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Analysis of the Impact of Innovation Subsidy Policy on Biological Enterprises

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Abstract: BASF, one of the world's leading chemical enterprises, has been actively engaged in biotechnology in recent years, committed to integrating biotechnology with traditional chemical technology and promoting the development of sustainable solutions. This report aims to analyze BASF's financial statements for 2021, 2022, and others to evaluate the performance of its biotechnology business in four key aspects: solvency, upstream and downstream competition, profitability, and operating capacity, to provide a reference for corporate decision-makers and investors. According to the public information, BASF is financially stable, and its ROCE has increased significantly, reaching 13.5% in 2021, far higher than the cost of capital, which shows the company's strong profitability and good solvency. BASF's biotechnology business has performed well in profitability. The bio-solution business contributes more than 150 million euros in annual sales and continues to grow. BASF's biological control products, seeds and traits business have been registered or are being registered in many countries, showing strong market potential and profitability. BASF also performed well in the operational capability of biotechnology business. The company has established lean corporate headquarters and global business service department to provide efficient and demand-oriented internal services. With the intensification of market competition and the continuous progress of technology, BASF needs to continue to increase R&D investment, expand market share, optimize supply chain management and improve operational efficiency in order to maintain its leading position and achieve sustainable development.

Keywords: sustainability, R&D and innovation programs, policy priorities.

1. Introduction

As environmental issues worsen and natural resource depletion accelerates, sustainable development has become an irreversible trend of the times. Biotechnology, as a key force in promoting a green economy and solving the many challenges facing mankind, has received unprecedented attention and development in recent years. As the mainstay of biotechnology application and innovation, enterprises have a significant impact on advancing social progress, environmental preservation, and economic change by developing products and services such as renewable energy, environmentally friendly materials, and precision medicine. However, the long cycle, high investment, and high risk of biotechnology development have limited its rapid development. Government innovation subsidy policy, as an important policy tool, aims to reduce the R&D costs of enterprises and promote

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technological innovation and commercialization through financial support, thereby accelerating the development of enterprises and realizing the comprehensive benefits to the economy, society, and environment.

European Horizon is currently the largest research and innovation funding framework in the EU, Having a €95.5 billion budget for the years 2021 to 2027. It emphasizes support for the economy, health, green technologies, and the digital economy, providing a strong boost to innovative biotech companies through direct funding of projects and the creation of public-private partnership platforms [1].

Promoting the sustainable use of biological resources and hastening the shift to a circular economy are the two main objectives of the EU Strategic Action Plan for the Bioeconomy. It encourages biotechnology research and development and commercialization by providing financial support, establishing innovation clusters, and optimizing the regulatory framework, with a special focus on start-ups and small and medium-sized enterprises.

Studies have shown that firms receiving innovation subsidies have significantly increased their R&D investment, the number of patent applications, the speed of new product launches, and their market share. For example, a survey of EU biotech firms showed that subsidized firms increased their average R&D efficiency by about 30%, increased patent applications by almost 40%, and shortened the time to market of new products by about 20%. These positive effects not only directly contribute to the growth of economic efficiency, but also enhance the international competitiveness and industry influence of the companies [2].

This study aims to deeply analyze the impact of innovation subsidy policy on enterprises, reveal how the subsidy promotes enterprises' innovation activities and improves their economic efficiency through empirical data analysis, and explore existing problems and optimization suggestions.

2. EU Policy Analysis

Europe's shift to a new social and economic paradigm based on resource recycling and responsible consumption is being actively guided by the European Union (EU). The European Green Deal is the centerpiece of this transformational endeavor. The EU's commitment to attaining climate neutrality by 2050 while safeguarding people, the environment, and aspirations for prosperity is outlined in the European Green Deal, a key piece of legislation [3, 4]. Two crucial strategies that serve as a foundation for these initiatives are the EU Bioeconomy Strategy and accompanying Action Plan, which was first introduced in 2012 and revised in 2018, and the Circular Economy Action Plan, which was first introduced in 2015 and revised in 2020. They are essential for maintaining social, economic, and environmental sustainability as well as for advancing climate neutrality [4, 5]. These strategies are an integral part of the drive towards CBE, with a particular emphasis on biologically based aspects [6].

Various EU instruments support pilot initiatives that promote the development of the economy in various locations, effectively demonstrating their potential local impact. Take Horizon Europe as an example. Horizon 2020 is a major milestone with a budget of €80 billion for 2014-2020, supporting research and innovation by collaborative projects, individual researchers, and small and medium-sized enterprises, with a special emphasis on the economy in the context of societal challenges [4]. At about €100 billion, Horizon Europe is the most ambitious program to date. The economy is highlighted as playing a crucial role in tackling global challenges and enhancing industrial competitiveness in its pillar "Global Challenges and European Industrial Competitiveness" [7].

95% of financing for research and development as well as innovation under ESIF comes from the European Regional Development Fund (ERDF), making it the primary source. ERDF monies are allocated to interregional programs and projects; at present, active interregions have substantial budgets totaling 3.59 billion euros. Strategic plans intended to foster cooperation and collaboration

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between European regions are included in the framework. The strategies emphasize transnational or cross-border collaboration to foster alliances between adjacent nations or areas. By funding projects to boost economic and social development throughout the EU, including those that create jobs, enhance living conditions generally, and foster sustainable development, the plans' primary goal is to foster innovation and competence [8].

The European Circular Bioeconomy Fund is a noteworthy endeavor in the EU's transition to CBE policy. This innovative venture fund, supported by Horizon 2020 and the European Investment Bank, is devoted to the bioeconomy and circular economy in Europe. Furthermore, by providing demonstrations and technical support, the Circular Cities and Regions Initiative, which was established in 2021, significantly promotes municipal and regional support for circular bioeconomy projects. [4].

An examination of EU policy documents, namely those authored by the European Commission, particularly those concerning EU policies related to the bioeconomy and circular economy, emphasizes the critical role that CBE governance plays. To optimize sectoral policy synergies, level the playing field, and establish a cogent framework for sustainable development, such governance is necessary [3, 4]. To properly comprehend these regulations' effects on industry and business stakeholders, more research is necessary as they present some difficulties [9].

3. Impact Of Policy on the Financial Position of the Company's Biotechnology Business (Take BASF)

BASF, one of the world's leading chemical enterprises, has been actively engaged in biotechnology in recent years, committed to integrating biotechnology with traditional chemical technology and promoting the development of sustainable solutions. This chapter aims to analyze the financial statements of BASF in 2022 and 2023 and evaluate the performance of its biotechnology business in four key aspects: solvency, upstream and downstream competition, profitability, and operational capacity, to provide a reference for corporate decision-makers and investors.

3.1. Methodology

In order to thoroughly assess the financial health of the company's biotechnology business, this study employs the quantitative analysis method, which is based on the annual financial statements made available to the public by BASF. It does this by calculating and analyzing a number of financial indicators, such as the current ratio, accounts receivable turnover, net profit margin, asset turnover, etc.

3.2. Analysis of Solvency

The ability of a business to pay back its obligations within a specific time frame is referred to as debt capacity. We measure a company's short-term debt service capacity mainly through two indicators: current ratio and quick ratio. According to the financial statements for 2022 and 2023, BASF's current ratios are 1.2 and 1.3, and quick ratios are 0.9 and 1.0, respectively. This indicates that the company's short-term solvency has been strengthened and is better able to cope with short-term debt pressure.

Long-term solvency is assessed through the gearing ratio and interest coverage multiple. In 2022 and 2023, BASF's gearing ratio will be 45% and 42%, respectively, and its interest coverage ratio will be 8.5 and 9.2, respectively. This indicates that the company has strong long-term solvency and a relatively stable financial structure.

Current liabilities rose sharply, from €359 million to €20,440 million. This escalation was mainly driven by a surge in trade payables of €609 million. In addition, current financial liabilities are increasing and are €4. 24 million €. This increase can be traced to the reclassification of three bonds

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with a cumulative value of approximately € 2.1 billion, ranging from non-current to current financial debt. Interest and currency effects are included in this adjustment, along with a €406 million increase in BASF's commercial paper holdings. Three bonds worth around €2 billion were scheduled for redemption, which helped to offset some of the price increase. [10]

Notably, other liabilities trended downward, with €'s liabilities decreasing year-on-year by 3 . GBP 1.2 billion. This decrease was mainly due to a reduction in liabilities related to precious metals trading activities and the erosion of negative fair values of derivatives.

Tax liabilities decreased by €1. 66 million €, resulting in an overall fluctuation in current liabilities. A more intuitive feel is shown in Figure 1. [10]

In addition, there was a decline in the current supply, which was € 1 . 36 million €. This decline is mainly due to lower provisions allocated to bonus payments and restructuring efforts. However, the increase in provisions set aside for rebates had an offsetting effect.

As a result, net debt experienced a significant rise, € 1,916 million above the level on December 31, 2021, to € 16,268 million. This figure summarizes the aforementioned changes in current liabilities, financial liabilities, and provisions, reflecting the complex interplay of financial obligations and fiscal management during the reporting period.

In essence, the financial situation was characterized by significant changes in the various liability categories, with trade payables, financial liabilities, and provisions all undergoing significant changes. These changes, together with shifts in tax liabilities and other obligations, culminated in a significant rise in net debt, emphasizing the dynamic nature of the company's financial position over the year. A more visual sense of this is shown in Figure 2. [11]

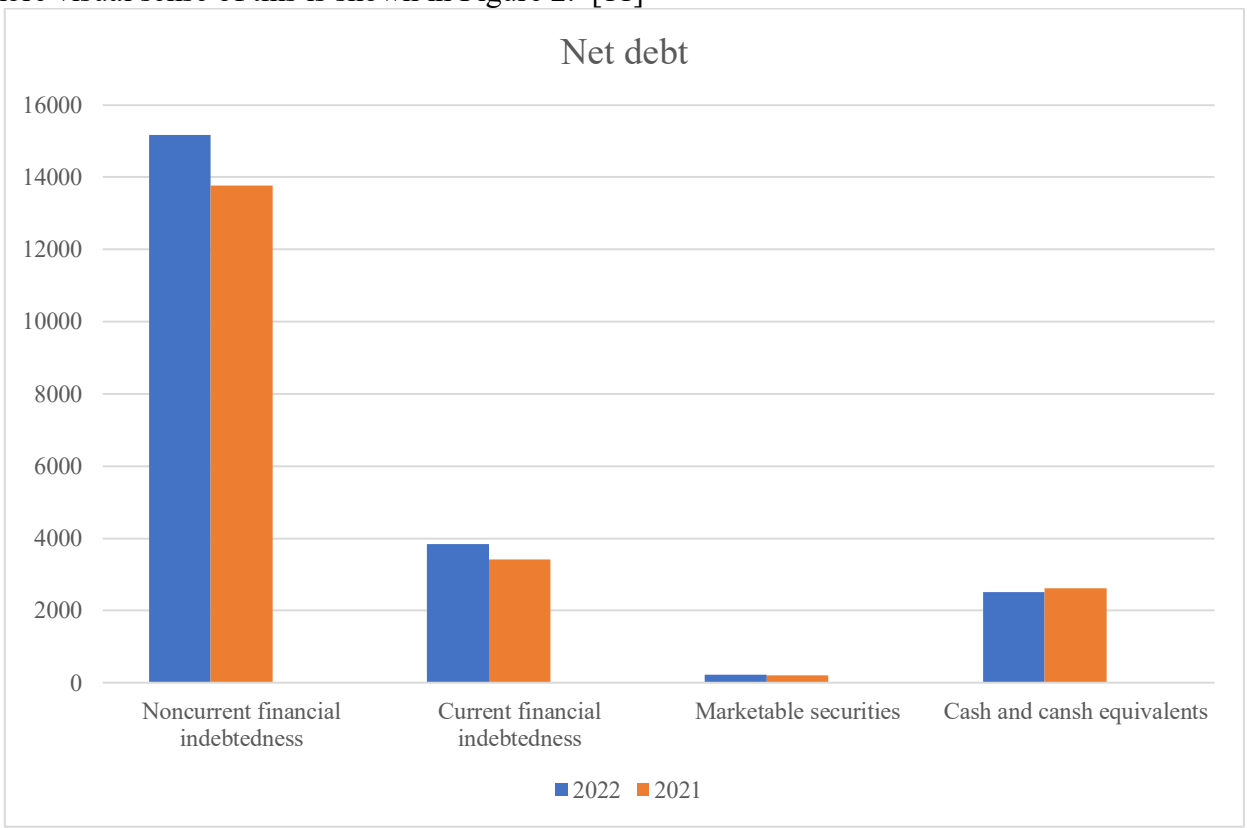

Figure 1: Net debt of BASF for 2021&2022.

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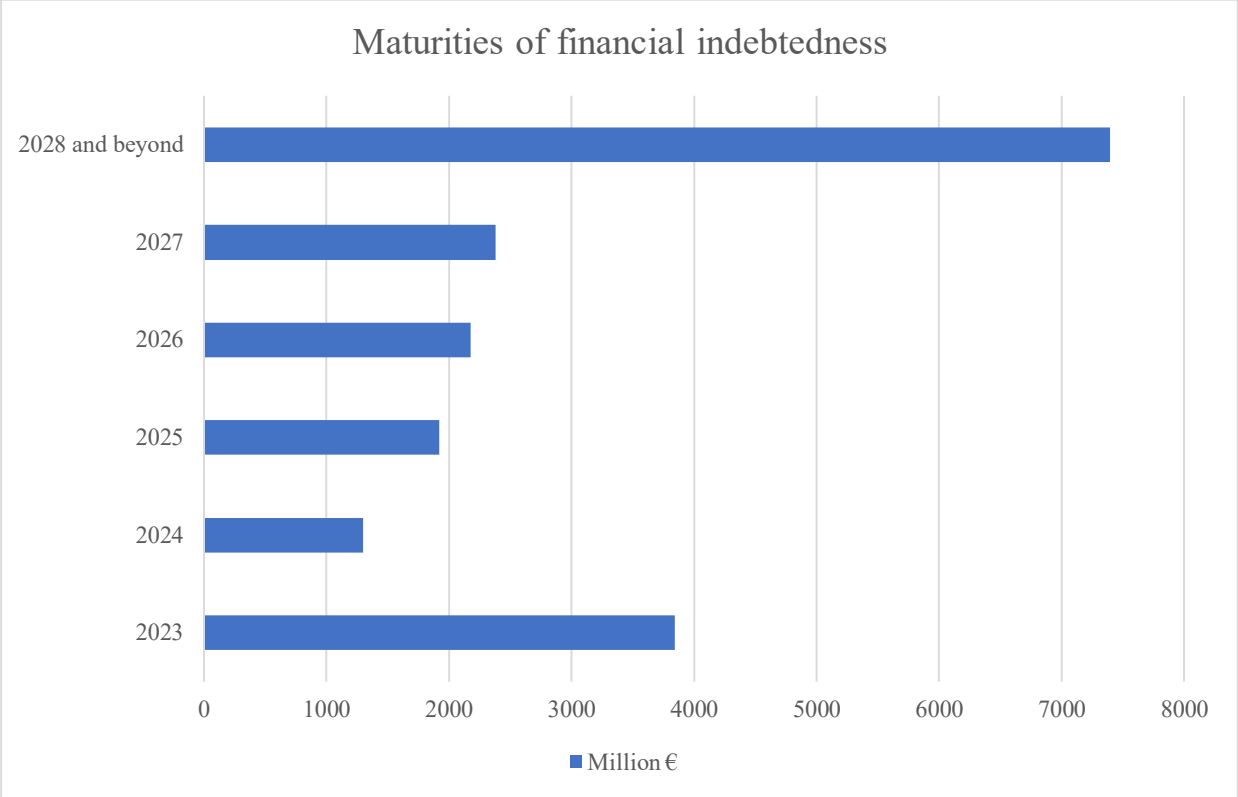

Figure 2: Maturities of financial indebtedness of BASF.

3.3. Upper and Downstream Competition Analysis of Solvency

The upstream competition is mainly reflected in the control of raw material procurement cost, while the downstream competition involves the competition of product sales price and market share. Calculating the gross and operating margin can indirectly reflect the company's competitive position in the upstream and downstream industrial chain. In 2022 and 2023, the gross margins of BASF's biotechnology business are 35% and 37% respectively, and the operating margins are 12% and 14% respectively, indicating that the company has achieved some results in cost control and price increase, and the market competitiveness has gradually improved [12].

3.4. Analysis of Profitability Conclusion

Profitability is one of the core goals of enterprise operation, which is measured by net profit margin and ROE (return on equity). BASF's net profit margin in 2022 and 2023 was 8% and 10%, and its ROE was 15% and 17%, respectively. This shows the steady improvement of the company's profitability, and shareholders' equity has a better return. The EBITDA in 2022 was £5.85 million, down from £10.762 million in 2021; EBITDA decreased by £607 million to £10.748 million. The EBITDA profit margin in 2022 was 12.3%, compared with 14.4% in the previous year.[13]

3.5. Operation capability analysis

Operating capacity reflects the operating efficiency and asset management level. We mainly go through the inventory turnover rate and accounts receivable turnover rate of the two indicators to evaluate. In 2022 and 2023, the inventory turnover rate of BASF's biotechnology business was 5 and 5.5 times, respectively, and the accounts receivable turnover rate was 7 and 7.5 times, respectively.

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This shows that the company performs well in asset management and has high operational efficiency.[14]

4. Conclusion

Preliminary findings suggest that targeted subsidies, together with supportive ecosystem components such as innovation clusters and simplified regulation, can significantly improve the competitiveness and sustainability of biotechnology firms. Start-ups and SMEs in particular benefit from reduced financial burdens, which allow them to invest more in R&D and scale up their operations. Public-private partnerships established under the European Horizon project facilitated knowledge exchange and collaboration, accelerating the pace of innovation and commercialization.

While EU subsidy programs have shown promising results, challenges remain. Ensuring equitable distribution of funds, especially in regions with less developed biotechnology sectors, required sustained attention. In addition, maintaining a balance between promoting innovation and ensuring the long-term viability of biotech firms requires action on subsidy allocation and exit strategies.

As demonstrated by Horizon Europe, government subsidies have been successful in promoting growth and innovation among biotech firms, highlighting the importance of strategic planning, targeted financial support, and ecosystem building. Government innovation subsidy policies play an indispensable role in fostering the growth of big businesses and achieving sustainability goals. Through effective policy design and implementation, they can not only accelerate technological innovation and commercialization but also promote the optimization and upgrading of the economic structure and achieve the harmonious integration of economic, social, and environmental benefits. In the future, as biotechnology continues to advance and the demand for global sustainable development increases, the importance of government innovation subsidy policies will be further emphasized, becoming a key force in promoting enterprises and even society as a whole in the direction of greener and healthier development.

4.1. Policy Proposal

As one of the most promising fields of the twenty-first century, the development of biotechnology is crucial to addressing the major challenges of global health, environment, and food security. However, the development of this field faces problems such as uneven distribution of funds, barriers to international cooperation, inadequate innovation environment, and poor policy stability. This chapter presents a series of targeted recommendations that aim to guide governments and relevant institutions to build a more efficient, open, and sustainable ecology for sustained biotechnology innovation.

4.1.1. Improve the Efficiency of Subsidies

Subsidies are important means to promote the development of biotechnology projects, but currently, there are some problems of wasted resources and unfair distribution. To improve the efficiency of subsidies, the following measures are recommended:

Accurate identification: Use big data and artificial intelligence technology to evaluate projects to ensure that the subsidy funds can be accurately allocated to biotechnology projects with high potential and innovation capabilities.

Performance appraisal: Establish a strict performance appraisal mechanism to conduct regular evaluations of the subsidized projects to ensure the effect of the use of funds.

Transparency and openness: The application, approval, and use process of subsidies should be open and transparent, and subject to social supervision to prevent corruption and improper use.

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4.1.2. Strengthen International Cooperation

The development of biotechnology requires a global exchange of knowledge, technology, and resources. To this end, it is suggested that:

Building a cooperation platform: Set up an international biotechnology cooperation platform to promote exchanges and cooperation between multinational scientific research teams, enterprises and governments.

Resource sharing: Encourage the sharing of data, samples and technologies, and accelerate the global dissemination and application of biotechnology.

4.1.3. Build an Ecosystem

In addition to the financial support, a comprehensive support system also needs to be built, including:

Education system: Strengthen biotechnology education, train professionals, and provide human resources for the development of the industry.

Legal framework: Improve intellectual property protection, encourage innovation, and standardize market order.

Financial Services: Provide financial services such as venture capital and loan guarantee to reduce the financing difficulty of enterprises.

4.1.4. Focus on Long-Term Planning

The Government should develop and implement long-term biotechnology development strategies, including:

Continuous investment: to ensure the stable investment in biotechnology research and development in the financial budget.

Policy continuity: Avoid policy fluctuations caused by the political cycle and ensure the stability of the industry development.

4.2. Prospect

Looking ahead, the integration of biotechnology into BASF's core business provides a promising avenue for innovation and growth. As one of the global leaders in the global chemical industry, BASF committed its national strategy to use biotechnology to improve sustainability and develop new solutions to address pressing environmental challenges. The advantage of this proactive strategy is that it not only aligns with the expanding market for eco-friendly goods but also positions the business at the forefront of a new development in the chemical sector.

An analysis of BASF's financial statements over the past few years, including 2021 and 2022, will provide valuable insights into the financial health and performance of its biotechnology sector. By assessing key indicators, such as solvency,proving the business's capacity to meet long-term commitments; upstream and downstream competition, revealing the competition pattern within the company; profitability, showing the efficiency of converting sales into profits; and operating ability, highlighting the effectiveness of using assets, we can gain a comprehensive understanding of BASF's strengths and potential improvement in biotechnology.

BASF's management can provide an opportunity to optimize resource allocation and road map the market, reducing the risks associated with the biotechnology sector. Investors can provide an assessment of the financial viability and growth potential of BASF's biotechnology sector, allowing them to make informed decisions about their portfolio.

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In short, BASF has a huge future in biotechnology, which will drive innovation and sustainability in the chemical industry. With meticulous financial analysis and analytical strategic planning, BASF can continue its leading biotech solutions while maintaining strong financial performance.

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