2025 "Huashu Cup" International Mathematical Contest in Modeling

ICM

Problem B: The investment priorities for the future of the Chinese industry

Background

In China, the future industrial structure is undergoing profound changes, shifting from traditional manufacturing to high technology and services. Emerging industries such as artificial intelligence, biotechnology, new energy, and others are flourishing, becoming new drivers of economic growth in China. The rapid rise of these industries is not only of great significance for the development of the Chinese economy but also has far-reaching implications for the global economic landscape.

The main industries of the Chinese national economy cover a wide range of sectors from basic resource development to high-end services, including agriculture, forestry, animal husbandry, and fisheries, industry, construction, wholesale and retail, transportation, warehousing and postal services, accommodation and catering, finance, real estate, and other sectors[1]. These industries together constitute the diversified and comprehensive foundation of the Chinese economy, reflecting the overall and balanced development of the national economy.

The interrelationships among industries are intricate and complex, with the potential

for both positive mutual promotion and negative constraints. This complexity of industrial interconnectivity requires policymakers to consider comprehensively when promoting industrial development to achieve economic balance and sustainable growth. At the same time, government investment can directly create job opportunities, drive the development of related industries, promote economic growth, and enhance employment in people's livelihoods, serving as a critical means to ensure employment growth. To facilitate the development of Chinese industries and increase employment rates, please establish mathematical models and address the following questions.

Requirement

- Please gather relevant data and analyze the interrelationships among the major industries in China, discussing how they influence each other and either promote or constrain economic development.

- Please establish one or multiple investment theoretical models to study the relationship between investment and the Gross Domestic Product (GDP) of individual industries, and evaluate the models.

- From the perspective of maximizing national wealth generation, promoting long-term stable economic growth, and considering comprehensive social progress, if the government has a total investment fund of 1 trillion units, which industries should be the key focus for investment to achieve the highest gross domestic product (GDP)? If there is no limit on the number of industries for investment, please provide the investment allocation for each industry. If investment is restricted to three types of industries, explain the reasons for

selecting these three industries and allocate specific investment proportions for each.

- Despite the rapid development of society today, the employment situation remains challenging. From the perspectives of promoting employment rates and improving job quality, analyze which industries government investment should primarily focus on. Based on this analysis, adjust the investment plan in question three. In a scenario without restrictions on the number of industries for investment, how should the 1 trillion units of investment funds be allocated across these industries to effectively stimulate employment? If limited to investing in three types of industries, specify the exact investment proportions.

- Considering the goal of increasing the national gross domestic product and improving employment in people's livelihoods, which industries should China vigorously develop to ensure steady growth in national wealth and employment rates? Based on the research from questions three and four, and considering the principles of sustainable development and the long-term development situation of the country, please rearrange your investment plan and provide your analysis and reasoning.

Your PDF solution of no more than 25 total pages should include:

• One-page Summary Sheet.

• Table of Contents.

• Your complete solution.

• References list.

• AI Use Report (If used does not count toward the 25-page limit.)

References

[1]https://www.stats.gov.cn/sj/ndsj/2024/indexch.htm