Scientific culture is an important social foundation for shaping the internal drivers of scientific and technological innovation in China

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Scientific and technological innovation (STI) imposes unique requirements on the culture of the society in which it occurs, and the scientific culture that nurtures innovation also provides internal drivers for the development of STI. As scientific culture gains importance in society, we need a vibrant scientific community and a society that embraces the spirit of science and supports and actively participates in STI in order to create a cultural foundation conducive to STI activities.

Scientific culture is the social foundation for driving STI

The process ranging from the establishment of modern science to developments in it coincides with rapid transformations in human society. While studying the enormous impact of science on society, people continually puzzle over the kinds of social forms and cultural traits that lay the foundations for the birth of modern science and the directions in which different social structures and cultures drive science.

To achieve its goals of becoming a world leader in science and technology as well as a major centre for scientific innovation, China needs to build a modern economic system with a high-quality supply of STI, build up its capacity for independent innovation in all domains and cultivate high-quality STI professionals. It is also important to lay a strong social foundation that underpins STI, especially a firm foundation for scientific culture.

Similarly to the theory about the physical foundations for spiritual production proposed by Robert King Merton, the social foundation for STI development can be divided into objective and subjective foundations. The objective dimension, or the material conditions on which STI depends, refers to social factors that can be visually quantified into precise values, such as the economic foundation, infrastructure, human capital and the social structure.

The subjective dimension of the social foundation is the cultural environment in which STI occurs and develops. A sound cultural environment nurtures and promotes STI. A positive scientific culture drives the

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creation of an innovation-friendly social atmosphere, leading to STI emerging as a widely respected undertaking in society and enhancing the public’s interest and willingness to participate in innovative activities. That, in turn, helps foster an innovation-friendly sociocultural foundation. Scientific culture in this sense functions like an internal driver of STI development.

**What kind of sociocultural foundation is needed for STI?**

The continual generation of innovative outcomes cannot be separated from the sociocultural foundation that nurtures innovation. It requires innovative actors to uphold the scientific spirit of pursuing excellence and blazing new trails while demanding the public’s recognition and support for STI to constantly inject new force into the enterprise.

STI calls for a scientific culture led by the spirit of scientists. In the context of China, this spirit includes both the scientific spirit and the fine cultural traditions of the Chinese scientific community. It conforms to the needs of China’s scientific and technological development in the new era and points the way forward for the execution of STI activities. Therefore, the spirit of scientists represents a feature and the strength of the scientific culture.

STI also requires a scientific culture with an excellent academic style and code of conduct. The excellence of academic style refers not only to the integrity of research, the ethics of science and technology and other norms of behaviour followed by the scientific community, but also includes the scientific culture that people should uphold and seek to inherit. As long as the scientific community consciously upholds honesty in academic conduct, and the public plays the role of watchdog against dishonesty in scientific research and ethical misconduct, a sound scientific culture that provides the social foundation for STI to be a force for good can be guaranteed.

Another aim of STI is a scientific culture in which the public fully understands science and tolerates and supports innovation. It is important to cultivate the scientific spirit of tolerance of failure and critical reasoning across society based on the public’s understanding of science and to boost public attention and interest in STI. This is a critical goal in building a scientific culture and an important part of a modern social civilization. With improvements in the average level of education and literacy among the Chinese population, the focus of constructing a scientific culture should gradually expand from helping citizens master the requisite scientific knowledge to helping the public perceive and approach popular scientific and technological issues based on reason, strengthen its interest in and positive attitude towards STI, and establish respect for STI to solidify its sociocultural foundations.

STI also calls for a scientific culture in which the public actively participates in STI activities. Achieving high-level self-reliance and self-improvement in science and technology requires promoting the spirit of bold exploration as well as trial and error across society. This, in turn, requires appropriate policy-based and institutional guidance to reverse and divert short-sighted thinking that emphasizes quick success and immediate results, and the creation of a sociocultural environment that tolerates failure. This helps involve the public in the entire process of STI activities.

**What else is needed to create an innovation-friendly sociocultural foundation?**

According to a survey conducted by the China Association for Science and Technology, the Chinese public has long had a positive view of science and scientists, indicating a favourable social environment for the development of science and technology in China. However, the problems of dishonesty in research and ethical misconduct persist in the scientific community. This shows that STI has not yet fully shaped its perfect temper despite the progress made thus far and is not completely harmonious with the mood of society. It can be concluded that, despite strong external support from the Chinese public, the internal support provided by the social culture to science remains weak. This is the major bottleneck in the cultivation of an innovation-friendly sociocultural foundation.

The survey also shows that, although the public has placed sufficient trust in scientists, only a small portion of young people are willing to pursue
careers in science. This may be because the cultural establishment associated with STI has not kept pace with advances in science and technology. For example, the mechanism for the evaluation of scientists is not sufficiently rational, as it is excessively dependent on objective quantitative indicators but lacks a systematic evaluation of their contributions. This has led to speculative behaviours in scientific research that have made it difficult to improve its quality. The lack of a clearly defined boundary between science and society is another problem. In addition to the failure to establish a proper supervisory mechanism for the risks and ethics of scientific research, it involves excessive interference by administrative forces in the process of scientific research. There is also the problem of inadequate safeguards for failures of innovation. The market and society have provided sufficient rewards for successful innovators but not enough tolerance and protection for those who fail. The high uncertainty of the outcomes of scientific research is an inherent feature of science. Not all results of research can be ultimately transformed into profit, and even those that can be thus transformed require time and patience. The absence of a mechanism for safeguarding failures has encouraged scientists to choose subjects of research for which promising results can be easily obtained in the short term. This has resulted in a value system that favours quick success and immediate results. Over time, it has also had a negative impact on social culture and public choice.

China has, on the whole, developed a sociocultural atmosphere that is on par with that in developed countries in terms of respecting science and supporting innovation. However, it also suffers from prominent weak links in its cultural values, such as public tolerance for failure, participation in innovation and the truth-seeking spirit of scientists. There are specific historical reasons for the paradoxical attitude of the Chinese public towards STI, which is a weak link in the construction of scientific culture today. Encouraging the public to translate its support and enthusiasm for STI from words into action and to support and participate in STI through practical steps are important tasks in the consolidation of the sociocultural foundation for STI in China.

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