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Research on the Trustworthiness Evaluation of Scientific Data Management Platforms in Chinese Universities

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This study investigates the current research status of trustworthiness evaluation in China through literature review and web-based surveys, revealing a lack of tailored evaluation frameworks and practices specifically targeting scientific data management platforms in Chinese universities. Building upon the FAIR principles (Findability, Accessibility, Interoperability, and Reusability), this research aims to develop a localized trustworthiness evaluation system aligned with the developmental needs of university scientific data management platforms in China. The proposed system is applied to evaluate platforms, enabling them to assess their trustworthiness status and identify pathways for improvement. The detailed approach includes:

Conducting a multi-dimensional comparative analysis and LDA (Latent Dirichlet Allocation) topic clustering of three international digital repository certification standards—Nestor Seal, ISO 16363, and CoreTrust-Seal—to extract trustworthiness-related indicators. Concurrently, core elements affecting trustworthiness in university scientific data platforms are analyzed, focusing on organizational governance, data management functions, and technical infrastructure/security. By integrating these trustworthiness indicators with platform-specific elements and incorporating FAIR principles, a comprehensive set of trustworthiness evaluation indicators for university scientific data platforms is derived.

Synthesizing the extracted trustworthiness indicators with China's contextual realities and existing research, a preliminary draft of trustworthiness evaluation criteria for Chinese university scientific data platforms is formulated. This draft undergoes iterative refinement through expert reviews, resulting in a finalized hierarchical framework comprising **3 primary indicators, 14 secondary indicators, and 41 tertiary indicators**. Leveraging surveys from experts at nine universities within the China University Research Data Management Working Group, the Analytic Hierarchy Process (AHP) is employed to assign indicator weights, while the Fuzzy Comprehensive Evaluation Method is adopted to construct a localized trustworthiness evaluation system. The system rigorously adheres to FAIR principles to ensure data findability, accessibility, interoperability, and reusability.

In empirical validation, four scientific data platforms from China's top 10 universities (participants in the China University Research Data Management Working Group) are selected for testing. The evaluation results preliminarily validate the system's effectiveness and practical guidance.

Based on the evaluation outcomes, recommendations are proposed across three dimensions—organizational infrastructure, digital object management, and technical infrastructure/security—to enhance the trustworthiness of Chinese university scientific data platforms. The study concludes with insights and implications for advancing trustworthiness evaluation in this domain.

In summary, this research represents a pioneering exploration of trustworthiness evaluation for scientific data management platforms in Chinese universities, demonstrating innovation in research focus, methodology, and practical application. By embedding FAIR principles, the study holds significant value for promoting localized trustworthiness evaluation and certification in China, as well as advancing the long-term reliable management of scientific data.

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