

Application of Computer Networks and Multimedia Technology in Television Stations (Postprint)

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Abstract

In recent years, alongside continuous societal progress and corresponding economic development, computer network and multimedia technologies have undergone rapid updates and advancements, being deployed across an expanding spectrum of fields and exerting a significant, non-negligible influence. With the widespread adoption of network technology, computer network and multimedia technologies have garnered considerable attention from television stations and have been integrated into various operational workflows, thereby catalyzing the rapid evolution of television application technologies. The cognitive frameworks and working modalities of television station personnel have experienced profound transformations, streamlining procedural workflows on one hand while concurrently accelerating operational efficiency and enhancing work quality on the other, thus fostering the sustainable development of the television broadcasting enterprise.

Full Text

Application of Computer Network and Multimedia Technology in TV Stations

Abstract: In recent years, as society has progressed and the economy has developed, computer network and multimedia technologies have rapidly evolved and been deployed across an increasing number of fields, playing a significant role. With the widespread adoption of network technology, TV stations have paid considerable attention to computer network and multimedia technologies, applying them to various operational segments. This has accelerated the development of television application technologies and fundamentally transformed the mindset and working methods of TV station staff. On one hand, these technologies have simplified workflows; on the other hand, they have accelerated work pace and improved quality, thereby promoting the sustainable development of television broadcasting.

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In today's technologically advanced era, the development prospects for traditional broadcasting remain limited. Moreover, as technology continues to evolve, computer network technology has been widely applied across various industries. To meet the new demands of multimedia technology, television professionals must leverage the advantages of computer network and multimedia technologies to ensure smooth operations at TV stations. This paper provides a detailed explanation of the application of computer network and multimedia technology in television broadcasting.

1.1 Lagging Operational Concepts

County-level radio and television stations emerged around the 1970s and gradually spread to cities of all sizes, though their penetration in rural areas remained limited. In rural regions, only a handful of households owned televisions, making it difficult for people to access outside information through broadcast media, resulting in a limited information dissemination scope. By the 1990s, economic development had improved this situation, with ordinary rural families gaining access to televisions. Broadcasting stations began emphasizing management concepts and control, yet many problems persisted, including outdated television broadcasting management concepts and lagging operational philosophies. Stations could only accept a small number of programs and offered no nighttime programming, hindering development. Around 2000, the state introduced a series of preferential policies for radio and television stations, providing funding to encourage reform and the establishment of cable television. However, when these policies were first introduced, the problems facing television development were not substantially resolved because rural residents lived in dispersed areas, requiring substantial capital investment to build broadcasting infrastructure. Additionally, the installation of cable and wireless lines created complex interweaving problems [1]. Due to the enormous cost of building cable television, viewers had to pay additional fees, leaving many areas without cable service and resulting in relatively backward broadcasting development.

1.2 Outdated Hardware and Limited Program Capacity

Due to the limited popularization of cable television, many local radio and television stations suffer from outdated hardware and small program capacity. Because cable television has not been widely adopted, many local broadcasters operate with obsolete equipment and limited program storage. Since the construction of cable television infrastructure requires significant investment,

and because rural residents are dispersed, many areas still lack cable service, resulting in relatively backward broadcasting development [1].

1.3 Low Work Efficiency

Due to outdated concepts in television broadcasting management and operations, numerous problems have emerged during station development. For instance, the work allocation mechanism is flawed, innovation awareness is insufficient, yet work benefits are distributed equally, leading to low staff motivation and reduced work efficiency. Additionally, there are unreasonable practices in talent recruitment and personnel transfers. The evaluation system for assessing staff capabilities and performance is incomplete, and the reward and punishment system is unclear, causing employees to lack motivation, adopt improper work attitudes, and become less conscientious and responsible. This results in slow information transmission and hinders the development of radio and television stations.

2. Advantages of Applying Computer Network and Multimedia Technology in TV Stations

With the rapid development of network technology, applying computer network and multimedia technology to television stations is an inevitable trend, offering numerous advantages:

First, **material sharing and collaborative editing**. Each television station has dedicated studios, post-production editing rooms, audio production rooms, and broadcast rooms, though the number and distribution vary across different stations. Network technology transforms individual program production departments into an integrated whole, enabling sharing of all program materials and resources, streamlining workflows, accelerating production speed, and effectively improving work efficiency. After application of network technology, television programs are digitized or data-fied using appropriate file encoding and recorded onto stable media for long-term preservation and reuse to meet production, broadcast, and exchange needs. After audio-visual materials are uploaded and transcoded into the system, index files are created and catalogued for later retrieval and browsing to locate needed materials for download and reuse. Network technology has effectively resolved signal loss problems caused by multiple editing cycles in the past, allowing staff to edit programs repeatedly without affecting signal quality while improving program quality.

Second, **tapeless hard disk broadcasting**. Early offline storage used mechanical tapes, which were difficult to maintain and had poor compatibility across generations. These have gradually been replaced by data stream hard disk libraries. By connecting the program production system to the internet, automatic upload and broadcast of programs has become simple and convenient. Automatic broadcast equipment can not only control and adjust program content and playback sequence but also rapidly modify program schedules.

Third, **remote editing**. Previously, program editing could only be performed in specific production studios. However, after applying network technology, journalists can place footage shot on location into portable non-linear editing systems for post-production work in various environments. Upon completion, they can transmit the finished programs back to the station's server library via internet network technology for broadcast, greatly shortening television program production time. However, this editing technology requires extremely high bandwidth for wide-area transmission networks, and since wireless transmission network construction is incomplete in some regions, remote editing has not been widely adopted. Additionally, network technology plays positive roles in news, feature films, and TV dramas.

Fourth, **new media applications**. With the popularization of “two micros and one terminal” (Weibo, WeChat, and mobile clients), an increasing number of TV stations have begun building their own new media platforms. New media technology has specific standards for audio-video playback formats, data capacity, and upload/download speeds. Through network technology, various program materials produced by TV stations can be streamlined and organized, then automatically transcoded by the central server's format encoder and synthesized using network technology for release on corresponding new media platforms.

3.1 Application of Computer Network Technology in TV Station Information Management

TV station information management includes various types such as equipment management, advertising project management, and administrative archive management. Since these management systems all operate on standalone machines in relatively independent states, they cannot perform dynamic management and fail to meet the objective needs of information industry production management. Applying network technology to management systems integrates several management systems into one and enables dynamic information management, greatly improving work efficiency. The system comprises multiple elements with different functions. Network technology helps managers integrate equipment procurement and usage, program advertising operations, and personnel work arrangements. The system primarily includes three aspects:

First, **program department terminals**. This department's role is to determine work direction and plans in advance and apply for potentially needed equipment to prepare for production.

Second, **management terminals**. Management terminals encompass three aspects: project management, equipment management, and personnel management, each with distinct characteristics and functions. When developing program plans, the program department can apply for supporting acquisition and editing equipment based on preliminary planning proposals and relevant material information provided by archive databases, arrange journalist interviews, and coordinate editor post-production work.

Third, **IC card management control terminals and studio query terminals**. IC card management requires staff to insert their IC cards into corresponding card readers; only after identity verification can they freely use equipment. Since personnel mobility is high in various studios, touchscreen interfaces are often used for interaction, creating better human-machine interfaces that positively contribute to safe and stable system operation and help relevant functions perform effectively. For studio query terminals, staff can use them to check the operational status of various studios and equipment at any time to promptly identify and resolve machine problems, thereby reducing machine failure probability and ensuring normal operation.

3.2 Building Databases to Achieve Resource Sharing

3.2.1 Manuscript Data Management The media asset management system is a crucial system for TV stations to manage audio-visual materials. To ensure normal station operations, TV stations must build various databases including organizational information databases and material databases. Despite current technological advancement, most TV stations still use paper manuscripts for writing and reviewing materials, with machines only serving remote reception and printing functions. Due to heavy workload and complex procedures, quality is poor, causing significant damage to equipment and failing to meet growing objective demands. Therefore, this traditional work format requires rapid change [3]. Applying network technology to TV stations enables paperless editing and reviewing of materials, allows manuscript resource information sharing, and permits editing of materials on any authorized terminal. After manuscripts are correctly entered into the manuscript management system, the system can automatically perform cataloguing and remote transmission for review, avoiding repetitive labor, effectively improving work efficiency, and ensuring high program timeliness.

3.2.2 Multimedia Data Management With the rapid development of network technology, computers participate in the entire program production process. With digital systems at the core, building efficient multimedia databases and network systems can meet people's demands for information that is "fast, authentic, rich, and accurate." Applying network technology to TV stations enables real-time storage and sharing of large-capacity multimedia data, improving data information utilization efficiency and avoiding repetitive labor. Additionally, computers play important roles in static graphic management, sound effect management, audio-visual database management, and special effects animation production.

The application of computer network and multimedia technology in TV stations promotes development, helps improve acquisition, editing, and broadcasting application technologies, enriches program creation formats, significantly streamlines workflows, improves work efficiency and program quality, increases ratings, generates greater economic benefits, and better responds to changing media mar-

ket demands. For the future comprehensive development of TV stations, it is necessary to constantly monitor audience needs, promptly adjust operational thinking, upgrade software and hardware equipment, and effectively integrate computer network multimedia technology with new media technology to play their proper role in the all-media era.

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

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