered their opinions on the relationship between financial performance and sustainability. The purpose of this research was to find out how easily corporate sustainability reporting tools are available to Romanian managers and what role they play in boosting firms' financial success. From July to December 2019, the researcher conducted this study, after which he entered the data into AMOS software to perform regression and path analysis to test his hypotheses. Validity, reliability, and normality tests are run on the instrumentation. This study concludes that corporate social reporting indicators can be included in financial success reporting and can turn sustainability into a true benefit for all parties involved.

(Kamaluddin, Norhafizah Ishak, & Nor Farizal Mohammed, 2019)[18] have studied the relationship between cash flow ratios and financial distress. The goal of this study

is to look into how cash flow ratios relate to the likelihood that a company will go bankrupt, using a sample of industrial and consumer goods companies listed on Bursa Malaysia. The findings show that the solvency ratio and financial distress have contradictory associations, as well as a strong negative relationship between the profitability ratio and financial distress, but no relationship at all between the efficiency ratio and financial distress. According to these findings, cash flow ratios are reliable indicators of financial distress in Malaysia.

(López-Gutiérrez, Sanfilippo-Azofra, & Torre-Olmo, 2015)[24] have researched the effect of financial distress on the company's investment decision. This paper investigates how financial ambiguity influences a corporation's behavior when making investments. The analysis includes companies from a wide range of institutional environments, including those from Germany, Canada, Spain, France, Italy, the United Kingdom, and the United States. The methodology used is panel data estimation using the Generalized Method of Moments (System-GMM), which allows control of both unobservable heterogeneity and issues associated with endogeneity in explanatory variables. As a result, businesses in trouble with few opportunities have a greater proclivity to underinvest, whereas businesses in trouble with many options exhibit the same investment behavior as healthy businesses.

(Capkun, Ari-Pekka Hameri , & Lawrence A. Weiss , 2009)[9] have investigated the relationship between inventory and the financial performance of manufacturing firms. This paper examines the financial performance of manufacturing firms in relation to total inventory (INV) and its discrete components, such as raw materials (RMI), work-in-process (WIP), and finished goods (FGI). Statistical analysis was performed on financial data from US-based manufacturing companies from 1980 to 2005. The study discovers a significant positive correlation between financial performance (at both the gross and operating levels) and inventory performance for businesses in the manufacturing industries (total as well as discrete components of inventory). The strongest relationship exists between RMI performance and financial performance measures. When WIP inventory and FGI performance are compared, the former is more strongly correlated with operating profit metrics than the latter with gross profit metrics.

(Pindado & Rodrigues, L., 2005)[32] have determined the factors that affect the financial distress cost. To achieve this, the researcher developed a model in which the costs of

financial distress are determined. On the one hand, by employing a more precise indicator of the likelihood of financial distress and, on the other hand, by a set of variables that, according to financial theory, explain the size of the costs borne by a firm in the event of financial distress. His findings show that the improved financial distress likelihood indicator has a positive impact on the costs of financial distress in all of the countries taken in the study. Additionally, he can also evaluate the trade-off between the advantages and disadvantages of debt because the model takes the likelihood of financial difficulty into account.

3.8 LITERATURE REVIEW RELATED TO THE SIGNIFICANCE OF RATIO ANALYSIS

(Das, 2023)[11] has performed an analysis on financial appraisal using ratios. The current study's goal is to demonstrate Tata Steel Ltd.'s financial evaluation through a historically significant relationship between the balance sheet and profit and loss account feedback. This study, which relies on secondary data, examines Tata Steel Ltd.'s financial performance from 2017-2018 to 2021-2022. External variables such as GDP, inflation, stock market capitalization, and so on are not included in the study because it is limited to a small number of financial appraisal elements. This analysis assists the industry in developing better regulations for future development and effectively supports capital appreciation.

(Limbong, 2022)[23] has compared the COVID-19 pandemic and the financial performance of listed pharma companies on IDX. The goal of this research was to compare the financial performance of pharmaceutical companies listed on the IDX before and after the pandemic in 2019-2020. The secondary research data, which includes 12 pharmaceutical companies, was obtained from the Indonesia Stock Exchange's website. A quantitative descriptive methodology is used in this type of research. According to the study's findings, only two of the five typical profitability ratios—gross profit margin and earnings per share—have grown. Profit growth, even with an increase in market demand, is not giving assurance of improved financial success.

(Pratiwi, Satoto, & Suprapti, 2022)[34] have assessed the likelihood of financial distress in manufacturing companies. The Altman Z-Score Model will be used to investigate the effects of the financial ratios Net Working Capital to Total Assets, Retained

Earnings to Total Assets, Earnings Before Interest Tax to Total Assets, and Book Value of Equity to Total Liability. A purposive sampling of 39 companies was obtained for this study. In this study, the Altman Z-Score was used to calculate the criterion for financial hardship. According to the study's findings, certain financial ratios used in the Altman Z-Score model are insufficient for predicting the occurrence of financial distress in manufacturing companies listed on the Indonesia Stock Exchange from 2018 to 2020.

(Sari, Eri Novari, Yuda Septia Fitri, & Ade Iskadar Nasution, 2022)[38] have examined various ratios and concluded their effect on Return on Assets. The goal of this research is to determine how the Current Ratio, Quick Ratio, Debt To Asset Ratio, and Debt To Equity Ratio affect Return On Assets. Descriptive analysis, model selection testing, data selection technique testing (Chow, Hausman, and Lagrange multiplier tests), panel data regression analysis testing, hypothesis testing (partial test and simultaneous test), and coefficients were all used in this study. The study's findings indicate that the Current Ratio and Quick ratio measurement results do not significantly impact the Return on Assets. On the other hand, Debt to Assets Ratio and Debt to equity measurement results have an impact on Return on Assets.

(Toly, Ratna Permatasari, & Elva Wiranata, 2019)[45] have evaluated The Impact of the Financial Ratio (Altman Z-Score) on Financial Distress Prediction in Indonesia's Manufacturing Sector from 2016 to 2018. The purpose of this research is to shed light on the possibility of financial distress in publicly traded industrial companies in Indonesia. The Altman Z-Score model was used as a test instrument for predicting bankruptcy. Furthermore, this study sought to clarify how each ratio contributes to financial distress. From 2016 to 2018, the overall sample size for this study was 139 businesses. In 2016, 2017, and 2018, there were 55 enterprises in financial distress. According to this study's analysis using the logistic regression test in SPSS, the four ratios in the Altman Z-Score model had a favorable impact on financial hardship. The most significant effects were seen in the ratios of retained earnings to total assets and earnings before interest and taxes to total assets.

(Alayemi, 2015)[3] has examined how the accounting policy of the reporting entity affects the financial statements that have been analyzed and interpreted. Declaring the approved policy will allow financial statement readers and consumers to make informed

decisions. The primary hypothesis of this paper is that, even when identical data is used, the choice of accounting policy affects financial statement analysis and interpretation. The firm must reduce contract costs, which include the accounting policy to be selected. As a result, the various accounting policies employed by a reporting organization have a significant impact on how financial statements are interpreted using ratio analysis.

(Adedeji, 2014)[2] performed research on Ratio Analysis As A Measure Of Organizational Performance. It determines the relevance of internal and external financial data during ratio analysis to develop important connections and outcomes and to evaluate financial performance. The study's population is the PZ CUSSONS PLC team; this company seems to have a solid reputation for efficiency due to its honest management. The population will be drawn from the company's production, marketing, and finance departments, and they will form the survey's sample population. For this study, respondents were chosen at random from the entire population. According to the findings, it was recommended that ratio analysis be used to gauge profitability performance and that financial ratios be calculated regularly to identify relative strengths and weaknesses.

(Innocent, Okwo Ifeoma Mary, & Ordu Monday Matthew, 2013)[14] have studied the Analysis of Financial Ratios as a Predictor of Profitability in the Nigerian Pharmaceutical Sector. The primary goal of the study is to determine whether financial ratio analysis has any effect on company profitability, with particular reference to various pharmaceutical companies that have been publicly traded in Nigeria for the past eleven years, from 2001 to 2011. The data were examined using multiple regressions and the descriptive research approach to determine the relationship between the variables. The findings of the study revealed a negative relationship between every independent variable and profitability in the Nigerian pharmaceutical sector. Furthermore, only the inventory turnover ratio has a significant correlation with profitability, not the debtors' turnover ratio, creditors' velocity, or total assets turnover ratio.

3.9 LITERATURE REVIEW RELATED TO THE APPLICATION OF THE Z- SCORE MODEL

(Abadi & Muhammad Sultan Mubarok, 2023)[1] have examined the accuracy of Altman's model in property companies. Six real estate firms that were listed on the

Indonesia Stock Exchange served as examples from 2019 to 2021. The Altman Z-score analysis approach, as well as the Microsoft Excel spreadsheet tool, were used in this study's hypothesis testing. The purpose of this article is to 1. Calculate the financial ratio score for the real estate industry. 2. Examine industrial property businesses' profitability, activity, leverage, liquidity, and market ratios. The findings of this study's hypothesis test show that the Altman z-Score model is very good at predicting business failure. Furthermore, the liquidity ratio, leverage, profitability, market ratio, and activity all affect the final value of the Altman z-score prediction. Another finding indicates that six businesses are in a sound position, while the rest will face financial difficulties.

(Ali & Iqball, 2023)[5] have researched "Financial Drive Utility Abandonments in India" This project financing method is not new, and it aims to ensure liquidation distance while also providing no (or limited) options to marketers. Given the limited role advertising played in the Venture's day-to-day operations, the advertiser's accountability for the venture established by the Task Organization was, on the whole, limited. While it is impossible to prove this definitively, collecting supporting evidence can help to establish this expectation as commonplace. In less meticulously organized archives, one might find haphazard and complex promises made to borrowers to ensure consistency by advertisers/supports, as well as the commitment to ensure there is no surrender.

(K Krishnamoorthy & R. Vijayapriya, 2023)[17] have published research paper that examined the Indian auto ancillary industry's financial stability. The purpose of this research paper is to provide a framework for potential investors to investigate the recent growth of the listed companies in the auto auxiliary manufacturing industry. The assessment was based on a thorough examination of the literature on the history of the National Stock Exchange as well as the views of the Altman Z-Score model. The descriptive quantitative approach was used to analyze the computational data obtained from the moneycontrol.com website and the annual reports of the selected car ancillary gear manufacturing companies. The findings indicate that not every company listed on the NSE is financially stable. According to the study, with a few exceptions, several Indian car accessory manufacturing companies are solid and reliable.

(Swalih, K.B. Adarsh, & M.M. Sulphey, 2021)[44] have done research on the financial efficiency of the automobile sector using the Z-Score model. The study's goals are to analyze the financial stability of the Indian auto industry and identify healthy firms for investors. The Z-Score model was used in this study. To examine the financial stability of the Indian automobile sector, selected automobile businesses listed on the National Stock Exchange that are representative of all segments—including tractors, lorries, LCVs, passenger cars, and two and three-wheelers—were examined. The Altman Z-score for the industry was calculated using annual financial data from a few selected companies' financial statements for the 2019-2020 fiscal year. The Indian auto industry is strong and stable, according to the study's findings. The original formula and the emerging market formula should be learned to more precisely assess the Z-Score values in a developing country like India.

(Siregar & Nurlaila, 2023)[43] have conducted a bankruptcy analysis of manufacturing companies listed on the Jakarta Islamic Index (JII) using the Altman Z-Score Method for the 2019-2021 period. This study's objective is to investigate manufacturing companies that are listed on the Jakarta Islamic Index (JII). A quantitative descriptive research design was used for this study. The next step is to use the purposive sampling technique to select three sample companies (CBP, TBK & PT) as a group for the study. According to the study's findings, PT Indofood CBP Sukses Makmur Tbk has recently experienced serious financial difficulties (2021). Later, the same thing happened to PT Unilever Indonesia Tbk, which was also struggling financially. In contrast to PT Kalbe Farma Tbk, this company is viewed as safe because its financial situation is stable.

(Singh & Ravi Singla, 2019)[41] have done research on "Corporate Bankruptcy Prediction Using Altman's Z-Score Model: The Effect Of Time And Methodology On Accuracy Of The Model" The purpose of the paper is to investigate how the Altman model responds to changes in methodology and time. For this, a sample of 74 Indian manufacturing companies from 2011 to 2015 is used, equally, split into defaulted and non-defaulted companies. The study's results show that Altman's model's correct classification rate in 2015 was only 66.21%, even lower than in the years before 2015. This overall correct classification rate rises to 81.10% when the model is re-estimated using the most recent data, and further to 87.83% when logistic regression is used to re-estimate the model. According to the study's findings, to improve the accuracy of

bankruptcy prediction, the model coefficients should be re-estimated using logistic regression based on current data.

(Joshi, 2019)[16] has done a study on the prediction of bankruptcy in Reliance Communication. The purpose of this research is to look into how the Altman Z score model is used to predict Reliance Communication's likelihood of bankruptcy. The Altman Z-score model accurately predicts the publicly traded Indian non-manufacturing firm's financial problems and possible impending insolvency. For this study, the financial statements and market data of Reliance Communication were examined, and it was discovered that the company had been losing money for some time and was in the grey zone for bankruptcy risk according to the Altman Z score model. According to the study, the model was successful in predicting Reliance Communication's impending financial difficulties.

(Panigrahi, 2019)[30] has examined the pharmaceutical industry by applying Altman's Z- Score Model, The study's goal is to use Altman's Model to assess the financial health or status of sample units. If financial difficulties are not identified promptly and turnaround actions are not implemented, bankruptcy is sure. In this paper, the researcher used Altman's Z-score model for examination and analysis. A sample of 4 pharmaceutical industry businesses was chosen for this study. The foundation of this investigation is secondary data. The first section of the article examines how the financial crisis has impacted a few pharmaceutical firms. The results show that the pharmaceutical industry's average Z-Score was 5.90 during the study period. Because the Z-Score is significantly higher than the threshold score, or 1.8, the pharmaceutical industry is clearly in good financial standing.

(Altman, 2018)[6] talked about learning from the Z- score model in the past 50 years. He believes that by discussing a variety of applications from the standpoint of the former, this study provides a roadmap for future extensions beyond those already mentioned. There have been numerous practical implementations of the Altman Z-score model, which can be divided into two categories: (1) internal to the troubled firm applications and (2) external analytical applications. Since the release of the Z-score model for predicting business financial hardship and bankruptcy 50 years ago, a significant number of practitioner applications have emerged, not to mention the vast number of scientific papers that have relied on the Altman model as a reliable tool.

(Anjum, 2012)[7] have analyzed "Business bankruptcy prediction models: A significant study of the Altman's Z-score model" This article contains a detailed description of Altman's studies to predict business bankruptcy. Altman made constant adjustments to the ideal equation that could predict bankruptcy. Finally, Altman's improved Z-score model is one of the most successful Multiple Discriminant Analysis models studied over the last 40 years. Altman's Z score Model can be used to forecast economic crisis and insolvency in the modern economy one, two, and three years in advance. The key component of this research is multiple discriminant analysis.

3.10 LITERATURE REVIEW RELATED TO THE COMPARISON OF THE Z-SCORE MODEL WITH THE DIFFERENT MODELS TO DETERMINE ITS ACCURACY LEVEL

(Isnaini, Teuku and Yusnidar, Cut and Fatrisia, & Putri, 2022)[15] have examined multiple models and presented their view on which has the highest accuracy. This study's goal is to examine and determine whether there are variations in the computation outcomes between the Altman, Springate, Ohlson, Grover, and Zmijewski methods when used to forecast bankruptcy. The best technique for forecasting the failure of SMEs in 2022. The demographic factor of the study includes all first-time business owners who registered with the Department of Cooperatives as SMEs in 2022. The data collection method makes use of documentation strategies. The paired sample t-test, as well as descriptive statistical techniques, normality checks, and hypothesis testing, were used to validate the data analysis procedure. The results showed that the techniques of Altman, Springate, Ohlson, Grover, and Zmijewski differed significantly, with the Grover model having the highest level of accuracy (90.17%).

(Sharma & Bodla, 2022)[40] have analyzed two distinct bankruptcy prediction models created by scientists from different parts of the world. Among the models employed are Altman's (1968) Multivariate model and Ohlson's (1980) O-score model. A systematic literature review (SLR) identifies, selects, and evaluates content to address a specifically stated question. Different academics have developed some bankruptcy models, but there is no agreement on the optimal one. This study reveals that there is a very high positive coefficient of correlation between the years and Altman's Z-score model from 1993. According to the research, Altman's (1993) Z-score model predicts business insolvency more accurately than Ohlson's (1961) O-score model.

(Elviani, et al., 2020)[12] have examined the accuracy of different models in trade sector companies of Indonesia. The goal of the numerous studies on bankruptcy prediction that are currently being conducted is to identify the best suitable and reliable bankruptcy prediction model. This research aims to find the most appropriate and reliable model for predicting the failure of 53 trade sector enterprises in Indonesia. The analysis method used in this study was binary logistic regression. The study's findings show that the Springate and Altman models are the most appropriate and reliable models for predicting the failure of trade sector enterprises in Indonesia. Longer data periods should be used in future studies to provide a more complete picture of bankruptcy forecasting.

(Pramudita, 2020)[33] presented opinions on how the Z-Score and O-Score models can be used to predict bankruptcy in the Indonesian SME sector. This study seeks to investigate the validity of the Altman Z-Score and Ohlson O-Score methods as predictors of bankruptcy in Small-Medium Enterprise segment companies in Indonesia, as well as its validity statements in this segment in reflecting the realistic circumstances of the corporation as input data for financial distress evaluation prediction. Financial report data for the study came from businesses that owed money to Bank Mandiri's Small-Medium Enterprise sector. According to the findings, the Z-Score calculation results had an accuracy of 51.8%, 37.4%, 36.3%, and 11.4% in predicting bankruptcy one, two, three, and four years before the bankruptcy. Ohlson O-Score produced better accuracy statistics of 73.6%, 43.2%, and 58.5% for the one, two, and three years preceding the bankruptcy, respectively.

(Karamzadeh & Mani Shehni, 2013)[19] have investigated and compared the Z- Score model and O-Score model to assess a company's financial health. The Altman and Ohlson models, two of these techniques, are investigated in this study. This study's statistical population consists of all 90 companies listed on the Tehran Stock Exchange. This study used data from four years, from 2007 to 2010. The econometric logistic analysis methodology was used. When the Altman and Ohlson models are compared, the Altman model outperforms the Ohlson model in all three scenarios, and investors may want to consider using it to forecast corporate bankruptcy.

(Renalita & Sutra Tanjung, 2013)[37] have compared various financial distress models. The first goal of this study is to see if there are any differences in the ability of the

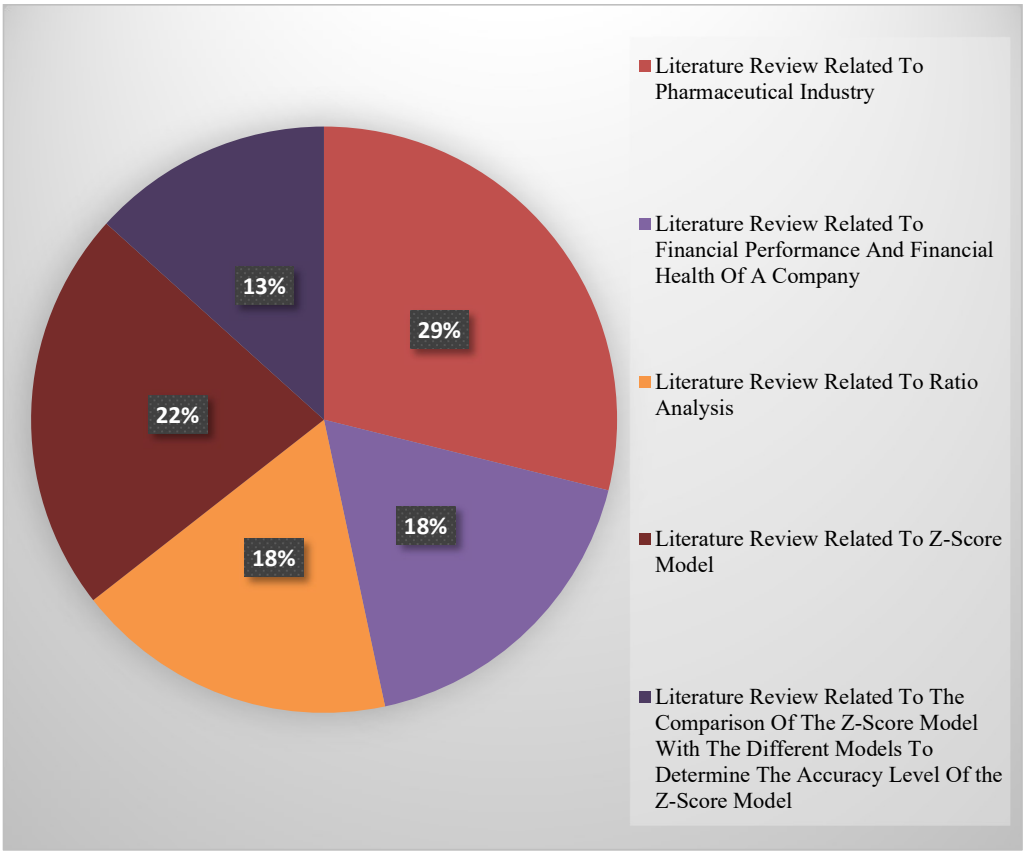
Altman, Springate, Zmijewski, and Ohlson models to predict financial distress, and the second is to find the most accurate forecasting model for a pharmaceutical business listed on IDX. Purposive sampling was used to sample 45 data points from 9 pharmaceutical companies listed on IDX. The SPSS program was used to analyze the data, which included descriptive analysis, a normality test, and a paired sample t-test. According to the findings of these studies, there is a considerable difference between the Altman, Springate, Zmijewski, and Ohlson models in terms of their ability to anticipate financial distress, and the Altman model is the most effective one.

Table 3.1 Phase-Wise Summary of Literature Review

Sr. No.	Topic	Total
1	Literature Review Related To Pharmaceutical Industry	13
2	Literature Review Related To Financial Performance And Financial Health Of A Company	8
3	Literature Review Related To Ratio Analysis	8
4	Literature Review Related To Z-Score Model	10
5	Literature Review Related To The Comparison Of The Z-Score Model With The Different Models To Determine The Accuracy Level Of the Z-Score Model	6
	Total	45

(Source: Self Constructed)

Figure 3.1 Segments Of Literature review



(Source: Computed from the excel)

3.11 RESEARCH GAP

- From the above literature review, it can be said that, the Altman Z-Score model has been widely used to assess financial performance and bankruptcy risk involved in various industries.
- Furthermore, the literature review reveals that there aren't many research studies done in the pharmaceutical industry that use Altman's Z-Score Model to assess its financial status.
- However, the pharmaceutical industry is unique due to the nature of its products, dynamic market, stringent regulations, and huge investments, which usually entails more research and development. As a result, the performance of pharmaceutical companies may differ from that of other industries.
- As a result, the Altman Model will be used to examine the financial health of major pharmaceutical companies in India in the current study.

3.12 CONCLUSION

The goal of a literature review is to collect relevant literature on the chosen topic and synthesize it with the statement of the problem. This allows the researcher to present his argument or to conduct original research on the subject. The above-mentioned literature review aids the researcher in data analysis and interpretation. Moreover, it will be helpful in the generation of realistic and useful suggestions.

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CHAPTER 4

RESEARCH METHODOLOGY

CHAPTER 4

INDEX

4.1 INTRODUCTION

The word research is made up of two words: Re (again) and search (to find) "Research" signifies that we are engaging in an activity to look into an aspect yet again and or we are seeking out new information about something.

Some people see research as a step from the known to the unknown. In reality, it is an exploratory journey. We all have the instinct to be curious, which is important because it drives us to probe and learn more about the unknown when it confronts us. Curiosity is the source of all knowledge, and research is the process by which man learns about whatever the unknown is.

Thus, the research adds new information to the existing body of knowledge and advances it till one reaches a conclusion. It is the search for information by means of research, observation, comparison, and experimentation. In a nutshell, it is the systematic and logical step-by-step process of discovering better ways to carry out tasks by reducing the time, effort, and money required to achieve a predetermined goal and also determining the effectiveness of the targets achieved.

4.2 MEANING AND DEFINITION OF RESEARCH

Meaning

- The research process begins with problem identification and modification, followed by the formulation of hypotheses or proposed solutions, data collection, data arrangement, and analysis to reach a valid conclusion. Finally, the conclusions are tested extensively to see if they agree with the original hypotheses.
- Research can be conducted in a variety of fields, including science, social sciences, and humanities, and can take various forms, including experimental research, observational research, and literature reviews. The research aims to generate new knowledge and inform decision-making and policy-making. (C.R.Kothari, 2015)[1]
- Research is the activity of gathering facts and figures in order to comprehend a particular subject or phenomenon. It entails employing a variety of procedures and strategies to collect, analyze, and evaluate data in order to reach relevant conclusions.

Definitions

1. **According to the Department of Education and Training, the research includes:**

   The definition of research is the creation of new knowledge and/or the creative application of previously acquired knowledge to generate new concepts, theories, and understandings. To make new and creative discoveries, it may be necessary to combine and interpret previous research.
2. **According to Redman and Mory,** research is an organized effort to learn new things. (Redman & A.V.H. Mory, 1923)[2]
3. **The Advanced Learner's Dictionary of Current English defines research as** "a careful investigation or inquiry, especially through the search for new facts in any branch of knowledge." (Oxford, 1952)[3]

4.3 OBJECTIVES OF RESEARCH

The goal of the research is to find answers to open-ended questions using scientific methods. The principal aim of the research is to uncover previously hidden and undiscovered truths. Even though each research study has a distinct purpose.

We can categorize research objectives into the following broad categories:

- To acquire new knowledge about a phenomenon or to get used to it.
- Accurately describing a particular person, situation, or group of people.
- To figure out how frequently something happens or how it's connected to other things.
- To investigate the validity of the causal relationship hypothesis.

4.4 CHARACTERISTICS OF GOOD RESEARCH

Inquiry is the foundation of all progress. The famous Hudson maxim, "Doubt is often better than overconfidence because it leads to inquiry, and inquiry leads to invention," explains the significance of the research. Research promotes the development of logical thought patterns, organizational skills, scientific, and inductive reasoning.

- An organized process is used in good research to collect precise data. Researchers must uphold moral standards and a code of conduct when making observations or drawing conclusions.
- The logic-based analysis employs both inductive and deductive reasoning.

- Actual observations made in the context of the natural world are the source of current facts and knowledge.
- All data that has been gathered has undergone a thorough analysis to ensure that there are no irregularities.
- It paves the way for the development of fresh inquiries.
- It is analytical and makes use of all the information available to ensure that the inferences are clear.
- One of the most essential aspects of research is accuracy. The information must be exact and correct.

4.5 WHAT IS THE RESEARCH METHODOLOGY?

Simply put, research methodology is the "how" of conducting a specific piece of research. It refers to the systematic design process used by a researcher when conducting a study to ensure reliable and valid results that address the investigation's goals and objectives.

- What data to collect (and what data to ignore)
- Whom to collect it from (in research, this is called “sampling design”)
- How to collect it (this is called “data collection methods”)
- How to analyze it (this is called “data analysis methods”)

To put it another way, the methodology chapter should provide evidence to support the researcher's research design selection decisions and explain why the methodologies and approaches chosen are the best fit for achieving the study's goals and objectives and producing reliable and accurate results.

4.6 RESEARCH PROCESS

A researcher must follow a set of organized steps in the research process to provide knowledge that will be valued by the project and center on the pertinent topic. Understanding and adhering to the research process steps are necessary for conducting successful research. It seems appropriate to give a brief overview of the research process before getting into the specifics of the research methodology and techniques.

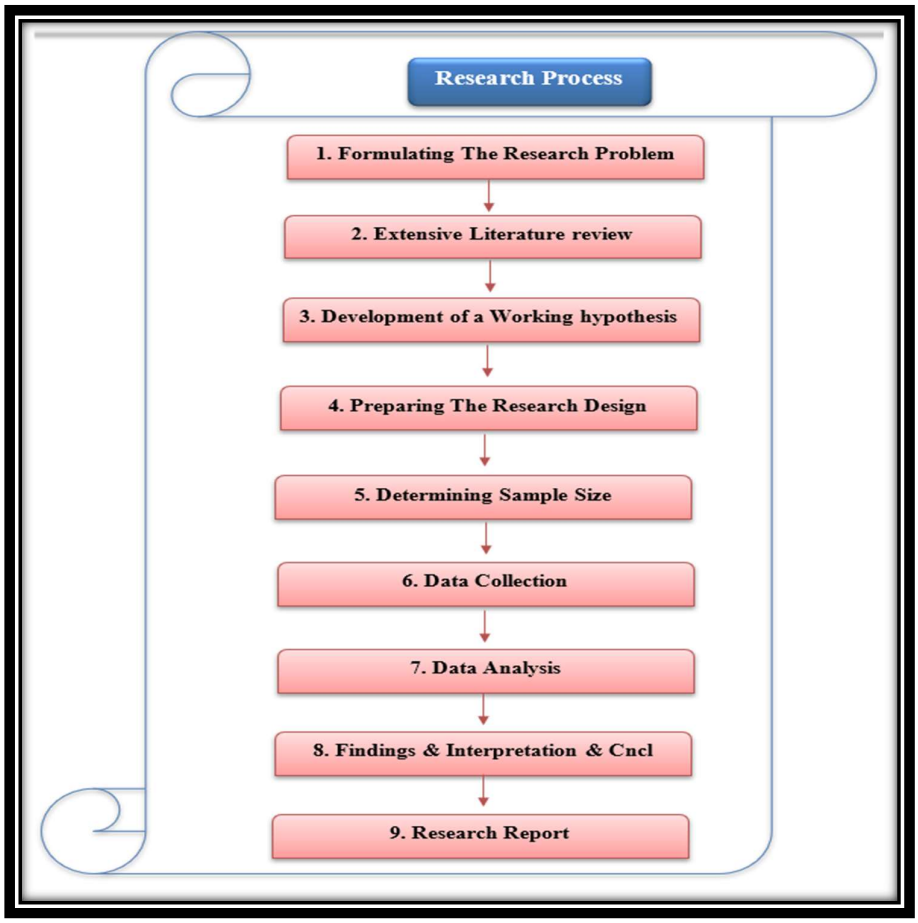
The research process can be simplified by following these steps:

1. **Formulating The Research Problem**

   The formulation of a general topic into a specific research problem constitutes the first step in a scientific inquiry. If there are any ambiguities, they can be clarified

after the problem has been stated broadly in the beginning. Then, the feasibility of a particular solution has to be considered before working on it. To ensure the objectivity and dependability of the background data regarding the issue, however, caution must be exercised. Professor W.A. Neiswanger is right when he says that the statement of the problem is fundamentally important because it determines what data will be collected, the relevant characteristics of the data, the relations that will be explored, the techniques that will be used in these explorations, and the format of the final report.

Figure 4.1 Steps to be Included in Research Process



(Source: Self-Constructed)

2. Extensive Literature Review

Once the problem has been identified, a brief description should be written down. The researcher should now conduct an extensive literature review on the subject. This is accomplished through the use of abstracting and indexing journals, both published and unpublished. The bibliography is the first resource to consult.

Academic journals, conference proceedings, government reports, books, and other resources, depending on the nature of the issue, must be reviewed. At this point, a good library will be extremely useful to the researcher.

3. **Development of a Working Hypothesis**

The researcher should clearly state the working hypothesis or hypotheses after carrying out an extensive review of the literature. A working hypothesis is a speculative assumption made to investigate and test the logical or empirical consequences of that assumption. As a result, since they constitute the primary focus of research, how research hypotheses are developed is a critical task. They have an indirect impact on the quality of the data required for analysis as well as how tests must be performed during data analysis.

4. **Preparing The Research Design**

After clearly defining the research problem, the researcher must create a research design in which he specifies the conceptual framework within which the research will be conducted. The development of such a design makes it easier for researchers to produce as much information as possible while managing to stay as efficient as possible. In other words, the goal of research design is to collect relevant data with the least amount of effort, expense, and time. However, how all of this is accomplished is primarily determined by the research objective. The goals of research can be divided into four categories: (i) exploration, (ii) description, (iii) diagnosis, and (iv) experimentation.

5. **Determining Sample Design**

A "universe" or "population" is the collective set of all the objects under consideration in any field of study. A census inquiry is a comprehensive list of every component of the "population" under study. When every aspect of the investigation has been covered, it can be assumed that there is no room for error and that the highest level of accuracy has been achieved. A sample design is a predetermined strategy chosen prior to gathering any information in order to select a sample from a specific population. The sample design must be chosen by the researcher while keeping the nature of the investigation and other relevant factors in mind.

6. **Data Collection**

When confronted with a real-world problem, it is frequently discovered that the data at hand is insufficient, requiring the collection of more appropriate data. There are several methods for gathering accurate data, each with its own set of costs in terms of time, money, and other resources available to the researcher. Primary data can be gathered through an experiment or a survey. Information gathered from sources other than the original user is referred to as secondary data. It indicates that the information has already been analyzed and is available including books, journals, magazines, newspapers, and other secondary data sources. There is a chance of having either released or unreleased secondary data.

7. **Data Analysis**

Following the collection of data, the researcher begins the process of data analysis. For data analysis, several closely related processes are required, including the creation of categories, and the application of these categories to raw data via coding, tabulation, and the drawing of statistical inferences. The researcher should organize the raw data into some useful categories. To determine the validity of data, relationships or differences supporting or contradicting original or new hypotheses should be subjected to significance tests during the analysis process.

8. **Findings & Interpretation & Conclusion**

If a hypothesis is tested and confirmed several times, the researcher may be able to generalize it. i.e., able to construct a theory. The ability of research to draw generalizations represents its true worth. The interpretation process frequently raises new concerns that could inspire new investigations. In research, a finding is an empirical fact supported by data that does not rely solely on opinion (even that of an expert); a conclusion summarizes and interprets the finding and renders a reasoned conclusion that is consistent with the finding.

9. **Research Report**

Finally, the researcher must write a report that summarizes his findings. A research report is a well-written report on research processes, information, and conclusions. It is an important document that provides others with information about the perspective of the study process and is widely regarded as a trustworthy source of information. A research report is a concise summary of the investigation process

that emphasizes conclusions, suggestions, and other crucial details. You can learn everything you need to know about the research done and the conclusions reached by reading a well-written research report.

4.7 PROBLEM OF THE STUDY

The first and most important step in the research process is the identification of a problem and correctly defining a research problem. A researcher must understand what a problem is in order to define it accurately. A research problem is, generally speaking, a challenge that a researcher faces in the context of a situation that is either theoretical or practical and for which he is looking for a solution. (C.R.Kothari, 2015)[1]

The rise in bankruptcies has made it increasingly important to research a company's financial stability before investing. Financial statements such as the income statement, cash flow statement, and balance sheet provide information about a company's financial health. It reveals whether the company is profitable and whether its financials look promising in terms of potential future earnings.

The present study attempts to EXPLORING THE FINANCIAL PERFORMANCE OF SELECTED PHARMACEUTICAL COMPANIES THROUGH THE ALTMAN'S Z-SCORE MODEL.

4.8 OBJECTIVES OF THE STUDY

Research projects must have specific goals in order to guide the researcher on how to proceed. Analyzing an organization's financial performance to determine the condition of its financial health requires a significant amount of effort and a thorough understanding of financial statements. This study's objective is to bridge this gap using the Z-Score model.

Listed below are the objectives of the current study:

- To gain knowledge about Altman's Z-Score model.
- To analyze the financial health or status of selected pharmaceutical companies using Altman's Z-sore model and classify them into zones suggested by Altman.
- To identify healthy firms for investors among the selected pharmaceutical companies covered in this study.
- To examine the company's overall performance of the last five years using the Z-Score model.

4.9 HYPOTHESES OF THE STUDY

Typically, when someone mentions a hypothesis, they are referring to a simple assumption or assertion that must be supported or repudiated. A hypothesis, on the other hand, is a formal question that a researcher hopes to answer. As a result, a hypothesis can be defined as a claim or set of claims made to explain the occurrence of a specific set of phenomena. (C.R.Kothari, 2015)[1] These assertions may be made solely to direct an investigation, or they may be accepted as highly probable in light of existing facts.

When discussing statistical analysis, the terms null hypothesis and alternative hypothesis are frequently used.

1. **Null Hypothesis (H_0):** The Null hypothesis states that there is no statistically significant relationship between the two variables.
2. **Alternative Hypothesis (H_1):** The alternative hypothesis states that there is a statistically significant relationship between two variables. It is also known as the researcher's hypothesis.

The alternative hypothesis is typically the one that the researcher wishes to prove, whereas the null hypothesis is typically the one that the researcher wishes to disprove.

The following hypothesis was developed to test the above-mentioned objectives.

H_0: There is no significant difference between the Z-Score of selected pharmaceutical companies.

4.10 RESEARCH DESIGN

Research design is necessary because it makes it easier for the various research operations to run smoothly, maximizing the amount of information that can be obtained with the least amount of work, time, and money. A good design reduces bias while boosting the accuracy of the data gathered and analyzed. The research design serves as the conceptual framework for the study and serves as the guide for data collection, measurement, and analysis. As a result, the design contains a step-by-step by step process of the researcher's moves, from developing the hypothesis and evaluating its operational implications to conducting the final data analysis. (C.R.Kothari, 2015)[1]

Here, in this research study "EXPLORING THE FINANCIAL PERFORMANCE OF SELECTED PHARMACEUTICAL COMPANIES THROUGH THE ALTMAN'S Z-SCORE MODEL" will be examined.

4.10.1 TITLE OF THE STUDY

The following is the title of the study:

"EXPLORING THE FINANCIAL PERFORMANCE OF SELECTED PHARMACEUTICAL COMPANIES THROUGH THE ALTMAN'S Z-SCORE MODEL"

4.10.2 PERIOD OF THE STUDY

The current study is conducted for a period of five years, from 2017-18 to 2021-22, to ensure that the research is both meaningful and useful. The length of the study period is regarded as an important factor in reaching a conclusion; if it is too short, the results will be unsatisfactory, and if it is too large data collection and data analysis will become complex and tedious.

4.10.3 SAMPLE OF THE STUDY

The current study considers all the pharmaceutical companies listed on the BSE (Bombay Stock Exchange) as a population. There are 166 Pharmaceutical & drug companies listed on BSE. BSE was taken as a parameter because it is India's primary and biggest stock market. It serves as a centralized market for buying and selling securities, providing investors with a variety of investment options, making it easier for businesses to raise capital, and ensuring the efficient operation of the Indian stock market.

The truth is that the number of units sold is just as important as the revenue generated. Why? Knowing your sales volume can help you in identifying underperforming products and improve your overall sales process. Companies can easily formulate various policies related to economic dimensions using sales data. Total sales reflect the size of the customer base the business has. That is why sales are taken as a selection parameter.

As a result, based on **"total net sales,"** (2021-2022) the researcher selected the top ten pharmaceutical companies listed on the BSE [Bombay Stock Exchange] as a sample from the general population for this study.

Table 4.1 Top 10 Pharmaceutical Companies

NAME OF THE COMPANY	NET SALES [RS. CR.]
1. SUN PHARMA	15585.98
2. DR. REDDY'S LABS	14,405.20
3. CIPLA	13091.79
4. LUPIN	11771.67
5. AUROBINDO PHARMA	11287.14
6. DIVIS LAB	8879.82
7. ALKEM LAB	8829.81
8. GLENMARK	8141.58
9. ZYDUS LIFE	7981.90
10. TORRENT PHARMA	9742.32

(Source: https://www.moneycontrol.com/)

4.10.4 DATA COLLECTION

Data collection begins with determining what type of data is required based on the sampling design and then carrying out the data collection process. The process of data collection entails gathering information from all relevant sources in order to find a solution to the research problem. Data is a collection of facts and figures used for analysis or reference.

There are two categories of data: primary data and secondary data. The current study's data were gathered using a secondary data collection method. It indicates that the information has already been analyzed and is available in books, journals, magazines, newspapers, and other secondary data sources. This data is either published or unpublished.

The main source of data used for this study is **SECONDARY DATA**, which is obtained from the published annual report of selected companies and the website called moneycontrol.com.

4.10.5 DATA ANALYSIS

The extraction of useful information from data and the drawing of conclusions based on that analysis is the objectives of data analysis. The process of modifying, processing, and cleaning raw data in order to extract useful, pertinent information that supports business decision-making is known as data analysis. The analysis provides useful insights and statistics, which are frequently presented in charts, images, tables, and graphs, reducing the risks associated with decision-making.

In this study, Secondary data collected through annual reports and the website will be analyzed with the help of Microsoft Excel.

According to the nature of the study, the researcher employs the following data analysis tools to test the hypothesis:

- Altman's Z-Score Solvency Test

Statistical Tools:

- Anova Test
- Mean
- Standard Deviation
- Coefficient of Variance

Anova Test

Ronald Fisher, a statistician developed the ANOVA. For the current study, ANOVA one-way test is used. One-way ANOVA is frequently used to determine whether variations or different levels of a single independent variable, or factor, have a measurable impact on a dependent variable. Using the ANOVA test, it is possible to compare more than two groups simultaneously to see if there is a correlation between them.

Mean

In statistics, the mean, along with the mode and median, is one of the measures of central tendency. The mean is simply the average of the values in the given set. It denotes that the values in a given data set are distributed equally.

Standard Deviation

The standard deviation is a metric that reveals how much variation from the mean. A "typical" deviation from the mean is shown by the standard deviation.

Coefficient of Variance

The ratio of the standard deviation to the mean is known as the coefficient of variation (CV). The amount of dispersion around the mean increases as the coefficient of variation increases. A percentage is usually used to express it.

4.11 SIGNIFICANCE OF THE STUDY

The study's significance refers to its contribution and impact on a research field. Additionally, the significance also indicates who and how the research findings are beneficial.

- Investors will be able to forecast the financial health of companies before investing by using the Z-score model.
- This study could reveal crucial information about whether the Indian pharmaceutical industry is more vulnerable to financial problems or not.
- By using the Altman model as an early indicator of financial distress, this research will help managers to react quickly in order to stop further losses and or defuse the situation.
- The findings can be used by regulators to develop and implement appropriate policies that will ensure the success of the market system by avoiding the impact of financial hardship on their organization.

4.12 FUTURE SCOPE OF THE STUDY

It is critical to define the scope of the study because it allows a researcher to concentrate on their research work within realistic boundaries.

- To obtain a comprehensive understanding of the pharmaceutical industry, researchers can extend their study's time frame.
- To gain a better understanding of the impact of financial distress on Indian pharmaceutical companies, researchers can collect a larger sample of the pharmaceutical industry.
- In future research, the Altman and other bankruptcy prediction models could be combined to provide more accurate results.
- The researcher used sales as a measurement in this study, but profit, market capitalization, and other metrics can also be used to assess financial health.

- In the present study, financial models are used to predict bankruptcy; for further study, researchers can use accounting-based models, which may give a more precise result.

4.13 LIMITATIONS OF THE STUDY

Every living and non-living thing on Earth has a limitation that limits its functionality. The same rule applies to this research project.

The following are the study's primary limitations:

- The study is based on secondary data obtained from websites and published annual reports. The accuracy and reliability of conclusions depend on the data presented in the annual report and the website.
- The study's sample size is small and the time period covered is of five years. Thus, it may or may not represent the whole population. As a result, the general conclusions drawn may be not applicable to the whole industry.
- Every limitation associated with using secondary data has been considered in this study.
- Analyzing the impact of inflation is significantly vital to the Indian economy. Altman's model does not consider inflation when analyzing the financial situation, the evaluation may be inaccurate.
- The current study's main limitation, it is entirely dependent on Altman's Z-Score Model.

4.14 CHAPTER PLAN

The present study is divided into six chapters, which are as under:

- ✓ **Chapter 1 Introduction of The Pharmaceutical Industry**
- ✓ **Chapter 2 Conceptual Framework**
- ✓ **Chapter 3 Literature Review**
- ✓ **Chapter 4 Research Methodology**
- ✓ **Chapter 5 Data Analysis, and Data Interpretation**
- ✓ **Chapter 6 Summary, Findings, and Suggestions**

CHAPTER 1 INTRODUCTION OF THE PHARMACEUTICAL INDUSTRY

The researcher has provided an overview of the pharmaceutical industry in this chapter. Such as the meaning of pharmaceuticals, the meaning of industry, the meaning of pharmaceutical industry, a brief history of medicines, the father of pharmacy in India, the

post-independence era of the pharmaceutical industry, the types and needs of pharmaceutical companies, pharmaceutical industry products, pharmaceutical industry regulatory bodies, pharmaceutical industry market size and segmentation, and the role of the pharmaceutical industry in Indian GDP, pharmaceutical exports from India, the impact of the Coronavirus on the pharmaceutical industry, key issues facing the pharmaceutical industry, recent technological trends, the pharmaceutical industry's current scenario, worldwide revenue, swot analysis, and the 5S of the pharma industry

CHAPTER 2 CONCEPTUAL FRAMEWORK

This chapter covers the following topics: causes for corporate failure, the definition of financial distress, an explanation of bankruptcy and related terms, an understanding of Altman's Z-Score model, the need for a bankruptcy prediction model, an understanding of several bankruptcy prediction models, what is financial statement analysis, and ratio analysis. The second section of this chapter contains brief information about the sample companies, which are the top ten pharmaceutical companies of India listed on BSE. The parameter for that is total net sales. Moreover, this section describes the vision, mission, business overview, and global footprint of selected companies. Namely, Sun Pharma, Dr. Reddy's Laboratories, Cipla, Lupin, Alkem Labs, Divi's Labs, Aurobindo Pharma, Glenmark, Zydus, and Torrent Pharma.

CHAPTER 3 LITERATURE REVIEW

This chapter defines the meaning, purpose, and importance of literature reviews and provides a step-by-step guide to writing a literature review. This chapter is broken down into five sections. This chapter is divided into five segments. The first one is a literature review related to the pharmaceutical industry & its current scenario. The second segment is a literature review related to the evaluation of the financial performance of corporate entities. The third segment is a literature review related to the significance of ratio analysis. The fourth segment is a literature review related to the application of the z-score model. And the last segment is a literature review related to the comparison of the z-score model with the different models to determine its accuracy level. To identify the research gap, literature reviews are conducted. The above-mentioned literature review aids the researcher in data analysis and interpretation.

CHAPTER 4 RESEARCH METHODOLOGY

The research methodology chapter describes the pathway for research work. This chapter includes the following sections: the meaning and definition of research, the purpose of the research, the qualities of good research, the methodology of the study, the goals and hypotheses, the title of the study, the period of the study, the sample of the study, the data collection method, the tools and techniques used to analyze the data, the significance, scope, and limitations of the study, and a chapter plan.

CHAPTER 5 DATA ANALYSIS & ITS INTERPRETATION

In this chapter, Altman's Z-Score model is used to assess the financial health of the selected pharmaceutical companies. Furthermore, the researcher examined all of the financial components used in the Z-Score formula in this chapter. This chapter discusses the interpretation and analysis of each year's Z-Score and its components. Following that, the ANOVA test was used to examine the Hypothesis.

CHAPTER 6 SUMMARY, FINDINGS AND SUGGESTIONS

This is the final chapter of the study, and it is the final outcome of all the preceding chapters. A summary of the researcher's entire work is presented in this chapter. Then it includes the results of the study for which the researcher wrote this dissertation. Finally, the researcher made recommendations based on the study's findings

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CHAPTER 5

DATA ANALYSIS & DATA INTERPRETATION

CHAPTER 5

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5.1 INTRODUCTION

Written records that describe the operations and financial performance of an organization are known as financial statements. Internal and external stakeholders both utilize financial statement analysis to assess the worth and performance of an organization. All businesses are required to prepare financial accounting to produce balance sheets, income statements, and cash flow statements, which serve as the foundation for financial statement analysis. Analysts examine financial statements using three methods: ratio analysis, vertical analysis, and horizontal analysis.

To get better data insights, researchers should ideally have a deeper knowledge of the justification for choosing one statistical method over another. Finding the most comprehensive, unbiased insights is the main goal of data research and analysis. Any bias or mistake made when gathering data, selecting an incorrect analysis technique, or choosing a sample that is not truly representative of the population will result in a biased conclusion. To present accurate and reliable data, data analysis is used in research. Try to minimize statistical errors and learn how to deal with issues like outliers, missing data, changing data, data mining, or data manipulation.

5.2 WHAT IS DATA COLLECTION?

The task of data collection begins after a research problem has been identified and a research design has been established. The process of collecting data entails gathering information from all relevant sources to solve the research problem. It aids in determining the outcome of the problem. One can conclude about the answer to the critical question using the data collection techniques. The majority of organizations use data collection techniques to predict probabilities and trends in the future.

5.3 WHAT IS DATA ANALYSIS?

After data collection, the data must be processed and analyzed per the guidelines established for the purpose when the research plan was created. The computation of particular metrics and then conducting a search for relationships between data groups are referred to as analysis. Data analysis is the methodical application of statistical and/or logical techniques for describing, illustrating, summarizing, and evaluating data. Through data analysis, businesses can obtain meaningful and accurate information that can be used to develop future marketing plans, and business strategies, and aids in achieving the organization's vision or mission.

5.4 WHAT IS DATA INTERPRETATION?

After collecting and analyzing data, the researcher must complete the task of drawing conclusions, which is followed by report writing. (Kothari, 2015)[1]

This must be done with extreme caution, or else false conclusions will be reached, and the entire purpose of the research will be adversely affected. The interpretation method allows for a more in-depth understanding of the variables that appear to explain the phenomena observed by the researcher throughout the course of the study. It also provides a theoretical framework that can serve as a road map for future research. As a result, the current phase of the study focuses on the investigation of financial health using the Altman model. Each company's Z-score will be calculated to determine its solvency.

Table 5.1 List of Companies Selected for Analysis Purpose

LIST OF THE COMPANY
1. SUN PHARMA
2. DR. REDDY'S LABS
3. CIPLA
4. LUPIN
5. AUROBINDO PHARMA
6. DIVI'S LAB
7. ALKEM LAB
8. GLENMARK
9. ZYDUS LIFE
10. TORRENT PHARMA

(Source: www.moneycontrol.com)

5.5 ANALYSIS OF FINANCIAL COMPONENTS OF Z-SCORE MODEL

The solvency test of sampled units has been conducted in this study using the Altman model. The Altman model examines a number of financial statement components. Therefore, the researcher also took the necessary elements from the financial statement of

the units that were sampled. All the sample companies are public manufacturing companies, so the researcher used the original formula of the Z-Score model to assess the financial position of each company. (Sakaria)[2]

Formula: Z-Score = 1.21X1+1.42X2+3.3X3+0.64X4+0.999X5

1. X1- Working Capital/ Total Assets Ratio
2. X2- Retained Earnings/ Total Asset Ratio
3. X3- Earnings Before Interest and Tax / Total Assets Ratio
4. X4- Market Value of Equity/ Total Liabilities Ratio
5. X5- Total Sales/ Total Assets Ratio

(Source: Self-Constructed)

Table 5.2 Financial Elements Used in The Formula Are As Follows

1. Current Assets	Given in The Balance Sheet
2. Total Assets	Current Assets + Non-Current Assets
3. Net Sales	Revenue from The Operation – Excise/Service Tax & Other Levies
4. Interest	Finance Cost Is Given in The Profit And Loss Account
5. Total Liability	Total Current Liability + Total Non-Current Liability
6. Current Liability	Given in The Balance Sheet
7. Market Value of Equity	Total Shareholder's Fund
8. Earnings Before Interests and Tax	PBT + Finance Cost Given in The P & L
9. Retained Earning	Given in The Balance Sheet
10. Working Capital	Current Assets – Current Liability

(Source: Self-Constructed)

Table 5.3 Zone Wise Result

Zones	Result
Safe Zone	Z > 2.67
Grey Zone	1.81 < Z < 2.67
Distress Zone	Z < 1.81

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

5.5.1 Analysis of Financial Components of Sun Pharma Ltd.

Table 5.4 Financial Components of Sun Pharma Ltd (Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	9,575.21	11,169.77	11,941.12	12,066.34	9,703.75	10,891.24
2. Total Assets	36,791.81	37,714.13	38,410.33	38,998.83	40,765.48	38,536.12
3. Net Sales	8,774.41	9,783.29	11,906.74	12,570.93	15,518.50	11,710.77
4. Interest	388.31	540.92	408.01	256.98	388.1	396.46
5. Total Liability	14,469.20	14,870.52	14,014.11	13,958.67	16,177.53	14,698.01
6. Current Liability	12,558.42	13,271.83	11,203.74	8,343.55	10,105.83	11,096.67
7. Market Value of Equity	22,322.61	22,843.61	24,396.22	25,040.16	24,587.95	23,838.11
8. Earnings Before Interests And Tax	668.56	1,260.37	3,661.01	2,409.85	694.96	1,738.95
9. Retained Earning	12,037.00	12,384.61	14,005.27	15,964.55	13612.08	13,600.70
10. Working Capital	-2,983.21	-2,102.06	737.38	3,722.79	-402.08	-205.44

(Source: Computed from the moneycontrol.com)

Explanation

Table 5.4 shows Sun Pharmaceutical Company's financial components from 2018 to 2022. Current assets, total assets, and net sales all increased during the study period, indicating that the company is doing well. The company's interest cost fluctuates, suggesting an alteration in the company's capital structure. Total liability is nearly stable every year except in 2022. There is a very high fluctuation in the current liability of the company. The market value of equity shows the total shareholder's fund of the company in a given year. The next component is EBIT, which is increasing year over year until 2021, but in 2022 it shows a downward trend, which may put the company at risk. Retained earnings represent

a portion of the profit left with the company, which decreased in 2022 compared to all other years. One important point that should be noted here is that Sun Pharma is having trouble maintaining liquidity. It has negative working capital in 2018, 2019, and 2022 and positive working capital in 2020 and 2021.

Table 5.5 Table Showing Solvency Test Analysis of Sun Pharma

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	-0.081	-0.055	0.019	0.095	-0.009	-0.01
X2. Retained Earnings/ Total Assets	0.327	0.328	0.364	0.409	0.333	0.35
X3. EBIT/ Total Assets	0.018	0.033	0.095	0.061	0.017	0.05
X4. Market Value of Equity/ Total Liabilities	1.542	1.536	1.740	1.793	1.512	1.63
X5. Total Sales / Total Assets	0.24	0.26	0.31	0.32	0.38	0.30
Z Score	1.584	1.683	2.202	2.289	1.806	1.91
Zone	Distress	Distress	Grey	Grey	Grey	Grey

(Source: Computed from the Balance sheet)

Interpretation

Table No. 5.5 reveals the results of the solvency test of Sun Pharma for the last five years. The company is in a distress zone in 2018 and 2019, as the Z-score is less than 1.8. In that year, their X1 ratio was also negative. The X2 ratio has been relatively stable over the years, but in 2021 it increased from 0.36 to 0.41. The company moves from the distressed zone to the grey zone in 2020 as the Z-score increases to 2.2, and the company stays in the grey zone for the following years. The average Z-score of Sun Pharma for the last five years is 1.91, which shows the company's average position is in the grey zone as per Altman's Z-score in the given study period. To move from the grey zone to the safe zone, the company must improve its financial management for all the above-mentioned components. Working

capital management requires special attention because the average working capital to total assets ratio is negative.

5.5.2 Analysis of Financial Components of Dr. Reddy's Labs

Table 5.6 Financial Components of Dr. Reddy's Labs (Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	9,038.50	8,933.20	10,106.70	10,944.20	13,483.60	10,501.24
2. Total Assets	17,100.30	16,247.50	19,475.80	21,629.60	24,495.60	19,789.76
3. Net Sales	9,302.60	10,572.90	11,803.00	13,281.40	14,315.30	11,855.04
4. Interest	62.80	56.80	47.80	46.70	38.00	50.42
5. Total Liability	5,292.50	3,563.40	4,283.90	4,645.90	6,159.40	4,789.02
6. Current Liability	4,719.90	3,079.30	4,180.50	4,560.30	6,045.10	4,517.02
7. Market Value of Equity	11,807.80	12,684.10	15,191.90	16,983.70	18,336.20	15,000.74
8. Earnings Before Interests And Tax	759.80	1,757.50	2,823.60	3,102.90	2,261.80	2,141.12
9. Retained Earning	9,074.00	9,951.10	12,497.90	14,137.30	15,403.00	12,212.66
10. Working Capital	4,318.60	5,853.90	5,926.20	6,383.90	7,438.50	5,984.22

(Source: Computed from the moneycontrol.com)

Explanation

Table No.5.6 shows the financial components of Dr. Reddy's Labs Ltd. to calculate the Z-Score. In 2019, current assets fall from 9038.50 crores to 8933.20 crores. The average current asset maintained by the company for the last five years is 10,501.24 crores. Total assets show an upward trend in every year except for 2019. Net sales are increasing year after year, indicating that the company is generating a significant amount of cash. Finance costs are declining year over year, which is a positive sign for the company because it means it is not incurring new debt. Current liabilities decreased in 2019 but increased in 2022, but total assets, sales, and current assets all increased in the same year, allowing the company to pay its short-term debtors. Throughout the study period, shareholder funds show an increasing trend. Earnings increased dramatically in 2019 and continued to rise until 2021, but it began to fall in 2022. Working capital demonstrates a company's ability to convert its assets into cash, which grows year after year, indicating that the company

will not run out of cash on hand in the near future. The company maintains an average cash balance of Rs. 5984.22 crores.

Table 5.7 Table Showing Solvency Test Analysis of Dr. Reddy's Labs

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.252	0.360	0.304	0.295	0.303	0.30
X2. Retained Earnings/ Total Assets	0.530	0.612	0.641	0.653	0.628	0.61
X3. EBIT/ Total Assets	0.044	0.108	0.144	0.143	0.092	0.11
X4. Market Value of Equity/ Total Liabilities	2.231	3.559	3.546	3.655	2.976	3.19
X5. Total Sales / Total Assets	0.544	0.650	0.606	0.614	0.584	0.60
Z Score	3.074	4.432	4.475	4.549	3.919	4.09
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the Balance Sheet)

Interpretation

The above table summarizes Dr. Reddy's lab's solvency test results from 2018 to 2022. During the study period company's Z-Score ranged between 3.074 to 4.549. The company's average Z-score is 4.09, which is higher than 2.67 and indicates that the company is in the safe zone and will not go bankrupt in the coming 2 years. The company's higher retained earnings show higher reinvestment capacity. The reason could be that the company's net sales, total assets, working capital, and retained earnings proportion have been gradually increasing. This means that the company is better managing and utilizing its finances. The Z-score increased from 2018 to 2021 before declining in 2022.

5.5.3 Analysis of Financial Components of Cipla

Table 5.8 Financial Components of Cipla (Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	7,938.17	9,478.65	9,027.06	10,192.18	12,024.63	9,795.51
2. Total Assets	17,094.97	18,418.81	20,405.66	22,963.74	25,449.05	20,866.45
3. Net Sales	10,949.53	11,968.44	12,220.22	13,610.02	12,827.29	12,187.05
4. Interest	11.90	16.97	36.05	45.07	26.93	27.38
5. Total Liability	2,981.46	2,636.90	3,002.70	3,036.18	2,935.50	2,918.55
6. Current Liability	2,731.70	2,368.08	2,619.29	2,691.94	2,728.56	2,627.91
7. Market Value of Equity	14,113.52	15,781.91	17,402.96	19,927.56	22,513.55	17,947.90
8. Earnings Before Interests And Tax	1,923.30	2,509.08	3,000.36	3,395.73	3,573.16	2,880.33
9. Retained Earning	9,214.31	10,828.56	12,479.72	14,961.71	17,534.77	13,003.81
10. Working Capital	5,206.47	7,380.57	6,407.77	7,500.24	9,296.07	7,158.22

(Computed from the moneycontrol.com)

Explanation

Table No. 5.8 provides an analysis of the financial components of Cipla Ltd during the study period. Except for 2020, each of the remaining years sees an increase in the company's current assets. Throughout the study period, total assets increased. From 2018 to 2022, CIPLA's total assets averaged 20,866.45 crores. From 2018 to 2021, net sales increased slightly but then dropped slightly in 2022. Finance costs show a mixed trend, rising significantly in 2020 and then falling sharply in 2022, indicating a move in the company's capital structure. Current liabilities are increasing as well, but current assets are sufficient to cover them. If the market value of the company's shares rises, investors believe the company has excellent future prospects for growth, expansion, and increased profits. Generally, the increase in sales increases the company's earnings. Retained earnings are also increasing, indicating that businesses are financially viable. The average working capital of the company is Rs 7158.22 crore, indicating its ability to meet its current obligations.

Table 5.9 Table Showing Solvency Test Analysis of Cipla

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.304	0.400	0.314	0.326	0.3652	0.34
X2. Retained Earnings/ Total Assets	0.539	0.587	0.611	0.651	0.689	0.62
X3. EBIT/ Total Assets	0.112	0.136	0.147	0.147	0.140	0.14
X4. Market Value of Equity/ Total Liabilities	4.733	5.985	5.795	6.563	7.669	6.15
X5. Total Sales / Total Assets	0.640	0.649	0.598	0.592	0.504	0.60
Z Score	4.971	5.993	5.793	6.322	6.971	6.01
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the balance sheet)

Interpretation

Cipla Ltd.'s solvency is revealed in Table No. 5.9. Cipla's Z-score for each year is greater than 2.67, indicating that the company has remained in a safe zone throughout the study period. Cipla's average Z-score from 2018 to 2022 is 6.01, denoting that the company's financial position is incredibly powerful. The X1 ratio compares the firm's net liquid assets to its capitalization or total assets; in this case, working capital accounts for 34% of total assets, while retained earnings account for 62%. The market value of the result of the equity to total liabilities ratio is much higher than any other result. The measurements demonstrate how much can happen to the value of the company's assets before the liabilities outweigh the assets and the company goes bankrupt. The capital turnover ratio is a standard financial ratio that reveals a firm's asset's ability to generate sales. This ratio has gradually decreased from 2018 to 2022. Cipla's overall financial position is strong, so investors should not be concerned about their returns.

5.5.4 Analysis of Financial Components of Lupin

Table 5.10 Financial Components of Lupin

(Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	8,717.45	9,484.51	10,838.51	9,617.37	8,437.82	9,419.13
2. Total Assets	18,681.00	19,690.21	20,680.50	21,858.56	22,313.37	20,644.73
3. Net Sales	9,846.30	11,031.56	10,805.83	10,901.02	11,258.48	10,768.64
4. Interest	33.24	35.47	52.59	40.62	73.47	47.08
5. Total Liability	2,896.04	2,572.94	3,207.30	3,292.99	4,163.18	3,226.49
6. Current Liability	2,336.21	1,997.39	2,555.79	2,585.83	3,537.91	2,602.63
7. Market Value of Equity	15,784.96	17,117.27	17,473.12	18,565.52	18,150.19	17,418.21
8. Earnings Before Interests And Tax	1,827.17	2,377.84	1,104.84	1,670.32	-88.06	1,378.42
9. Retained Earning	12,961.06	14,227.34	14,592.93	15,579.67	15,032.74	14,478.75
10. Working Capital	6,381.24	7,487.12	8,282.72	7,031.54	4,899.91	6,816.51

(Source: Computed from the moneycontrol.com)

Explanation

Table No. 5.10 shows the interpretation of the financial components of the Altman model for Lupin Ltd., a developing pharmaceutical company in India. The current assets increased from 2018 to 2020. Then, in 2021 and 2022, it started to fall. The company's average total assets during the study period were Rs. 20644.73 crores. The net sale varies from 2018 to 2022. By 2020, interest expenses would have shot up from 35.47 crores to 52.59 crores. Then decreased in 2021 before increasing again in 2022 and reaching 73.47 crores. Total liability, which includes both short- and long-term debt from 2019 to 2022, exhibits an upward trend. Current liabilities that must be paid during the year display a mixed trend over the study period. In comparison to 2018, the equity's market value rose sharply in 2019. Then it gradually rises over the next few years. Earnings before interest and taxes (EBIT), a common measure of a company's operating profitability, has been highly unstable during the study period and fall negative in 2022. Throughout the study period, the average working capital was Rs. 6816.51 crore.

Table 5.11 Table Showing Solvency Test Analysis of Lupin

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.341	0.380	0.400	0.321	0.219	0.332
X2. Retained Earnings/ Total Assets	0.693	0.722	0.705	0.712	0.673	0.701
X3. EBIT/ Total Assets	0.648	0.678	0.766	0.645	0.435	0.634
X4. Market Value of Equity/ Total Liabilities	5.450	6.652	5.447	5.637	4.359	5.509
X5. Total Sales / Total Assets	0.527	0.560	0.522	0.498	0.504	0.522
Z Score	7.316	8.258	7.788	7.393	5.762	7.304
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from The Balance Sheet)

Interpretation

Table 5.11 shows Lupin Ltd.'s solvency position over the last five years. Despite ups and downs in each component, the Z-score indicates that the company's financial condition is very sound. The Z-Score is significantly higher than 2.67 in each of the years studied. The company is concise and won't experience a financial crisis shortly because its Z-score is higher than 2.67. The company's average Z-score during the study period was 7.30, which was more than twice the threshold. Every year's Z-score is relatively close to its average Z-score, except for March 2022. The Z-score drops to 5.76 in 2022. This is a result fact that the EBIT for that year was negative, total liabilities increased from the preceding year, and working capital decreased. Despite the high Z-score, the company should make sure all financial indicators are consistent and work to balance them all.

5.5.5 Analysis of Financial Components of Aurobindo Pharma

Table 5.12 Financial Components of Aurobindo Pharma

(Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	8,981.20	10,408.34	11,248.09	12,377.86	9,835.11	10,570.12
2. Total Assets	21,600.95	23,188.99	19,534.57	18,140.72	15,793.84	19,651.81
3. Net Sales	10,008.71	11,938.70	12,934.53	15,622.18	11,250.07	12,350.84
4. Interest	52.89	230.86	240.94	28.68	16.94	114.06
5. Total Liability	5,811.26	6,790.10	6,509.01	7,264.38	4,483.61	6,171.67
6. Current Liability	5,754.18	6,736.46	6,359.90	6,756.58	4,180.97	5,957.62
7. Market Value of Equity	9,982.58	11,350.62	13,025.56	15,924.61	17,117.34	13,480.14
8. Earnings Before Interests And Tax	2,395.83	2,195.48	2,618.64	4,221.69	1,654.42	2,617.21
9. Retained Earning	8,790.74	10,160.13	11,799.30	14,671.41	15,864.14	12,257.14
10. Working Capital	3,227.02	3,671.88	4,888.19	5,621.28	5,654.14	4,612.50

(Source: Computed from the moneycontrol.com)

Explanation

Table 5.12 shows the financial components of the Aurobindo Pharma Company that were used in Altman's Z-Score Model. From 2018 to 2021, current assets grew yearly but fell in 2022. Total sales increased in 2018 and 2019, after which they trend downward until 2022. Finance costs fluctuate significantly, and the company must record all of the causes of this and determine whether it has an impact on the final result or not. Consistently rising and falling, current liability sharply starts to fall in 2022. Throughout the study period, the market value is constantly increasing. EBIT nearly doubled from 2618.64 crores to 4221.69 crores in one year, and it declined at the same rate to 1654.42 crores in 2022. Positively, the retained portion gradually increased over these years. The fact that the company's working capital is increasing over time is another plus.

Table 5.13 Table Showing Solvency Test Analysis of Aurobindo Pharma

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.149	0.158	0.250	0.309	0.357	0.2451
X2. Retained Earnings/ Total Assets	0.406	0.438	0.604	0.808	1.004	0.652
X3. EBIT/ Total Assets	0.110	0.094	0.134	0.232	0.104	0.135
X4. Market Value of Equity/ Total Liabilities	1.717	1.671	2.001	2.192	3.817	2.280
X5. Total Sales / Total Assets	0.463	0.514	0.662	0.861	0.712	0.642
Z Score	2.608	2.633	3.450	4.447	5.183	3.664
Zone	Grey	Grey	Safe	Safe	Safe	Safe

(Source: Computed from the Balance Sheet)

Interpretation

Table 5.13 shows the result of the solvency test for Aurobindo Pharma for five years. It includes the Z-Score for 2018–2022. The Z- Score for the company in 2018 and 2019 is less than 2.67, which denotes that it is in the grey zone. The company's Z-score increased over the course of the following year from 2.63 to 3.45, which is higher than 2.67 and places it in the safe zone. The company then stays in the safe zone until 2022. Aurobindo Pharma's average Z-score is 3.66, placing it in a favorable range and assuring its shareholders and other stakeholders of its credibility. Once a company enters the safe zone from the grey zone, its Z-Score keeps rising, attracting more investors which demonstrates the company's ability to maintain its financial resources. Throughout the study period, Aurobindo Pharma's overall condition was satisfactory.

5.5.6 Analysis of Financial Components of Divi's Labs

Table 5.14 Financial Components of Divi's Labs (Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	4,553.91	4,647.49	4,661.17	6,125.31	8,295.96	5,656.77
2. Total Assets	6,807.78	8,040.18	8,514.11	10,723.77	13,307.86	9,478.74
3. Net Sales	3,731.90	4,737.22	5,207.32	6,687.55	8,719.22	5,816.64
4. Interest	1.33	3.50	6.06	0.69	0.65	2.45
5. Total Liability	848.13	1,066.87	1,197.42	1,452.20	1,616.51	1,236.23
6. Current Liability	640.49	832.52	902.94	1,088.89	1,168.40	926.65
7. Market Value of Equity	5,959.65	6,973.31	7,316.69	9,271.57	11,691.35	8,242.51
8. Earnings Before Interests And Tax	4,879.21	1,836.73	1,819.35	2,628.56	3,677.17	2,968.20
9. Retained Earning	4,761.92	5,636.87	5,814.44	7,588.31	9,967.53	6,753.81
10. Working Capital	3,913.42	3,814.97	3,758.23	5,036.42	7,127.56	4,730.12

(Source: Computed from the moneycontrol.com)

Explanation

Table No. 5.14 displays the elements of the Altman model that were examined during the research period. The company's current assets grow year over year, but its current liabilities grow more or less at the same or slower rate each year. In addition, the company's working capital also shows an upward trend, which is encouraging because it indicates the company has sufficient liquidity to cover its current liabilities. Interest costs rose between 2018 and 2020 but sharply dropped between 2021 and 2022. The company's net sales also demonstrate an upward trend, indicating that the rate at which the company is generating revenue is rising over time. generally, Investor confidence is high when a company's market value is high. Your investment in such a stock might generate great profits. The market value in this instance is rising yearly as well. Throughout the research period, EBIT displayed a mixed trend. In 2018 and 2019, there was significant fluctuation. Each year's retained earnings indicate the portion of the profit that was retained by the business. In 2018, 2019, and 2020, it was relatively stable, but after that, it began to trend upward, and during the study period, the average retained earnings were 6753.81 crores.

Table 5.15 Table Showing Solvency Test Analysis of Divi's Labs

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.574	0.474	0.441	0.469	0.535	0.499
X2. Retained Earnings/ Total Assets	0.699	0.701	0.682	0.707	0.748	0.708
X3. EBIT/ Total Assets	0.716	0.228	0.213	0.245	0.276	0.336
X4. Market Value of Equity/ Total Liabilities	7.026	6.536	6.110	6.384	7.232	6.658
X5. Total Sales / Total Assets	0.548	0.589	0.611	0.623	0.655	0.605
Z Score	8.797	6.815	6.468	6.816	7.597	7.299
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the balance sheet)

Interpretation

Table no. 5.15 reveals the solvency position of Divi's labs. The Z-Score is significantly higher than the cut-off score of 2.67, indicating that the company is operating in a safe zone during the study period. The company's financial position is considered to be very strong based on the average Z-Score observed, which is 7.30. This score is also very high when compared to the cut-off score. The highest Z-score observed in 2018 (roughly 8.80) then exhibits a downward trend over the following three years. Then it increases to 7.60 in 2022. All ratios during the study period were close to their average ratios, with the exception of the EBIT to Total Assets ratio. From 2018 to 2022, the EBIT to Total Assets Ratio fluctuates more than average almost every year. According to the statistics, it seems unlikely that the company will ever declare bankruptcy soon.

5.5.7 Analysis of Financial Components of Alkem Labs

Table 5.16 Financial Components of Alkem Labs (Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	2,933.67	3,080.68	4,229.18	5,631.54	6,860.61	4,547.14
2. Total Assets	6,814.17	7,292.15	9,105.83	10,772.73	13,169.17	9,430.81
3. Net Sales	5,196.70	5,631.36	6,534.80	7,088.08	8,829.81	6,656.15
4. Interest	32.37	28.26	38.71	42.93	37.90	36.03
5. Total Liability	1,928.81	1,826.94	2,825.39	3,146.98	4,425.51	2,830.73
6. Current Liability	1,786.68	1,669.87	2,579.76	2,909.94	4,123.76	2,614.00
7. Market Value of Equity	4,885.36	5,465.21	6,280.44	7,625.75	8,743.66	6,600.08
8. Earnings Before Interests And Tax	966.66	972.22	1,376.79	1,927.23	1,791.27	1,406.83
9. Retained Earning	2,933.78	3,517.81	4,350.32	5,700.62	6,823.39	4,665.18
10. Working Capital	1,146.99	1,410.81	1,649.42	2,721.60	2,736.85	1,933.13

(Source: Computed from the moneycontrol.com)

Explanation

Table No. 5.16, shows the position of the financial components of Alkem Labs. The company's current assets show an increasing trend over the course of the study. The company has kept current assets at an average level of Rs 4547.14 crore over the past five years. In 2019 as compared to 2018, current liability decreased. Then, in 2020, it increased by 1.5 times and it kept growing in the last year of the study period. The year goes on, and net working capital rises. In comparison to 2018, the company's total assets nearly doubled in 2022. The average total assets observed are 9430.81 crores. A mixed trend can be seen in finance costs, which decreased in 2019 compared to 2018 before increasing in 2021 and then falling once more in 2022. Year after year, the market value of equity rises steadily. From 2018 to 2021, EBIT also exhibited an upward trend, but in 2022, it began to decline. The average retained earnings held by the company during the study period were 4665.18 crores, and retained earnings also show an upward trend.

Table 5.17 Table Showing Solvency Test Analysis of Alkem Labs

Ratio / Year	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.168	0.193	0.181	0.252	0.207	0.200
X2. Retained Earnings/ Total Assets	0.430	0.482	0.477	0.529	0.518	0.487
X3. EBIT/ Total Assets	0.141	0.133	0.151	0.178	0.136	0.148
X4. Market Value of Equity/ Total Liabilities	2.532	2.991	2.222	2.423	1.975	2.429
X5. Total Sales / Total Assets	0.762	0.772	0.717	0.657	0.670	0.716
Z Score	3.554	3.913	3.435	3.745	3.278	3.585
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the balance sheet)

Interpretation

Table No. 5.17 provides an analysis of solvency ratios that predict corporate bankruptcy using the Altman Model. The company's Z-Score for 2018 was 3.554, higher than the threshold score of 1.81, putting it in the safe zone. A Z-Score of less than 1.81 indicates that the company will probably experience financial difficulty in the next two years, according to the Z-Score model. The company has kept its Z-Score above 2.68 for the duration of the study, putting it in the "Safe" region. This table shows that the company's financial situation has remained stable over the years. The Z-score ranges from 3.278 to 3.913, but in march 2022 compared to 2021, it slightly decreased. The lowest Z-Score was recorded in March 2022. This analysis leads to the conclusion that the business is doing well financially.

5.5.8 Analysis of Financial Components of Glenmark

Table 5.18 Financial Components of Glenmark

(Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	5,875.25	5,141.15	4,423.90	4,909.12	4,402.93	4,950.47
2. Total Assets	15,264.87	17,142.70	18,951.60	20,617.52	22,914.48	18,978.23
3. Net Sales	6,096.05	6,131.14	6,491.20	7,450.91	8,017.38	6,837.34
4. Interest	190.90	223.81	256.39	265.90	236.04	234.61
5. Total Liability	4,873.43	5,200.61	5,725.34	5,808.02	6,175.90	5,556.66
6. Current Liability	2,184.80	2,280.65	2,388.52	2,503.35	3,441.06	2,559.68
7. Market Value of Equity	10,391.44	11,942.09	13,226.26	14,809.51	16,738.59	13,421.58
8. Earnings Before Interests And Tax	1,409.23	2,041.99	1,791.03	2,209.66	2,573.49	2,005.08
9. Retained Earning	8,508.83	10,059.38	11,340.47	12,921.86	14,863.96	11,538.90
10. Working Capital	3,690.45	2,860.50	2,035.38	2,405.77	961.87	2,390.79

(Source: Computed from the moneycontrol.com)

Explanation

Table No. 5.18 demonstrates the analysis of the financial components the Glenmark Ltd. for 2018–2022. During the study period, the company's current assets and liabilities fluctuated. However, compared to the year prior, current liabilities rose by almost 1000 crores in 2022. Throughout the study period, total liabilities increased. Over the course of the study, working capital decreased. Here, it's important to keep in mind that, compared to 2021, working capital significantly decreased 2022 to Rs. 1443.9 crores in 2022. Net sales decreased only once in 2019 and increased gradually in the subsequent years. From 2018 to 2021, interest costs rose, but it slightly fell in 2022 to Rs. 29.36 crore. In these five years, EBIT experienced both ups and downs. The equity market value exhibits an increasing trend. Retained earnings are also rising annually, reaching a high of 14863.96 crores in 2022.

Table 5.19 Table Showing Solvency Test Analysis of Glenmark

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.241	0.166	0.107	0.116	0.041	0.134
X2. Retained Earnings/ Total Assets	0.557	0.586	0.598	0.626	0.648	0.603
X3. EBIT/ Total Assets	0.092	0.119	0.094	0.107	0.112	0.105
X4. Market Value of Equity/ Total Liabilities	2.132	2.296	2.310	2.549	2.710	2.399
X5. Total Sales / Total Assets	0.399	0.357	0.342	0.361	0.349	0.362
Z Score	3.053	3.149	3.006	3.262	3.304	3.155
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the balance sheet)

Interpretation

Table No. 5.19 shows the solvency position of Glenmark Ltd. The Z-score of the company is above the cut-off score, i.e., 2.67, showing that the company has been in the safe zone throughout the study period. Almost every year, the company maintained the same Z-Score level, indicating that the company's financial position is stable. The company maintains an average Z-score of 3.16, which places it in the safe zone and indicates that it won't go bankrupt anytime soon. The company kept its working capital to total assets ratio at 13 % throughout the study period. The highest percentage of all Z-Score ratios is the return on total assets, which suggests that it can be very helpful in predicting bankruptcies. Every year's ratio is roughly in line with the average, demonstrating the company's priority on maintaining balance. Currently, the company's overall financial condition is satisfactory.

5.5.9 Analysis of Financial Components of Zydus

Table 5.20 Financial Components of Zydus

(Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	3,557.40	4,262.00	4,792.70	6,031.70	6,837.40	5,096.24
2. Total Assets	12,163.70	13,671.10	16,551.50	18,463.60	17,740.00	15,717.98
3. Net Sales	5,576.00	5,746.60	5,967.70	7,436.70	7,590.00	6,463.40
4. Interest	63.90	89.60	233.90	70.90	134.90	118.64
5. Total Liability	4,418.20	5,101.90	5,291.30	5,719.10	4,499.50	5,006.00
6. Current Liability	2,790.70	2,805.90	3,449.30	4,821.00	4,027.90	3,578.96
7. Market Value of Equity	7,745.50	8,569.20	11,260.20	12,744.50	13,240.50	10,711.98
8. Earnings Before Interests And Tax	1,561.10	1,830.90	1,791.60	1,759.40	1,298.80	1,648.36
9. Retained Earning	6,073.90	2,910.10	1,806.30	3,736.50	3,545.40	3,614.44
10. Working Capital	766.70	1,456.10	1,343.40	1,210.70	2,809.50	1,517.28

(Source: computed from the moneycontrol.com)

Explanation

Table 5.20 shows the list of financial components used in the Z-Score model during the study period of 2018–2022. During the time of the study, current assets exhibited an increasing trend. Current assets are nearly doubled from what they were in 2018. During the study period, current liability showed an increase in trend. Working capital was nearly double in 2019 compared to 2018. After that, it starts to decline for the next two years before rising significantly in 2022. The first three years of the study period saw almost no change in net sales, but the final two years saw an increase. Interest costs were 89.60 crores in 2019, but increased at 2.5 times speed in the succeeding year, then decreased at nearly the same rate, and fell to 70.9 crores in 2021. The market value goes up yearly. Throughout the research period, EBIT exhibited a mixed trend. Retained earnings from 2022 are almost half of what they were in 2018. During the study period, the company kept on average 3614.44 crores in retained earnings.

Table 5.21 Table Showing Solvency Test Analysis of Zydus

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.063	0.106	0.081	0.065	0.158	0.094
X2. Retained Earnings/ Total Assets	0.499	0.212	0.109	0.202	0.199	0.244
X3. EBIT/ Total Assets	0.128	0.133	0.108	0.095	0.073	0.107
X4. Market Value of Equity/ Total Liabilities	1.753	1.679	2.128	2.228	2.942	2.146
X5. Total Sales / Total Assets	0.458	0.420	0.360	0.402	0.427	0.413
Z-Score	2.708	2.295	2.244	2.415	2.904	2.513
Zone	Safe	Grey	Grey	Grey	Safe	Grey

(Source: Computed from the balance sheet)

Interpretation

Table 5.21 shows Zydus Lifesciences Ltd.'s solvency position from 2018 to 2022. The Z-score indicates that the company has been in the grey area for three years. Z-scores between 1.81 and 2.67 are represented by the grey zone. Over the previous five years, the company's average Z-score was 2.51. The company must reach a Z-score of at least 2.67 to enter the safe zone, and for that management must take all required corrective actions after carefully examining all financial components. Table 5.20 shows that finance costs and working capital fluctuate more than expected. Do they have an impact on the business's finances? If so, corrective action should be taken to create a balance between all the elements. Another significant factor that the company had to carefully examine is retained earnings because it had been declining over time. Z-Score, however, exhibits an upward trend from 2020 to 2022. In order to be in the safe zone and win the trust of its customers, the business could achieve a Z-score of 267.

5.5.10 Analysis of Financial Components of Torrent Pharma

Table 5.22 Financial Components of Torrent Pharma

(Rs. In Crores)

Components/Years	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
1. Current Assets	3,639.05	3,748.95	3,819.26	4,141.88	4,060.05	3,881.84
2. Total Assets	11,820.07	12,027.27	11,884.47	11,761.04	11,152.56	11,729.08
3. Net Sales	4,141.90	5,556.72	6,025.93	6,333.04	6,665.96	5,744.71
4. Interest	293.68	480.97	430.49	334.12	236.29	355.11
5. Total Liability	7,263.58	7,012.00	6,763.50	5,730.94	4,807.14	6,315.43
6. Current Liability	2,987.55	3,087.82	3,387.48	2,585.80	2,423.36	2,894.40
7. Market Value of Equity	4,556.49	5,015.27	5,120.97	6,030.10	6,345.42	5,413.65
8. Earnings Before Interests And Tax	855.81	1,416.09	1,547.26	1,700.23	1,703	1,444.38
9. Retained Earning	1,453.31	1,884.05	2,093.30	2,899.91	3,212.92	2,308.70
10. Working Capital	651.50	661.13	431.78	1,556.08	1,636.69	987.44

(Source: Computed from the moneycontrol.com)

Explanation

The number of elements used to calculate the Z-score is shown in Table 5.22. The first four years of the study period saw an increasing trend in current assets, which then slightly decreased by 81.83 crores in the final year. After rising in 2019 and 2020, current liabilities then began to decline over the next two years. From a financial perspective, the company's total liability is decreasing year over year, which is a welcome thing. The total amount of assets is close to the average amount during the study period. Up until 2020, working capital was on the decline, but in 2021 it increased by more than three times. During the study period, the company's net sales increased gradually. The first three years of finance costs show an upward trend, then begin to decrease in the subsequent two years. The market value of the company's equity displays an increasing trend over the study period. The first three years saw an increase in EBIT, and the last two years saw almost no change. Between 2018 and 2022, retained earnings exhibited an upward trend. The company's average retained earnings during the study period were Rs 2308.70 crore.

Table 5.23 Table Showing Solvency Test Analysis of Torrent Pharma

Ratio	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	AVG
X1. Working capital/Total Assets	0.055	0.054	0.036	0.132	0.146	0.085
X2. Retained Earnings/ Total Assets	0.122	0.156	0.176	0.246	0.288	0.198
X3. EBIT/ Total Assets	0.072	0.117	0.130	0.144	0.152	0.123
X4. Market Value of Equity/ Total Liabilities	0.627	0.715	0.757	1.052	1.319	0.894
X5. Total Sales / Total Assets	0.350	0.462	0.507	0.538	0.597	0.491
Z Score	1.203	1.564	1.680	2.150	2.472	1.814
Zone	Distress	Distress	Distress	Grey	Grey	Grey

(Source: Computed from the balance sheet)

Interpretation

Table no. 5.23 reveals the results of the solvency test of Torrent Pharmaceuticals Ltd. For the period from 2018 to 2022. In 2018, 2019, and 2020, the company's Z-score was less than 1.81. The company then shifts into the grey zone in 2021 and 2022 by having a Z-score greater than 1.81 and less than 2.67. The company's average Z-score is exactly equal to the cut-off score, which is 1.81, indicating that during the study period, the company's average position was in the grey area. Table 5.22 shows that the components with the highest fluctuations are interest cost, total liability, and current liability. To look for gaps, the company's management must examine all of its accounts and statements. After talking with the company's management team, implement the necessary changes to foster a stable financial environment. A company must act wisely, take all necessary precautions, and achieve a minimum Z-score of 2.67 in order to enter the safe zone. The business has the opportunity to strengthen its financial standing in order to compete more effectively in the pharmaceutical sector.

Table 5.24 Showing Result Of Z-Score Of For Each Year From 2018 to 2022

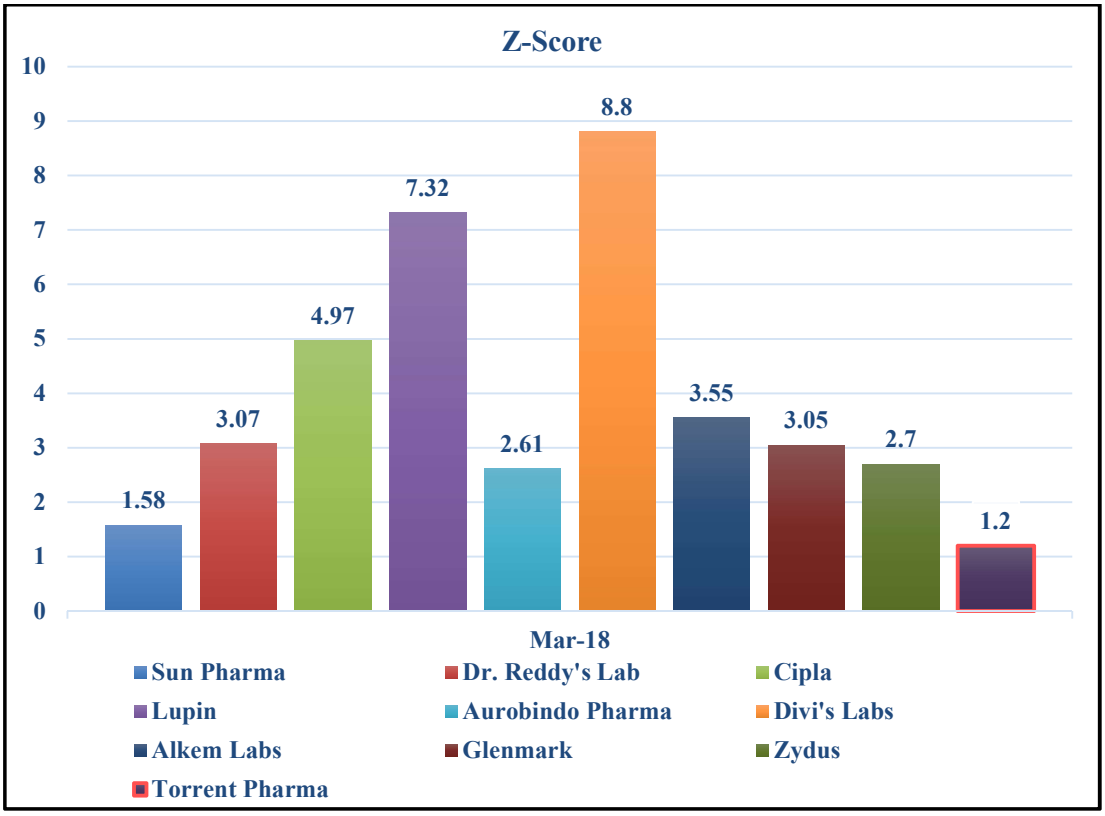
Company/ Year	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22
1. Sun Pharma	1.58	1.68	2.2	2.29	1.8
2. Dr. Reddy's Lab	3.07	4.43	4.47	4.55	3.92
3. Cipla	4.97	5.99	5.79	6.32	6.97
4. Lupin	7.32	8.26	7.79	7.39	5.76
5. Aurobindo Pharma	2.61	2.63	3.45	4.45	5.18
6. Divi's Labs	8.8	6.82	6.47	6.82	7.6
7. Alkem Labs	3.55	3.91	3.44	3.74	3.29
8. Glenmark	3.05	3.15	3.01	3.26	3.3
9. Zydus	2.7	2.3	2.24	2.42	2.9
10. Torrent Pharma	1.2	1.56	1.68	2.15	2.47
Average	3.89	4.07	4.05	4.34	4.32

(Source: Computed from the balance sheet)

Explanation

Table 5.24 shows the Z-Score for each company from 2018 to 2022. In 2018, Divi's lab reported the highest Z-Score, 8.8, and torrent pharma reported the lowest Z-Score, which is 1.2. In 2019, the Z-Score ranges from 1.56 to 8.26, and in March 2020, torrent pharma reports the lowest Z-Score, which is 1.68. None of the aforementioned companies reported a Z-Score below 1.81 in 2021, which was the best year for performance compared to other years. Lupin recorded the highest Z-Score of 7.39, and torrent pharma recorded the lowest of 2.15. The Z-Score for March 2022 ranges from 1.8 to 6.97, with an average of 4.32, placing pharmaceutical companies in the safe zone. There is no noticeable variation in the year-to-year average calculation. The average Z-Score for each company from 2018 to 2022 is approximately 4, which also indicates that companies are doing very well.

Figure 5.1 Showing The Z-Score Of Each Company For The Year 2018

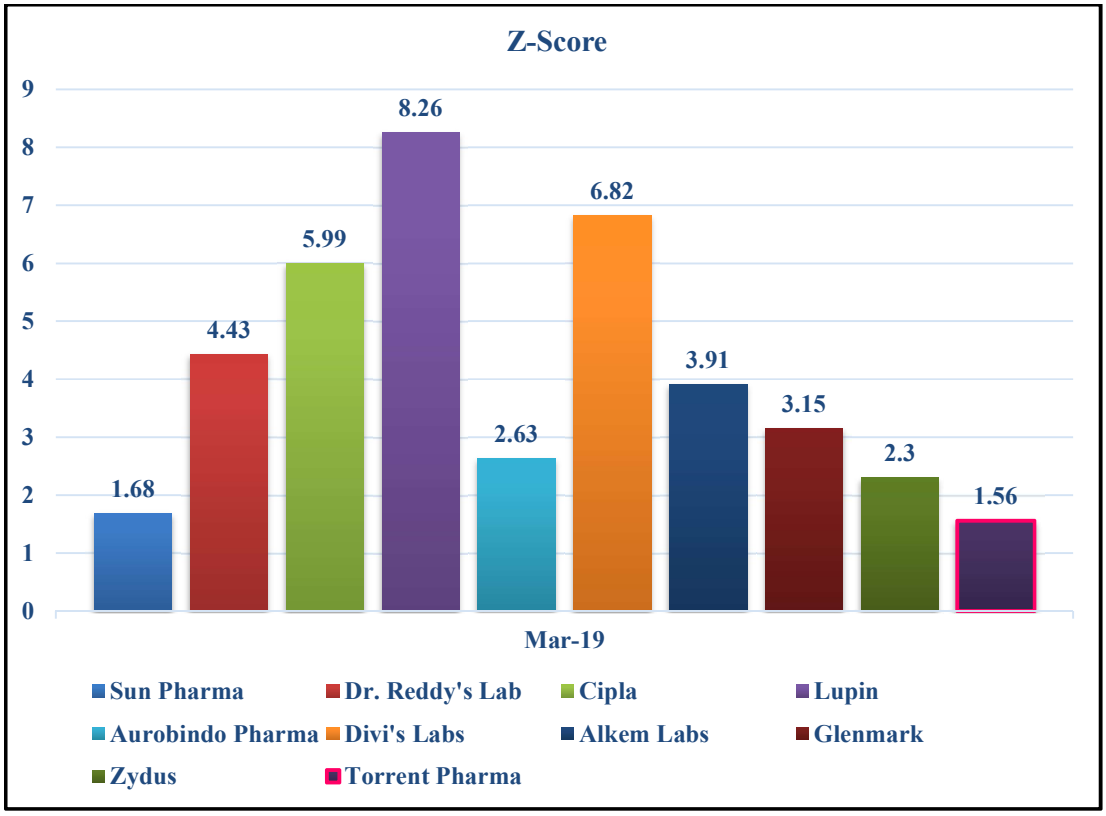


(Source: Computed from the Excel)

Explanation

- Figure 5.1 displays a bar graph of the Z-Score for a specific pharmaceutical company in the year 2018.
- The highest Z-Score, 8.8, was reported by Divi's Lab, while the lowest Z-Score, 1.2, was reported by Torrent Pharma.
- These are the top ten pharmaceutical companies. However, the Z-Score varies significantly for the same year.
- According to the guidelines of the Z-Score model, three out of ten companies are not in the safe zone by having Z-Score less than 1.81.
- By having companies in distress, grey, and the safe zone simultaneously, 2018 demonstrates a mix trend.

Figure 5.2 Showing The Z-Score Of Each Company For The Year 2019

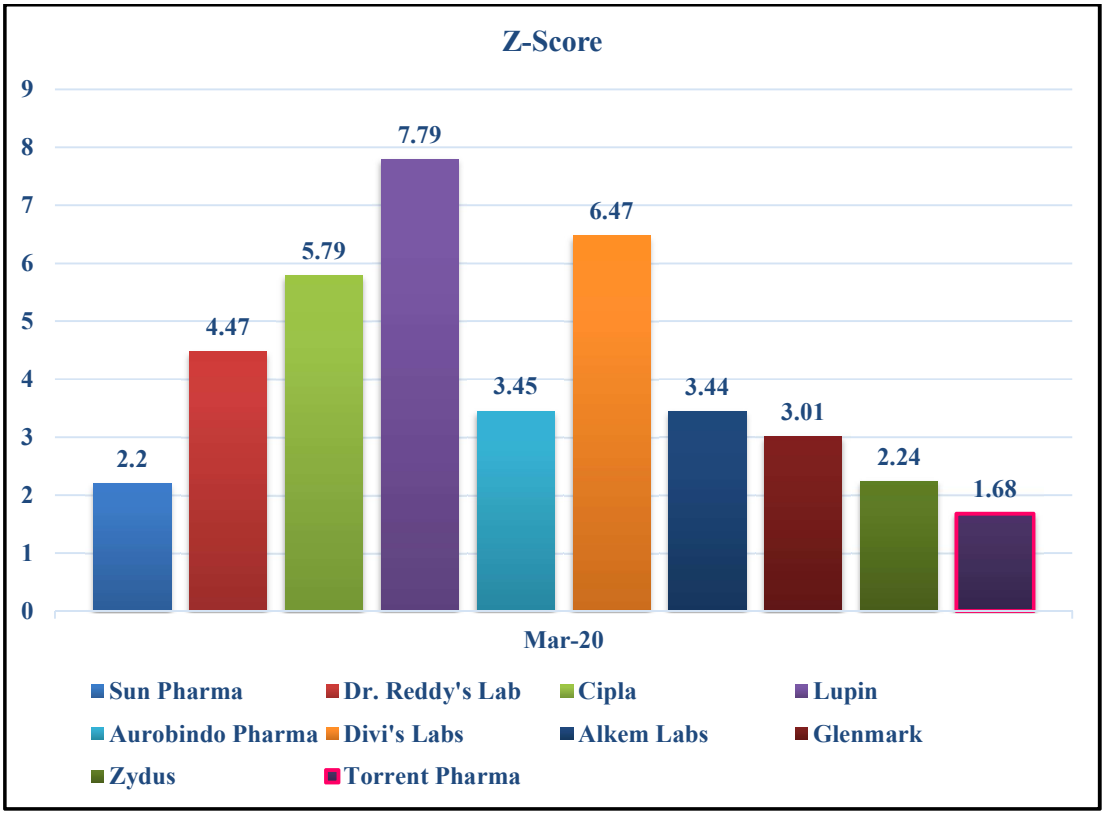


(Source: Computed from the Excel)

Explanation

- Figure 5.2 shows a bar graph of the Z-Score of a specific pharmaceutical company in 2019.
- To easily track progress, a bar graph divides the data into separate bars.
- According to the above graph, the highest Z-Score is 8.26 and the lowest is 1.56, respectively.
- Lupin pharmaceuticals has the highest and torrent pharmaceuticals has the lowest Z-Score in the year 2019.
- Another thing to keep in mind is that the Z-Score shows a mixed trend, or it can be said that there is a lot of variation in the Z-Score of different companies in the same year.

Figure 5.3 Showing The Z-Score Of Each Company For The Year 2020

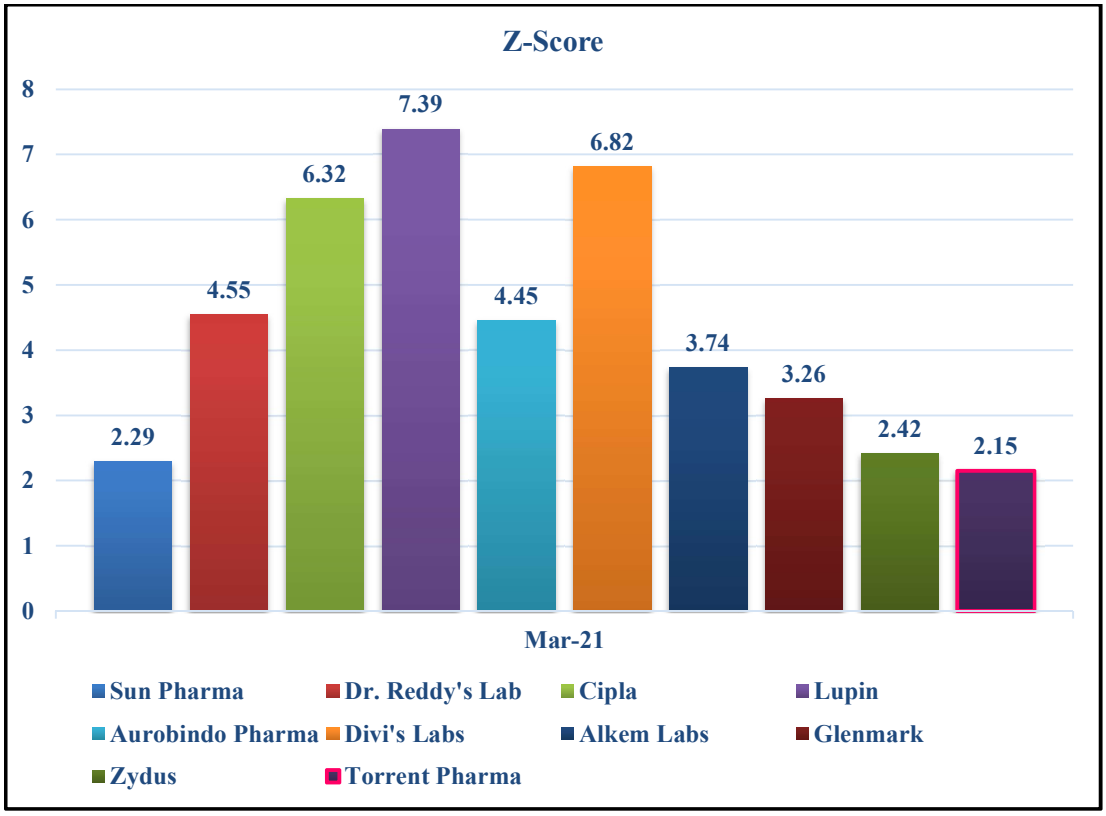


(Source: Computed from the Excel)

Explanation

- Figure No. 5.3 displays a bar graph representation of each company's Z-Score for the year 2020.
- The bar graph allows users to quickly estimate key values.
- The Z-score of each company shows the mix trend in March 2020.
- The above graph shows a greater degree of fluctuation, but only three out of ten companies have a Z-Score less than 2.68, namely sun pharma (2.2), Zydus (2.24), and torrent pharma (1.68).
- Lupin Pharmaceuticals has the highest Z-Score value of 7.79.
- With a Z-Score of 1.68, torrent Pharma has the lowest score.

Figure 5.4 Showing The Z-Score Of Each Company For The Year 2021

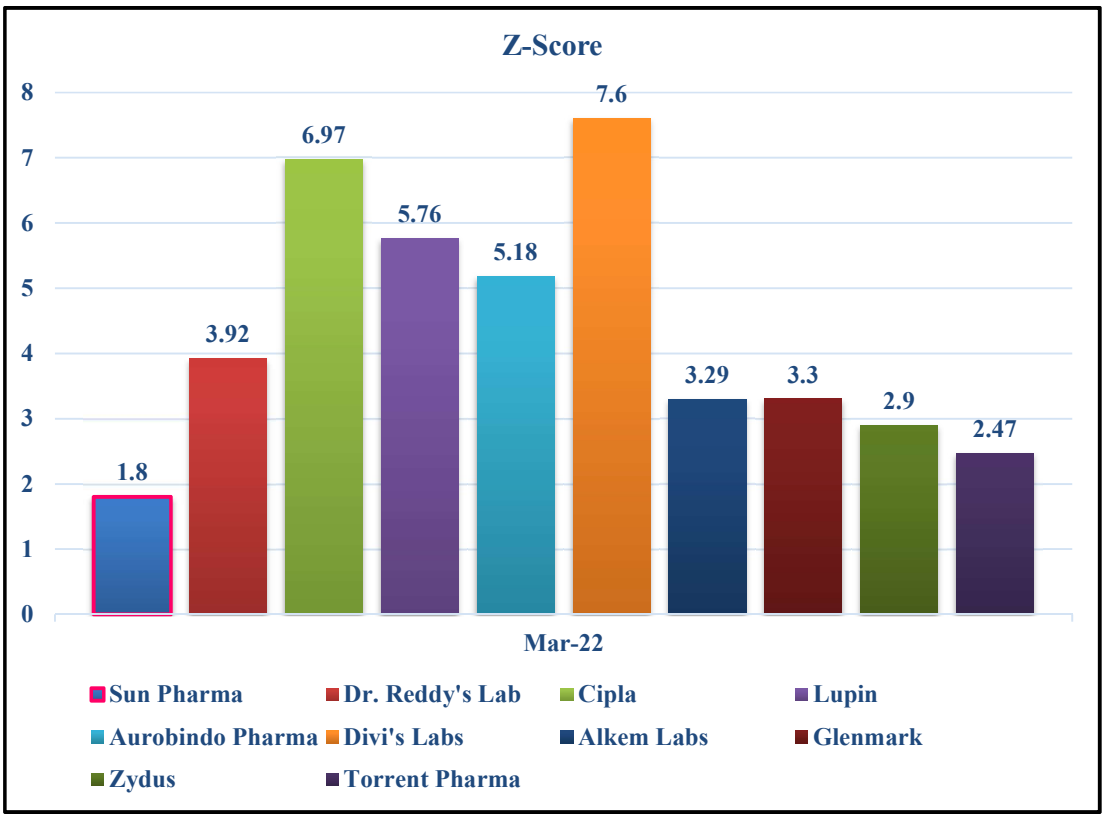


(Source: Computed from the Excel)

Explanation

- The Z-Score of each selected company is shown in figure No. 5.4 for the year 2021.
- The above chart depicts a bar graph representation of the Z-score, which summarises data in a simple pictorial or graphical format.
- In comparison to previous years, there is less variation between companies.
- All Z-Score values are greater than the cut-off value of 1.81, indicating that none of the companies were in the distress zone in 2021.
- Seven of the ten companies reported Z-Scores greater than 2.67, indicating that seven companies are in the safe zone.
- According to the above chart, almost every pharmaceutical company looked solid.
- In the year 2021, lupin had the highest Z-score, and torrent pharma had the lowest Z-score.

Figure 5.5 Showing The Z-Score Of Each Company For The Year 2022



(Source: Computed from the Excel)

Explanation

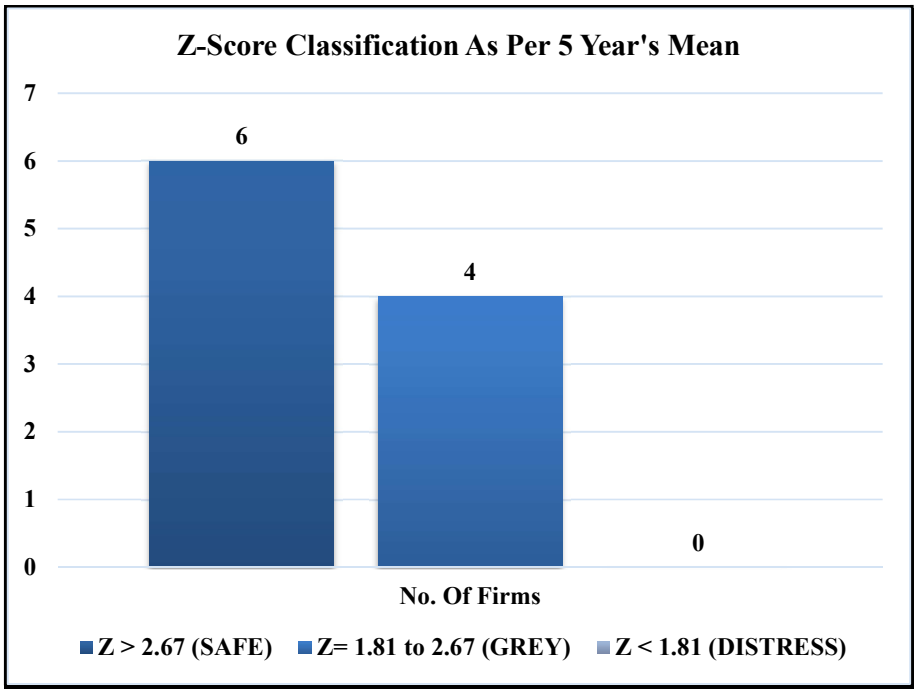
- Figure no. 5.5 demonstrates how well the aforementioned companies performed in 2022 based on their Z-Score values.
- The bar graph clarifies the numbers and trends better than the tabular format.
- The Z-Score value of each company for the year 2022 can be seen and evaluated from the above chart.
- The Z-Score values vary from one company to another.
- The above chart makes it clear which companies are in the safe zone and grey zone in March 2022.
- Out of ten companies, two are in the grey zone with a Z-Score less than 2.68, while eight are in the safe zone with a Z-Score greater than 2.68.
- Sun Pharma had the lowest Z-Score (1.8), while Divi's Labs had the highest (7.6).

Table 5.25 Displaying Zone-Wise Z-Score Classification Based On Each Company's Average Z-Score

Company	SUN PHARMA	DR. REDDY'S LABS	CIPLA	LUPIN	AUROBINDO PHARMA
Mean	1.91	4.088	6.008	7.304	3.664
Zone	Grey	Safe	Safe	Safe	Safe
Company	**DIVIS LAB**	**ALKEM LAB**	**GLENMARK**	**ZYDUS LIFE**	**TORRENT PHARMA**
Mean	7.302	1.812	3.154	2.512	1.812
Zone	Safe	Grey	Safe	Grey	Grey

(Source: Computed from table no. 5.26)

Figure 5.6 Showing Zone Wise Z-Score Classification



(Source: Computed from Excel)

Figure no. 5.6 displays a bar graph of the selected pharmaceutical companies in different zones over the last five years based on the average Z-Score Value. It is discovered that the average Z-Score value of six firms is greater than 2.67, namely Dr. Reddy's Labs, Cipla, Lupin Aurobindo Pharma, Divi's Labs, and Glenmark, whereas the average Z-Score value of four firms is between 1.81 and 2.67, implying Sun Pharma, Alkem Labs, Zydus, and

Torrent Pharma are in the Grey zone. None of the companies are in the distress zone as per the mean value.

5.6 CONCLUSION OF THE Z-SCORE MODEL

Table 5.26 Shows Altman's Z-Score Result

Company/ Year	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	Mean	Zone
Sun Pharma	1.58	1.68	2.2	2.29	1.8	1.91	Grey
Dr. Reddy's Lab	3.07	4.43	4.47	4.55	3.92	4.088	Safe
Cipla	4.97	5.99	5.79	6.32	6.97	6.008	Safe
Lupin	7.32	8.26	7.79	7.39	5.76	7.304	Safe
Aurobindo Pharma	2.61	2.63	3.45	4.45	5.18	3.664	Safe
Divi's Labs	8.8	6.82	6.47	6.82	7.6	7.302	Safe
Alkem Labs	3.55	3.91	3.43	3.74	3.28	3.585	Safe
Glenmark	3.05	3.15	3.01	3.26	3.3	3.154	Safe
Zydus	2.7	2.3	2.24	2.42	2.9	2.512	Grey
Torrent Pharma	1.2	1.56	1.68	2.15	2.47	1.812	Grey
Mean	3.88	4.07	4.05	4.33	4.31	**4.13**	
Zone	Safe	Safe	Safe	Safe	Safe		
Standard Deviation	2.45	2.28	2.03	1.93	1.96		
Coefficient of Variance	0.63	0.56	0.50	0.44	0.45		

(Source: Computed from the balance sheet)

[Horizontal = Year-wise, Vertical = Company-wise]

Interpretation

- Throughout the study period, the pharmaceutical sector's average Z-score was 4.13. The Z-score is significantly higher than the threshold score, which is 1.8, proving that the pharmaceutical industry is in a sound financial situation.

- Three companies are in the grey zone, while seven are in the safe zone. It means that three companies have a Z-score of less than 1.81, while the remaining seven companies have a Z-score greater than 2.68.
- The mean, as we all know, is the average of a range of outcomes. As per the mean result, Lupin and Divi's Lab reported the highest mean. If we see year-wise, the highest mean was recorded in the year 2021.
- A high standard deviation indicates that the data are dispersed widely (less dependable), while a low standard deviation indicates that the data are firmly grouped around the mean (more reliable and less fluctuation).
- The ratio of the standard deviation to the mean is known as a coefficient of variance. More dispersion around the mean is observed when the coefficient of variance is higher.
- Investors can determine how much risk or volatility is assumed in relation to the amount of return expected from investments by using the coefficient of variation in finance.
- The overall financial condition of the pharmaceutical industry is satisfactory. As a result, it can be said that the financial health of companies in the pharmaceutical sector is fairly good, and there is no or minimal chance of bankruptcy in the coming two years as none of them falls in the distress zone as per the average calculation.

Table 5.27 Showing Result of One Way Anova Test

ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	215.68	9	23.96444	53.25432	1.84418E-19	2.124029
Within Groups	18	40	0.45			
Total	233.68	49				

(Source: Computed in the Excel)

Interpretation

The p-value is 1.84418E-19, which is less than 0.05 at a 5% level of significance, indicating that the alternative hypothesis should be accepted and the null hypothesis should be rejected, indicating that there is a significant difference between each company's Z-Score.

5.7 CONCLUSION

The pharmaceutical sector's average Z-score was 4.13 over the duration of the research. Three firms are in the grey zone, while seven are in the concise. It means that three companies have a Z-score of less than 1.81, while the remaining seven have a Z-score greater than 2.68. The p-value at 5% significance is 1.84418E-19, which is less than 0.05, indicating that the null hypothesis should be rejected which means there is a significant difference between the Z-Score of companies. The pharmaceutical industry's overall financial situation is satisfactory. As a result, the financial health of pharmaceutical companies is fairly good, and there is no or minimal risk of bankruptcy in the next two years because none of them is in the distress zone.

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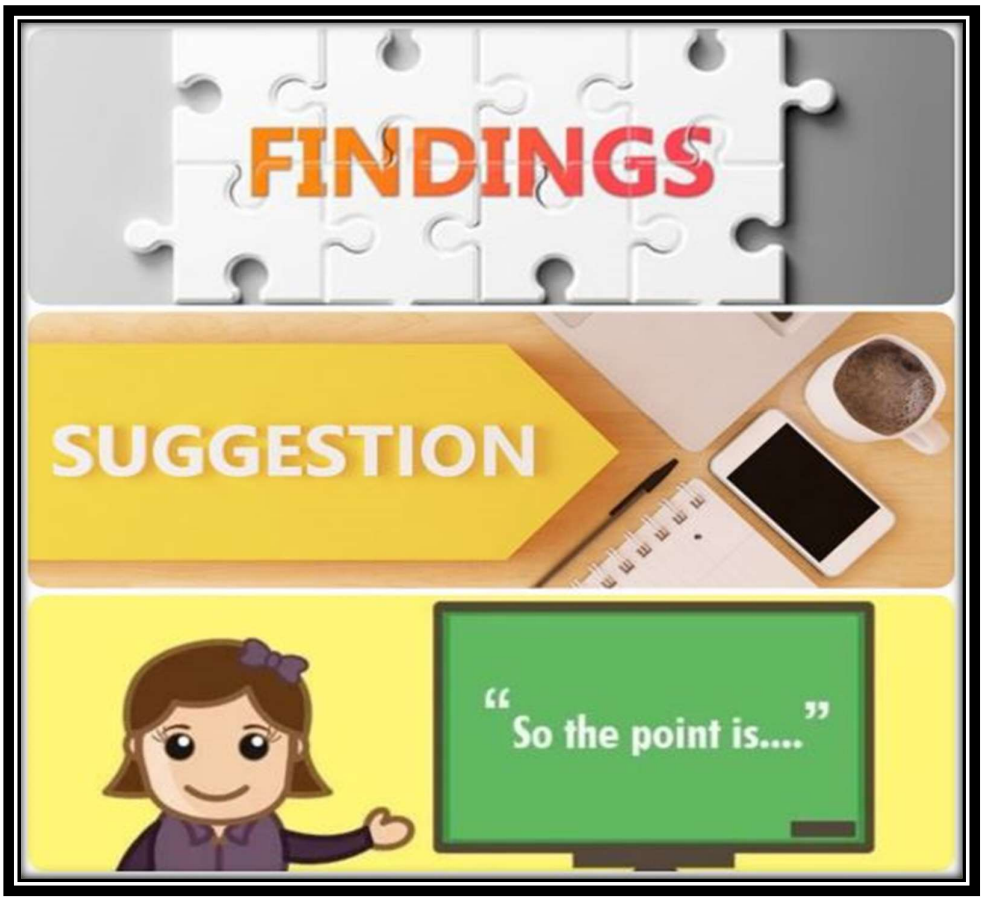
Annual Reports

- Annual reports of Sun Pharmaceutical Ltd. From 2017-18 to 2021-22
- Annual reports of Dr. Reddy's Labs From 2017-18 to 2021-22
- Annual reports of Cipla Ltd. From 2017-18 to 2021-22
- Annual reports of Lupin From 2017-18 to 2021-22
- Annual reports of Aurobindo Pharma From 2017-18 to 2021-22
- Annual reports of Divi's Labs From 2017-18 to 2021-22
- Annual reports of Alkem Labs From 2017-18 to 2021-22
- Annual reports of Glenmark. From 2017-18 to 2021-22
- Annual reports of Zydus Life From 2017-18 to 2021-22
- Annual reports of Torrent Pharma From 2017-18 to 2021-22

CHAPTER 6

SUMMARY, FINDINGS AND SUGGESTIONS



CHAPTER 6

INDEX

6.1 INTRODUCTION

The word "findings" refers to the listing of facts. Conclusions refer to the writer's summary opinion about the facts. The future courses of action that the author feels are justified in light of the findings and conclusions are referred to as recommendations or suggestions. The final section of the dissertation are findings, conclusions, and recommendations. The findings are the result of data analysis. Conclusions are answers to the questions posed, or statements of acceptance or rejection of the hypotheses proposed. This chapter is the outcome of the preceding five chapters. It is related to the study's findings, for which the researcher began her research.

6.2 SUMMARY OF THE STUDY

The entire Research Dissertation has been presented in the following chapters which are as follows:

1. **Introduction of The Pharmaceutical Industry**

   In this chapter, the overall introduction to the pharmaceutical industry is discussed which includes, the meaning of the pharmaceuticals industry, a brief history related to the origin of medicine, the post-independence era of the pharma industry, the types and needs of pharmaceutical companies, market size, contribution to the GDP, regulatory bodies, recent developments, government initiatives, the impact of the Coronavirus, key issues, world-wide pharmaceutical company business, a SWOT analysis, and the 5 S of the pharma industry. The pharmaceutical industry is a branch of the healthcare industry that deals with medicines. This shows that the Indian pharmaceutical industry is very significant for the Indian economy.

2. **Conceptual Framework of The Altman Z-Score Model & Sample Profile of Company**

   A conceptual framework consists of one or more formal theories (in part or in whole), as well as other concepts and empirical findings from the literature. This chapter contains a detailed description of Altman's Z-Score model which are the heart of the current study and it is used be used by researchers to determine the financial health of selected pharmaceutical companies. Additionally, this chapter also contains basic information about all the selected sample companies. In summary, this chapter gives a visual representation of the work that is done by the researcher.

3. **Literature Review**

A descriptive literature review provides an overview of previous research on the research topic. This literature review is useful for establishing a foundation for the research, avoiding duplication, identifying gaps, and developing a theoretical framework and methodology. The pharmaceutical industry is unique due to the nature of its products, dynamic market, stringent regulations, and huge investments, which usually entail more research and development. As a result, the Altman Model was used to examine the financial health of major pharmaceutical companies in India in the current study.

4. **Research Methodology**

The study's methodology is covered in this chapter. This chapter discusses and explains the research methodology, which includes topics such as the meaning of research, Its goals, characteristics of good research, and the research process. Another core point covered in the chapter is the research design, which includes the study's title, objectives, hypothesis, sample design, tools, and techniques to be used. The limitations, significance, and future scope of the study are also included. In the methodology chapter, the researcher should explain to the reader how she planned her research work and provide justification for her choice of research design.

5. **Data Analysis and Data Interpretation**

This chapter is considered a prime chapter in the research work because it justifies the study's title. In this chapter, the researcher uses the Z-Score model to evaluate the financial status of selected pharmaceutical companies.

6. **Summary, Findings, And Suggestions**

This chapter is the crux of the above five chapters. It is connected to the study's findings, for which the researcher started her research work. In addition, she could suggest additional studies to address any unresolved issues with her research problem. Moreover, researchers can offer ideas for future studies that address the drawbacks of your study.

6.3 FINDINGS OF THE STUDY

Finding is a term used to describe a list of facts. Exploring the financial performance of selected pharmaceutical companies using Altman's Z-score model is the goal of the current study. The findings of the current study are divided into four segments which are as follows.

6.3.1 Findings Based on Research Objectives

- The first goal of this research was to understand the Altman Z-Score model. During the conceptual framework and data analysis, this model was thoroughly studied and then applied to major pharmaceutical companies.
- The second aim was to use the Z-Score model to assess the financial health of selected companies and classify them into different zones suggested by Altman which are presented in the below table.

Table 6.1 Zone-Wise Classification of Selected Companies

Company/Year	2018	2019	2020	2021	2022	AVG
1. SUN PHARMA	Distress	Distress	Grey	Grey	Grey	Grey
2. DR. REDDY'S LABS	Safe	Safe	Safe	Safe	Safe	Safe
3. CIPLA	Safe	Safe	Safe	Safe	Safe	Safe
4. LUPIN	Safe	Safe	Safe	Safe	Safe	Safe
5. AUROBINDO PHARMA	Grey	Grey	Safe	Safe	Safe	Safe
6. DIVI'S LAB	Safe	Safe	Safe	Safe	Safe	Safe
7. ALKEM LAB	Safe	Safe	Safe	Safe	Safe	Safe
8. GLENMARK	Safe	Safe	Safe	Safe	Safe	Safe
9. ZYDUS LIFE	Safe	Grey	Grey	Grey	Safe	Grey
10. TORRENT PHARMA	Distress	Distress	Distress	Grey	Grey	Grey

(Source: Self-Constructed)

- The third objective is to identify healthy firms for investors. From Table 6.1, we can easily understand which firm is healthy and which is not, so the Z-Score may be useful to investors before investing in a specific company.
- The last goal was to examine the overall performance of selected companies over the preceding five years. The year-wise mean was calculated, and it was

discovered that 10 out of 7 company's overall health is financially sound, while 3 companies are in the grey zone, indicating that they require more supervision to reach the safe zone.

6.3.2 Findings Based on Hypothesis

- The "ANOVA" test has been used to determine whether there is a significant difference between the Z-Scores of the selected companies. It is carried out at a 5% level of significance, and the results are shown in table no. 5.27. which suggests that the p-value is less than 0.05, as a result, the null hypothesis should be rejected. So, despite being top companies, there is a significant difference in Z-Score value, and there is a great variation in terms of financial resource management.

6.3.3 Findings Based on Analysis of Financial Components

The study's key findings are as follows:

- During the analysis of Sun Pharmaceutical Ltd.'s financial components, the researcher discovered that the company's working capital was negative for three years during the study period, even though Sun Pharma is the number one company in terms of net sales. Another thing to keep in mind is that EBIT was significantly lower in 2022 compared to 2021. However, sales increased in 2022 compared to 2021.
- While analyzing Dr. Reddy's Labs' financial components, it was discovered that earnings before interest and tax increased more than 2.5 times in 2022 compared to 2018. Another point is that the current liability accounts for nearly 95% or more of the total liability, despite the fact that the company has enough capital to pay its current debts. Finance costs are decreasing year after year, indicating that the company did not incur new debt during the study period.
- During an analysis of Cipla Ltd.'s financial components, researchers discovered that finance costs dropped dramatically in 2022, from 45.07 crores to 26.93 crores. Retained earnings and working capital are nearly doubled since 2018. Overall financial condition is satisfactory because most of the components are gradually increasing, indicating that the company is very competent in handling its financial resources.

- According to an analysis of the financial components of the Lupin company, earnings before interest and tax showed a mix trend. It rose in 2019, but dropped suddenly the following year, then increased again in 2021, and then fell in the final year of the study. The company must critically examine its income sources to determine the causes of its negative earnings because total sales did not fall in 2022.
- During an assessment of Aurobindo Pharma's financial components, it was discovered that the company's EBIT decreased nearly three times in 2022 compared to 2021. According to the annual report, there was an increase in interest rates and depreciation. A significant drop in operating income could be one of the reasons for the sudden drop in EBIT. With all these setbacks, the company's retained earnings are increasing year after year, which should also be noted.
- When Divi's Labs' financial aspects are analyzed, it reveals some promising results, with total assets and net asset value exceeding twice what they were in 2018 as compared to what they are in 2022. In the annual report, it was discovered that the company had made brownfield investments, which demonstrates recent investment activity. According to the study, the company has spent less than 1% on its finance costs almost every year. Annual growth in the company's retained earnings is observed.
- An examination of Alkem Labs' financial components reveals that the market value of equity, earnings before interest and tax, and retained earnings are all twice as high in 2022 as they were in 2018. The cost of finance is similar on average. Current liability accounts for more than 90% of total liability, and it increased during the study. Alkem is the fifth-largest pharmaceutical company in India by domestic sales and has more than 800 brands in its portfolio.
- The researcher discovered that while Glenmark's current assets are gradually declining, the company's total assets showed an upward trend during the course of the study. It directly affects the company's working capital. Working capital was significantly lower in 2021 compared to 2022. The decline in working capital could be caused by a variety of things, including decreased sales revenues, poor inventory management, or problems with accounts receivable.

- An examination of the financial components of the Zydus company reveals a high degree of fluctuation in the finance cost. Compared to 2018, finance costs are nearly doubling in 2022. However, annual total liabilities are relatively constant. Increasing finance costs would indicate that the business has accessed more credit options. The timely repayment of the debt, the structuring of their debt, or the conversion of debt into equity for the creditors may be challenging for highly leveraged companies. Another important point is that retained earnings decreased dramatically in 2022. In 2022, it was almost half of what it was in 2018. However, when compared to 2020, it raised nearly twice as much in 2021. This demonstrates a financial imbalance.
- Analysis of Torrent Pharma's financial elements reveals that total liabilities are falling year over year, which might mean that the business is not taking on additional debt. However, interest rates rose in 2019 compared to 2018, and they decreased in the remaining years. Compared to 2018, EBIT was nearly double in 2022. Working capital typically rises as current liabilities decline, and thus company's working capital is gradually rising from year to year.

6.3.4 General Findings Related to The Indian Pharmaceutical Industry

- Strong headwinds have made it difficult for Indian pharmaceutical companies to maintain margins. Pharma companies are seeing price erosion in the market as a result of increased competition, which is limiting growth. Price erosion is not the only problem at hand; the supply chain disruption caused by China's lockdown, the increase in raw material prices, and the conflict in Russia and Ukraine have all increased packaging costs.
- Negative working capital conditions in India are as popular as it is with multinational corporations such as McDonald's, Amazon.com, and others. Negative working capital indicates non-liquidity or less liquidity within the firm, which can be studied from a long-term perspective to determine whether it has a favorable or unfavorable impact on the financial health of a company. In the present study sun pharma reported a negative working capital though it is a top company as per total sales.

6.4 SUGGESTIONS

6.4.1 General Suggestions Based On The Overview Of The Industry

- In the US, every third pill taken comes from India, and this trend is seen in many other nations as well. This demonstrates conclusively the superior quality of Indian drugs. However, the Indian pharmaceutical industry is dealing with an image problem that is affecting consumers.
- India is the world's top supplier of API and has about 10,500 manufacturing facilities for bulk medicines and formulations. Manufacturers of bulk medications face a variety of difficulties, such as rising utility costs, reliance on China for raw materials, time-consuming environmental clearances, and complex government regulations. to increase the competitiveness and innovation of the Indian API market following steps should be taken:
    - Infrastructure within clusters and chemical parks should be improved.
    - Improve the environmental clearance processes.
    - Adopt a cluster-based, common facility strategy for API industry promotion.
    - Encourage MSMEs that lack the ability to innovate and collaborate with research institutions.

6.4.2 Suggestions Based on Z-Score Analysis

- Analysis of financial components shows that working capital is increasing year to year which is a favorable point at the same time they have to see they do not remain ideal for a long time. Excess working capital may lead to speculative growth.
- Sun Pharma’s Working capital management requires special attention because the average working capital to total assets ratio is negative.
- It is observed that retained earnings are on average increases for each company. Relying on retained earnings could have drawbacks. Shareholders may feel cheated out of their dividend income if they believe you rely too heavily on earnings or don't use the money wisely. If you require outside capital in the future, you may not have established the necessary relationships with investors and lenders.

- Zydus company's retained earnings decreased in 2022 which may indicate that the company faces losses or its financial health is not strong.
- Sun Pharma, Zydus, and Torrent Pharma are in the grey zone. A company must act wisely, take all necessary precautions, and achieve a minimum Z-score of 2.67 in order to enter the safe zone.

6.4.3 How to Improve India's Pharmaceutical Industry

- Businesses must establish better research facilities, and the nation must be encouraged to conduct more scientific research.
- Suppliers must break Indian Pharma's reliance on Chinese goods and biomolecules.
- Establish manufacturing facilities for bulk goods and medicines within the country to accelerate this process.
- Legislators must encourage states to establish incubators and factories, as well as develop new regulations that benefit both research and the pharmaceutical industry.
- Pharma must build more testing facilities to expedite clinical trial completion and develop staff from higher education colleges.

6.5 CONCLUSION

Genuine business failures during downturns in business cycles are a common occurrence, but defaults brought on by malicious intent are very disturbing. Bankruptcy arises out of significant instability of financial resources and or improper management skills. It has the potential to seriously undermine public trust in the financial and economic system. The z-score is a popular metric for assessing institutional stability. Throughout the study period, the pharmaceutical sector's average Z-score was 4.13. The Z-score is significantly higher than the threshold score, which is 1.8, proving that the pharmaceutical industry is in a sound financial situation. It can be said that the financial health of companies in the pharmaceutical sector is fairly good, and there is minimal chance of bankruptcy in the coming two years as none of them falls in the distress zone as per the calculation of Z-Score.

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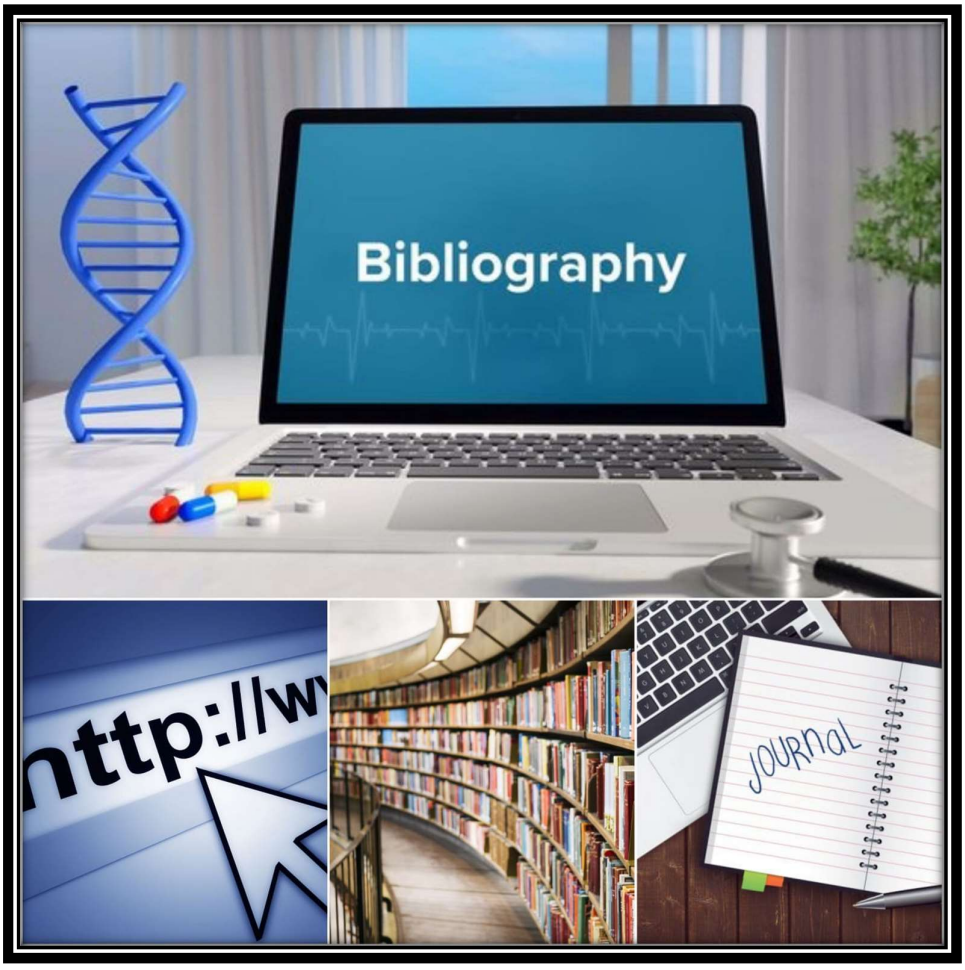

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❖ **ANNUAL REPORTS**

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Certificate

This is to certify that ~~Mr~~/Ms Drashti Dhabaliya *of* Atmiya University. *participated in* ***Vividha 2023*** *- A National Conference on Recent Trends in Commerce and Management, organized by Christ College, Rajkot, affiliated to Saurashtra University, Rajkot, on Saturday, March 04, 2023. ~~He~~/She has presented a Paper / ~~Poster~~ entitled* Validity of Altman's Z-Score Model in predicting Financial Distress of Selected Indian Pharmaceutical Companies *in* Commerce. *in the* PG. *category.*

~~He~~/She has Achieved 1st position

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