Postprint of the Construction of an Evaluation System for Mass Media Science and Technology Communication Capacity

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Abstract

Regarding the assertion that "science and technology constitute the primary productive force," historical verification has eliminated all doubt. The continuous advancement of science and technology, coupled with ongoing socio-economic development, further substantiates this principle. The societal standing of science and technology continues to ascend, wherein "mass media" serves a pivotal function in disseminating scientific and technological knowledge. Nevertheless, the process of science and technology communication via mass media is not without challenges, which consequently impact communication efficacy. Accordingly, this paper, following an analysis of the relationship between "science and technology" and "communication" and grounded in the evolution of mass media' s science and technology communication capabilities, delineates the science and technology communication system. The objective is to ultimately construct an evaluation framework for mass media' s science and technology communication capacity, thereby resolving existing issues in contemporary mass media science and technology communication and realizing its intended outcomes.

Full Text

Constructing an Evaluation System for Mass Media' s Science and Technology Communication Capacity

Abstract: The notion that "science and technology constitute primary productive forces" has been irrefutably demonstrated through history. Continuous advancements in science and technology, alongside rising socioeconomic development, underscore this principle. As the societal status of science and technology continues to elevate, mass media has emerged as a crucial vehicle for their dissemination. However, problems arising during this process can compromise the

effectiveness of science communication. This paper first examines the relationship between "science and technology" and "communication," then defines the science communication system based on the development of mass media's science and technology communication capacity. The ultimate objective is to construct a comprehensive evaluation system for mass media' s science and technology communication capacity, which can address existing problems and realize the intended effects of science communication through mass media.

Keywords: mass media; science and technology communication; capacity evaluation; evaluation system

Mass media, encompassing television, radio, newspapers, and the internet, maintains close attention to developments and trends across various industries [1]. In this domain, mass media remains a vital bridge connecting the external world with the scientific community, enabling the public to stay informed about scientific and technological advances through mass communication channels [2]. Simultaneously, mass media disseminates sound scientific attitudes, spirit, and literacy worldwide, playing a profoundly important role in shaping public behavior and fostering social development [3].

1. The Development of Mass Media' s Science and Technology Communication Capacity

The history of science and technology communication is as long as the history of science and technology itself, though its origins and development have lagged behind scientific progress. Early research literature already contained elements of science communication [4], and the current state of its development remains a shared concern across society [5].

Mass media's role in society is indispensable. The term "media" has expanded to encompass "mass media," making the two terms interchangeable [6]. This expansion aims to broaden communication channels, as evidenced by the emergence of newspapers, television, and the internet, while also accelerating dissemination speed and expanding the scope of information reach. In earlier societies, information transmission to remote areas with limited external contact would suppress certain information during the dissemination process [7].

Currently, a substantial portion of mass media science communication research focuses on problems encountered in scientific analysis, examining their causes based on present conditions and proposing solutions [8]. Regarding the content of science communication, mass media primarily refers to individuals and institutions engaged in related scientific and technological activities. These information providers mainly include university science and technology research associations, scientific research initiatives among social groups, relevant national research institutions, and science professors.

According to relevant data, television constitutes the primary channel for science and technology communication in China, supplemented by radio, computers,

print media, and other channels. Their respective proportions are shown in .

As evident from the table above, although China has numerous science communication channels, the distribution is highly uneven, with some channels remaining underutilized. Simultaneously, China' s mass media science communication process faces several systemic issues: lack of specialized science communication equipment, insufficient expertise among relevant personnel in mastering scientific knowledge, limited layout space for science content in media, non-fixed positions for general science communication roles leading to high personnel turnover, and crude program handover processes constrained by funding limitations. These problems stem partly from limited financial support and partly from inadequate public awareness of and attention to science communication. Media companies, prioritizing short-term profits over long-term vision, hold pessimistic outlooks on the prospects of science communication, resulting in insufficient resource allocation and demoralized staff, which naturally undermines effective science communication. The "mass media science and technology communication capacity evaluation system" has emerged precisely in response to these circumstances. Whether for better developing science communication or strengthening regulation of mass media, a scientific and unified evaluation standard is needed to provide data support for management decision-making.

2.1 Significance of Constructing the Evaluation System

The scientific and accurate construction of a mass media science and technology communication capacity evaluation system requires consideration of factors influencing media's science communication capacity, from which sufficient primary and secondary indicators can be extracted. The classification of these influencing factors must be based on media' s science communication work, primary dissemination methods, and media' s inherent characteristics. The construction of this evaluation system is useful not only for comprehensively promoting the development of the mass media industry but also for identifying problems through evaluation mechanisms, enhancing public acceptance of science and technology information, and ensuring the healthy development of the mass media sector. A well-developed evaluation system can effectively reduce errors in mass media science communication and strengthen management control over science communication content, holding major practical significance.

2.2 Indicators for Constructing the Evaluation System

The influencing factors can be summarized into seven main aspects:

1. **Facility Resources** refer to reliable supporting resources in the science communication process, primarily consisting of mass media outlets that bear responsibility for science communication. These include science communication supplements provided by newspapers, science programs, frequency settings established by radio stations, television programs related to science and their broadcast time slots, venues for conducting science

communication activities, and media personnel involved in dissemination activities.

2. **Content Sources** refer to institutions and organizations that specialize in researching and exploring scientific and technological information and have the authority to release science-related information, such as science museums, universities, and research institutions. They are responsible for providing scientific communication information to mass media and constitute important sources of science and technology information. Their scale and development level significantly impact media' s capacity to communicate science and technology.

3. **Policy Support** refers to relevant policies and regulations promulgated by the state and government to promote science and technology communication. Science and technology policies control the scale, speed, and direction of science and technology activities, while necessary economic and legal safeguards constitute important factors for the smooth development of science and technology. The most important manifestation of policy support is investment in mass media science communication, which serves as a crucial indicator for measuring the scale and development of social science and technology undertakings.

4. **Audience Quality:** As recipients of science communication information, the audience' s educational level, frequency of mass media usage, and degree of trust also affect the quality of science communication.

5. **Communication Environment** refers to the sum of various conditions upon which science communication media and activities rely. It concerns whether mass media creates a favorable atmosphere and environment conducive to achieving intended science communication outcomes.

6. **Communication Effects** refer to the impact of specific communication information on the audience, reflecting the quality of mass media technology communication indicators. This includes the reception level of science news and programs, and whether science activities and related products are understood and accepted by audiences.

7. **Achievement Transformation** refers to the speed and efficiency of mass media in promoting the application of scientific and technological achievements. It also encompasses mass media' s role in promoting patent applications, transfers, and transformation into productive forces.

Through summarizing these seven aspects of influencing factors, indicators for the mass media science and technology communication capacity evaluation system can be extracted, as detailed in .

It can be said that the several primary indicators in the table above influence the level of mass media' s science and technology communication. In practice, these primary indicators are indivisible, mutually influential, and collectively constitute important factors affecting mass media science communication.

When these primary indicators meet standards, they enhance mass media' s science communication level; when they fall short, they constrain it. Therefore, through evaluating the secondary indicators in the table above, the current status of primary indicators for mass media science communication can be properly understood, enabling specific measures for improvement or maintenance.

3.1 Improving Science Program Ratings

Constructing the mass media science and technology communication capacity evaluation system must begin with evaluating resource support, content optimization, and overall structure—this constitutes the prerequisite for building the evaluation system. Proper evaluation of this component helps mass media understand current audience preferences, directly identify deficiencies in existing science programs, and implement improvements, thereby playing an important role in enhancing mass media' s science communication capacity.

Specifically, when applying mass media to disseminate science and technology and related information for broader reach, evaluating resource support is essential. For instance, in establishing science programs, both radio and television stations must allocate program slots, while print media need to provide dedicated columns or prominent layout positions for science content. Content optimization requires statistical understanding of current audience viewing rates for science programs and discussion 热度 (heat/activity levels), thereby innovating program content, enriching program formats, and ultimately improving science program ratings.

3.2 Improving Communication Quality and Effects

Evaluating communication quality and effects constitutes a crucial component of constructing the mass media science and technology communication capacity evaluation system and represents the key to its construction. This evaluation component can highlight mass media's capacity in science communication from a lateral perspective, serving as an important indicator for correctly assessing the professional knowledge and practical capabilities of mass media practitioners, and playing a significant role in integrating media programs and increasing audience share.

Specifically, evaluating communication quality and effects requires establishing relevant research groups to track every program segment before, during, and after broadcast, comprehensively understanding each link in the program chain, integrating consulting content, information dissemination scope, and audience feedback and evaluation, thereby enabling mass media institutions to provide excellent scientific and technological achievements.

3.3 Improving Professional Standards of Industry Personnel

Improving professional standards of industry personnel represents the core of constructing the mass media science and technology communication capacity evaluation system and constitutes one of its ultimate objectives. Evaluating industry personnel' s professional standards primarily involves assessing mass media practitioners' mastery of scientific knowledge and understanding of audience groups' scientific literacy indicators. This serves as the main basis for improving science communication and plays an important role in ensuring the authenticity of science communication and timely transformation of communication outcomes.

Specifically, the evaluation system should achieve close coordination of work across every segment of the communication process, avoiding blind following of trends and inaccurate content in science communication to ensure zero errors in every report. Based on feedback from society, staff at each segment should fulfill their duties and actively promote the dissemination of science and technology.

In summary, mass media represents one of the primary means of science and technology communication in contemporary society. However, the process is affected by various factors that create problems influencing public acceptance of science and technology information. To improve this situation, constructing a mass media science and technology communication capacity evaluation system is essential.

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Note: Figure translations are in progress. See original paper for figures.