Research on the Development Models of Convergence Media Based on Shared Resource Library: A Case Study of the National Agricultural Science and Technology Innovation Alliance

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Abstract. Driven by information technology, media convergence is entering a new stage of "all media", and the media and communications of the National Agricultural Science and Technology Innovation Alliance is undergoing tremendous changes. At present, the alliance's new media portal platform is still in a loosely integrated state, for example, content collection, production, review and release are still in independent operation and maintenance, not included in unified management, and there is no real media integration of production and release process. In response to these problems, it was proposed to establish the National Agricultural Science and Technology Innovation Alliance convergence media development models, that is, relying on the design of alliance's convergence media based on the shared resource library, through the construction of convergence media multi-platform interactive publish system of the alliance, it was suggested to explore the integration of multiple convergence, collection, production, management, and release channels to achieve "one collection, multiple generation, multiple releases and full media dissemination", so as to play the propaganda and support role of the new media portal of the National Agricultural Science and Technology Innovation Alliance.

Keywords: The National Agricultural Science and Technology Innovation Alliance; convergence media; development models; multi-platform; interactive release

1 Introduction

The National Agricultural Science and Technology Innovation Alliance was established in 2014. It aims to implement and solidly promote the innovation-driven development strategy, deepen the reform of the agricultural science and technology system and the governance system of agricultural scientific research, improve the ability and efficiency of independent technological innovation, and realize the "two thousand ways" and "two efforts to ensure" and "two continuous improvement" of the work goals, which strongly support China to march towards a modern agricultural The members of National Agricultural Science and Technology Innovation Alliance

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(NASTIA) are composed of national, provincial and municipal agricultural scientific research institutions. NASTIA focuses on solving major agricultural overall strategic and common technical problems and major key technical problems in regional agricultural development, and carries out collaborative innovation of agricultural scientific in cooperative organization[1].

Since the Party Central Committee promulgated the "Guiding Opinions on Promoting the Integrated Development of Traditional Media and Emerging Media" in 2014, the strategic layout of media integration has been implemented for more than 7 years, and media integration has been practiced and applied in many mainstream media. Especially driven by information technology, media convergence has entered a new stage of "all media". At this time, the media and communications work of the National Agricultural Science and Technology Innovation Alliance (hereinafter referred to as "Innovation Alliance") is also ushering in a critical period of transformation, from the portal media as the main position of the alliance's public opinion to the current "new media" layout where multiple media forms coexist Now, the media integration and development of the Innovation Alliance has become the primary task of the alliance's news and public opinion work.

Throughout the existing research, many explorations and results of new content, new media systems and new technologies have laid a certain foundation for this study to carry out research on the development model of convergence media based on shared resource library, and also as a reference. In-depth integration of multi-platform interactive systems, multi-modal technology to respond to "all-media" needs, and integration of service ecosystem development still need to be further strengthened. Therefore, under the top-level design idea of "further accelerating the construction of the alliance, vigorously promoting the in-depth integration of industry, academy and research, and ensuring the high-quality development and standardized operation of the alliance around agricultural cost-saving and efficiency, quality and safety, and ecological and environmental protection needs"[2].

This study proposes an integrated platform construction and development model with parallel content and technology, and builds a resource-intensive, collaborative and efficient convergence media communication system, with a view to scientifically allocating agricultural science and technology innovation resources, cultivating new momentum for agricultural and rural development, and supporting and leading rural revitalization. An important platform and carrier for the National Agricultural Science and Technology Innovation Alliance to better play its leading and demonstration role in exploring and trying.

2 The Development Models of Convergence Media Based on Shared Resource Library of The National Agricultural Science and Technology Innovation Alliance

2.1 Theory on the Development Models of Convergence Media

In January 2019, the "Four All Media" theory of "whole media, holographic media, all staff media, and all effect media", providing new ideas for the development of convergence media from personnel, information, technology and carriers, to promote the in-depth development of convergence media with the shared integration angle and

level of effects[3], and also point out the trend and direction of future media integration development. Broadly speaking, alliance convergence media development model of China includes three convergence media models which features of industry, regional and brand[4] as an industry development model. It builds an convergence media platform for the alliance industry resources and uses professional data and resources to establish the national team of NASTIA. In a narrow sense, the development of models of convergence media of NASTIA refers to the integration of traditional media, websites, Weibo terminals, and the establishment of convergence media matrix in conjunction with other influential agricultural media platforms.

The key content of the development of convergence media of NASTIA adheres to the parallelism of content and technology. Relying on the convergence media design based on a shared resource library, it carries out the construction of convergence media platform and explores the integration, collection, production, management and release channels. To achieve the effect of "single collection, multi-channel aggregation, convergence release and all-media communication". At the same time, further optimize and standardize the management and operation of new convergence media, form a good convergence production ecological environment, and ensure the sustainable development of the convergence media of NASTIA.

2.2 The Necessity of Convergence Media Development in the National Agricultural Science and Technology Innovation Alliance

It can be seen from the series of strategic deployments and important speeches of President Xi Jinping since 2014 that promoting the in-depth development of media integration is a key task for deepening reforms in the field of the public opinion in China. After a series of guiding opinions issued by government of China on the development of convergence media, scientifically analyzed the integration development practices of Chinese mainstream media and put forward requirements for promoting the in-depth development of media integration. Against this background, the media and communications landscape of the National Agricultural Science and Technology Innovation Alliance is developing in the direction of in-depth integration. The need for in-depth integration has arisen, and the pace of reform cannot be delayed. The media integration development of the National Agricultural Science and Technology Innovation Alliance has become an important task in implementing an all-media communication project and strengthening new mainstream media. How does the alliance implement the central spirit, change publicity concepts, innovate publicity models, integrate publicity processes, integrate publicity channels, and create publicity matrix has also become an urgent problem that needs to be solved in development model research[5].

The news media of agricultural scientific research institutions use internet thinking to produce news, shrinking from traditional media positions and shifting from media product strategies to "mobile first", "content big" and "channel expansion" strategies. However, the current new media platform of NASTIA is still in a loosely unified state. The content collection, production, review and release between "one website and one Weibo" are still operated and maintained independently and have not been integrated into the unified platform. There is no real media integration, production, review, and release process. News information has not yet been presented in a multi-modal and multi-channel form.

3 The National Agricultural Science and Technology Innovation Alliance Convergence Media Platform Construction Ideas and Structure

The National Agricultural Science and Technology Innovation Alliance convergence media integrates human resources, content, editing, communication, supervision, etc., and connects different media such as websites and WeChat that have both common ground and complementarity. It is a new media matrix that achieves "resource accommodation, content integration, publicity integration, and interest integration", not really an independent entity media[6]. Without making major changes to the existing system, personnel, processes, and management, the National Agricultural Science and Technology Innovation Alliance will use the convergence media shared resource library as the basis for content construction to build a content ecosystem that integrates media communication system. Supported by advanced technology, build a technical service system that integrates media communication and realize the collaborative integration of resources, technology and communication.

According to the actual needs of platform construction, the design of innovation alliance platform will adopt a three-layer service architecture model based on cloud computing standards by the infrastructure services, platform services, and software services[7]. They use the shared resource library as a resource pool to realize the integrated management and control of public cloud and media cloud resources, as well as the service-oriented application of business systems. The infrastructure services of the National Agricultural Science and Technology Innovation Alliance's convergence media platform adopt an open architecture. It has both self-built private cloud resources and can also be integrated and controlled with public cloud resources, such as Alibaba Cloud, Tencent Cloud (Fig. 1). This hybrid cloud architecture incorporates infrastructure equipments from different manufacturers to integrate data resources, and then uniformly provides common media resources to upper-level application services from the data layer of the shared resource library through the content management layer.

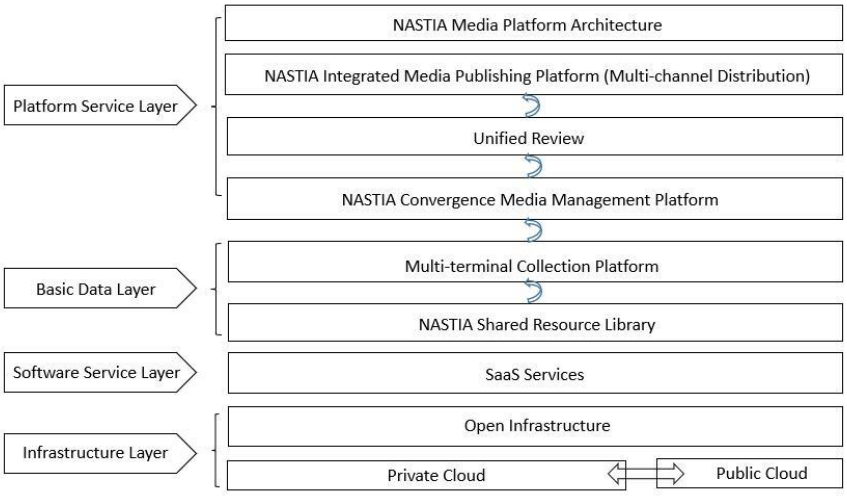

Fig. 1. NASTIA Convergence Media Platform Architecture

The convergence media infrastructure layer of NASTIA adopts an open architecture. Public cloud and private cloud exist at the same time. The core attribute of the public cloud is that it can share resource libraries with others. As a support platform, it can integrate upstream and downstream services and users. The private cloud is established in the organization. Internally, it is conducive to standardizing cloud service management processes and security, and can integrated manage and control the two cloud storage methods.

The convergence media software service layer is mainly oriented to the media and communications of the NASTIA. Users bring data into the resource library and then call news data from the resource library. Correspondents from the NASTIA member units can carry out practical applications of news gathering and editing at any place and at any time. The basic data layer of the NASTIA convergence media as a data center performs data acquisition and integration based on the converged media resource sharing library. According to the requirements of each storage component in the data center, the basic data layer cleans, exchanges and loads the original media data collected from various channels, and provides basic data support to the service layer of the integrated media platform.

The service layer of the NASTIA convergence media platform includes a media publishing platform and management platform. The service framework is mainly composed of a resource data layer, a computing layer, a business engine layer and a data access layer. In addition, the platform service layer is also responsible for coordinating the system configuration and management of the entire platform content service, business system configuration and management, distributed framework and load balance.

4 Process design and main business functions of the National Agricultural Science and Technology Innovation Alliance integrated media platform

4.1 Media convergence business process design based on innovation alliance shared resource library

The shared resource library of the Innovation Alliance collects multi-terminal data in the entire network domain through a self-built private cloud media platform. The collected media data comes from various types of resources. Content collection methods include data import, repost on multiple-platforms, mobile editing, and network collection, database collection, website group collection, media channel access, etc., and establish a dynamic data resource pool[8].

The member entities of NASTIA are responsible for the collection, centralized storage and real-time dynamic updating of media resources, and can freely interact with data in the resource pool. The media management department of the member entities uniformly maintain and manage the media data in the resource pool. By deploying media data resources, various media operation and maintenance personnel can gather in the virtual space, enter the shared resource library, and query and call materials on demand (such as manuscripts, pictures, audios, videos, etc.)

The dynamic shared resource library provides stable data support for the process design of convergence media and forms a closed business loop in the entire process of convergence media production and management.The process design innovation alliance's convergence media embodies the full-process production of various businesses and practice activities such as converged news, content production, and interactive publication. It ensures comprehensive management of media information and simultaneously achieves effect tracking of information suppliers to achieve integrated results across multiple terminals.

4.2 The main business functions of the multi-platform interactive publishing system in convergence media of the National Agricultural Science and Technology Innovation Alliance

The multi-platform interactive publishing system of NASTIA is the main business system of the convergence media platform, which can meet the business scenario of simultaneously using cloud desktops by the news and publicity departments of the National Agricultural Science and Technology Innovation Alliances more than 70 member entities. In the operation and use of the system, the correspondents of news and publicity department can access the interactive publishing system through lightweight terminals such as regular laptops, and obtain an operation experience consistent with the local workstation installation tool software.

Under the condition of retaining the original organizational structure and working mode, the multimedia interactive publishing system of the NASTIA integrates, produces, publishes, and manages various business modules, including the content aggregation module, content production module, content management and review module, and integrated publishing module (Fig. 2). After logging into the system, editorial staff can share and use content materials collectively in the system. The system allocates permissions for users, displaying corresponding content and layouts based on different users and permissions, realizing the decentralized use of resources and personnel.

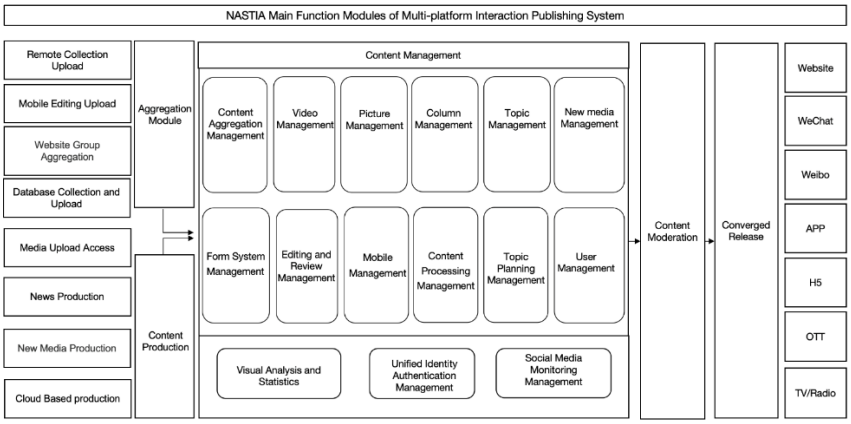

Fig. 2. Main Business Function Models of Innovative Alliance Media Fusion Multi-platform Interactive Publishing System

1) Content aggregation module

The content aggregation module supports personal computer (PC) and mobile system deployment. Content uploading can be completed through remote collection, mobile editing, website group aggregation, database collection, media upload access, etc. to achieve the aggregation of news materials from different sources. At the same time, the system supports multiple formats of data, making it convenient for innovation alliance members to upload media data through multiple channels.

2) Content production module

The content production module integrates various tools required for integrated production, provides access to news data storage, data source tracking and news material citation, and can realize intelligent search, analysis and processing, intelligent extraction and recommendation[9]. At the same time, the content production module also deeply integrates various functions of the collaborative work platform to realize content annotation and online communication based on press releases, and supports the integration of instant messaging and video conferencing functions into the editing and processing platform, which can be initiated at any time during the production process. This module provides access to manuscript data and material references, and provides basic editing services to the outside.

3) Content management module

The integration of the content management module is mainly divided into two parts, namely platform production management and data support management. Platform production management includes topic planning management, content collection management, video management, picture management, column management, thematic management, form system management, content processing management, editing and review management, new media management, mobile terminal management, user Management.

4) Converged Release Module

The converged release module releases reviewed manuscripts to cross-platform and cross-terminal devices. In the content releasing process, users only need to release it once, and it can be pushed to PCs, website groups, mobile apps, WeChat, Weibo, H5, OTT, TV/radio and other media platforms across the entire network. It also supports PCs and mobile phones, iPad, large screen and other multi-terminal display. This module realizes multi-platform connectivity based on the Internet and achieves full network coverage of content release.

5 The Characteristics and Innovations of the Innovative Alliance Converged Media Platform

5.1 Create a 'one-stop' multi-platform interactive release tailored for converged media

The innovative alliance converged media platform integrates various media, such as websites and WeChat, which share commonalities but also exhibit complementary differences in terms of personnel, content, editing, dissemination, and supervision. This platform achieves comprehensive integration, realizing a new type of news communication platform characterized by 'resource integration, content integration, publicity integration, and mutual benefit. The 'one-stop' converged media platform for interac-

tive releases is based on the interactive publication of data from the innovative alliance converged media's shared resource repository. After the intersection and cleaning of media data, technological means are employed to achieve the collaborative integration of processes and resources.

In practice, this cloud-based converged media multi-platform interactive release process breaks through the traditional content production and dissemination barriers across various channels and platforms[10]. It integrates multiple channels for aggregation, collection, production, management, and publication, standardizing content aggregation, production, business processes, content management, and converged release. Through the construction of a shared resource repository, various forms of resources such as news leads, manuscripts, images, audio, video, microblogs, WeChat, web pages, etc., from different sources, can be uniformly managed and centrally accessed. Upon logging into the system, editorial staff can share and utilize content materials collectively. The innovative alliance converged media platform assigns different permissions to users, and based on their roles and permissions, their displayed content and layout vary, achieving decentralized use of resources and personnel.

5.2 Develop and promote a new form of converged media based on the national innovation alliance's shared resource library

More than 70 national alliance units jointly build a shared resource library, breaking the current state of isolated resources in various systems. This achievement enables the convergence, retrieval, and management of diverse materials through multiple channels. It establishes a platform connecting agricultural scientists, agricultural communication media, and the general public for disseminating scientific knowledge. The creation of a national, regional, and industry-oriented, multi-level, and multidimensional agricultural popularization content creation and dissemination network promotes the transition from a focus on content and channels to a focus on scenes in the context of science popularization activities in the Internet environment. This transformation facilitates the universal, fair, and barrier-free discovery, access, and sharing of agricultural science and technology knowledge, technical achievements, and other information resources throughout society. It actively nurtures a new generation of open, intelligent forms of scientific communication and popularization in the agricultural field that are adaptable to the needs of the Internet economy. This initiative aims to provide comprehensive content support for the efficient and high-quality production of various communication media.

5.3 Actively explore new models of agricultural science and technology institutional reform and mechanism innovation within the framework of the rural revitalization strategy system

Under the existing scientific and technological management system, the establishment and development of the innovative alliance converged media is one of the expressions of exploring major mechanisms for innovation in collaborative agricultural science and technology. Vigorous promotion of the innovative alliance converged media is conducive to breaking down professional, disciplinary, regional, and unit boundaries, forming a scientifically rational collaborative innovation layout, nurturing diverse innovation entities, constructing top-tier disciplines and teams, and establishing a platform for joint construction, sharing, and mutual benefit that stimu-

lates the initiative of all entities. This will maximize the enthusiasm for innovation and entrepreneurship among agricultural enterprises, as well as central, provincial, and municipal-level agricultural research institutions and higher education institutions, accelerating the resolution of significant agricultural science and technology and industry issues crucial to national strategic needs and enhancing competitiveness.

5.4 Further strengthen and enhance the management, operation, and support capabilities of the innovative alliance converged media portal

Firstly, the core of managing the new media converged portal is to integrate the latest content from the innovation alliance into the portal's content system continually. This involves incorporating the latest developments from the innovation alliance, streamlining the content system, constructing the framework for the latest content sections, and highlighting the functional positioning and key tasks of the innovation alliance, in line with the fundamental principles of networked scientific communication. Secondly, the innovative alliance converged media platform focuses on the latest developments in agricultural science and technology innovation, carrying out tasks such as news information collection, editing, proofreading, and publication for the innovative alliance media converged portal. Quality control is applied to the published content. In terms of operation and maintenance, the emphasis is on system maintenance and technical support for the new media converged portal, ensuring the stable, reliable, secure, and uninterrupted operation of the portal platform. This includes services such as data backup, portal platform system management and operation services, portal platform security protection services, and portal platform emergency response services.

5.5 Enhance the integration of industry, academia, and research in the agricultural science and technology innovation system, forming an innovative alliance for a converged production ecosystem

By establishing the business processes and platforms for the innovative alliance converged media, we can better integrate the construction of innovative alliance converged media with information technology, promote the deep integration of media content and technology, and extend the scope of innovative alliance media services. This transformation involves transitioning from providing singular media information products to offering services related to agricultural science and technology innovation resources. It aims to create a virtuous fusion production ecosystem within the innovative alliance community[11]. In this environment, the National Agricultural Science and Technology Innovation Alliance's new media converged portal is currently operating steadily. It serves as a pioneering force in the news media of agricultural research institutions, continually exploring new frontiers.

6 Conclusion and Outlook

In today's rapidly evolving media technology landscape, the innovative alliance-driven converged media development model, guided by the "full-process media, holographic media, all-staff media, and all-effect media" strategy, is gradually clarifying its path and direction in the exploration of deep integration practices. The deep development of innovative alliance converged media is imperative. This study takes the National Agricultural Science and Technology Innovation Alliance as a leading ap-

plied demonstration case. Through the research on the innovative alliance converged media development model, it proposes a solution for alliance converged media dedicated to achieving a multi-level, widely covered, and new form of communication pattern in the era of fully shared media resources. The goal is to construct a mainstream media cluster with communicative, guiding, influential, and trustworthy capabilities. In terms of application and demonstration effects, the innovative alliance converged media platform and portal based on a shared resource library have become important platforms and carriers for scientifically allocating agricultural science and technology innovation resources, nurturing new dynamics for agricultural and rural development, and supporting and leading rural revitalization for nearly 70 alliance members.

With the continuous iteration and upgrading of new technologies and the ongoing improvement of the policy environment, the future development of innovative alliance converged media will face new difficulties, challenges, and opportunities. For instance, the in-depth development of media convergence (i.e., deep integration) is still immature, with a focus on "convergence" rather than "integration" in practical operations. Many news outlets excessively rely on technological empowerment, leading to a scarcity of high-quality converged media products. The management and operational mechanisms of innovative alliance converged media still require innovation, and there is a relative shortage of interdisciplinary professionals. Overcoming these challenges will be crucial in the future. Therefore, conducting research on the National Agricultural Science and Technology Innovation Alliance converged media not only facilitates breaking down barriers between different professions, disciplines, regions, and units but also contributes to the formation of a scientifically rational collaborative innovation layout. This encourages the cultivation of diverse innovation entities and the establishment of a platform for joint construction, sharing, and mutual benefit that stimulates the initiative of all alliance members.

While deeply implementing the requirements of the Central Committee of the Communist Party of China and the State Council regarding the implementation of the innovation-driven development strategy and rural revitalization, the construction of the innovative alliance converged media platform is a robust exploration and practice in promoting the in-depth integration of industry, academia, and research. It will also serve as a theoretical and methodological reference for subsequent related research.

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