Analysis of the Development of Meteorological Services in China

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This article conducts a preliminary exploration of the development of meteorological services in China. It begins by introducing the historical evolution and administrative structure of the China Meteorological Administration. Subsequently, by reviewing policy documents, it seeks to understand the developmental trajectory and policy objectives of China's meteorological services. Finally, it outlines potential challenges that the meteorological industry in China may face in its future development.

Through the compilation of policy documents, we have found that, with significant policy support, meteorological services in China have developed in recent years and the private meteorological industry is gradually emerging. During the "11th Five-Year Plan" period, the policies regarding the development of meteorological services mainly focused on industries highly sensitive to weather changes, such as agriculture, water resources, transportation, and aviation. When entering the "14th Five-Year Plan" period, however, China's approach to meteorological service development increasingly underscores the integration of technological innovation and artificial intelligence (AI). The objective is to leverage these advancements to continuously enhance capabilities in meteorological monitoring, forecasting, and early warning systems. Simultaneously, policies emphasize the importance of applying meteorological information across diverse sectors to unlock its full potential, represented by the concept of "meteorology +". Furthermore, private enterprises have continued to enter the meteorological service market in recent years, prompting increased attention from the Chinese government to the governance of the meteorological industry. Issues such as improving legal and standard systems, as well as industry management practices, have become recent concerns in China's governance of the meteorological industry.

As the private meteorological industry gradually emerges, we also observe that meteorological services in China are still primarily provided as public services funded by the government. Overall, revenue from public meteorological services accounts for about three quarters of the meteorological

service sector, while revenue from providing specialized and customized meteorological services to other industries accounts for only a very small proportion. Additionally, although the number of meteorological enterprises in China has rapidly increased since 2020, most new entrants are small or micro-sized enterprises. These firms still lack sufficient technological capacity and can only compete in the market through low-price strategies.

Overall, meteorological services in China have gradually developed with policy support, offering increasingly diverse services. However, national meteorological agencies (such as the China Meteorological Administration) and state-owned enterprises still play the most critical roles in the provision of meteorological services in China. In recent years, Chinese authorities have aimed to accelerate the cross-domain application of meteorological information through the open sharing of meteorological data, striving to achieve the policy goal of "meteorology +". However, with national entities playing a significant role in meteorological service provision, consumers or industries who need meteorological services may lean towards services provided by state-owned enterprises, considering the data advantages of public sectors and the trust associated with national institutions. This situation poses challenges for private sector entry into the meteorological service market. The roles of state-owned enterprises in the development of meteorology in China as well as their competitive relationships with the private meteorological industry, are important research topics for the future development of meteorological services in China.