Analysis of the Impact of Digital Transformation on the Management of Elderly Care Institutions

Rui Li[1 2]，Siegfried Erorita[1]
Corresponding Author:Rui Li
Affiliation(s)
[1]University of the Cordilleras, Baguio City, Philippines，2600
[2]GuiYang Healthcare Vocational University,Guiyang City, Guizhou Province,China,55008

Abstract: With the rapid advancement of technology, digital transformation has become a crucial trend in the management and transformation of various industries. This article aims to analyze the application of digital technologies such as intelligent surveillance systems, health data management systems, and interactive platforms in elderly care institutions. It discusses the impact of digital transformation on the management of these institutions and addresses the challenges faced during this transformation. The article proposes corresponding implementation strategies, offering new perspectives for the research and development of digital transformation in elderly care institutions.

Introduction: The trend of an aging population structure has become a global issue. As time progresses, the challenges of an increasingly elderly population become more pronounced, leading to a continuous rise in the demand for elderly care institutions and services. These services have varying needs in terms of service quality, content, professional staff, and institutional management. Moreover, with the advent of the fourth industrial revolution, information technologies such as the Internet, the Internet of Things (IoT), and big data are transforming the traditional elderly care industry. This transformation is driving the industry to expand and evolve, giving rise to new models like "Internet Plus" and "Smart Elderly Care." In this context, the digital transformation of elderly care institutions is particularly crucial. Based on the introduction of modern information technology, AI, and big data, these institutions rely on intelligent, informational, and data-driven methods to enrich their service content and comprehensively improve service efficiency and standards. The aim is to efficiently integrate resources and provide personalized, high-quality services to meet the growing needs of the elderly population. Therefore, digital transformation encompasses the transformation of hardware and software based on information technology, changes in management practices, and shifts in service philosophies.

1. Application of Digital Technologies in Elderly Care Institutions

1.1 Application and Effectiveness of Intelligent Monitoring Systems

In the digital transformation of modern elderly care institutions, the application of intelligent surveillance systems has become a core component, significantly

enhancing the safety and quality of life of the elderly. These systems utilize video surveillance, mobile sensors, emergency call devices, and other smart technologies to monitor the activities and health status of the elderly in real-time. For instance, video surveillance installed inside the institutions allows around-the-clock monitoring of public areas, quickly identifying emergencies such as falls or fainting. With system upgrades, features like motion detection, advanced facial recognition, and behavioral analysis can rapidly identify and respond to emergencies, as well as assist in recognizing the emotions and health issues of the elderly, providing vital information to caregivers. Additionally, mobile sensors and wearable devices in these systems enable individual health monitoring, tracking vital physiological parameters like heart rate, blood pressure, and sleep quality in real-time, and transmitting data to a central database. This allows caregivers to accurately monitor the health of each elderly person, providing timely and personalized care. Emergency call devices offer the elderly a direct and rapid method of seeking help. These devices are designed for simplicity and ease of use, ensuring that in emergencies, the elderly can quickly contact caregivers or medical personnel for immediate assistance[1].

Overall, the application of intelligent surveillance systems in elderly care institutions not only significantly enhances the safety of the elderly but also improves the quality and efficiency of caregiving services. It makes elderly care more personalized and professional, significantly reduces the workload of caregivers, allowing them to focus more on providing high-quality, humane care. This plays an important role in addressing the challenges of an aging society and raising the service standards of elderly care institutions.

1.2 Application and Effects of Health Data Management Systems

Medical and health services are also a crucial aspect of elderly care institution management. Health data management systems are multi-dimensional information integration platforms that include Electronic Health Records (EHR), Patient Management Systems (PMS), and remote health monitoring functions. By integrating, collecting, and analyzing the health data of the elderly in real time, and dynamically tracking their vital signs and physiological parameters, these systems significantly optimize the quality of medical and nursing services in elderly care institution management. Electronic health record systems allow medical staff to store and access detailed health histories, medication records, test results, and other key medical information of the elderly. This centralized data management not only improves data accuracy and accessibility but also reduces the risk of medical errors, enhancing the efficiency and quality of medical decisions and care. Patient management systems focus more on the organization of daily care and services, helping institutions optimize the allocation of medical resources, such as arranging caregivers or medical staff according to the health needs of the elderly and developing individualized care plans. Additionally, these systems can be used to track and manage medication distribution, schedule medical services, and collect feedback from the elderly. Remote health monitoring systems provide the elderly with a sustainable[2], remote monitoring option. These systems, combined with intelligent surveillance, add

technologies like remote location and video calling, offering remote medical consultations and even simple check-up services. Such technologies allow elderly care institutions to maintain timely contact with comprehensive medical facilities and receive remote medical guidance, which is particularly important for institutions in relatively remote locations or with weaker comprehensive medical capabilities.

In summary, the introduction of health data management systems provides elderly care institutions with a comprehensive, efficient, and personalized platform for managing medical and caregiving services. Not only do they enhance the caregiving capabilities of the institutions, but they also improve the quality of medical services to a certain extent. Additionally, they enable institutions to better meet the growing and diverse health needs of an aging population, providing a practical solution for an aging society[3].

1.3 Application and Effects of Interactive Platforms and Remote Service Platforms

Interactive platforms and remote service platforms play a crucial role in the digital transformation of elderly care institutions, particularly in enhancing the quality and efficiency of services. These platforms utilize Information and Communication Technologies (ICT) to facilitate interactions with the elderly regarding their daily life needs, emotional needs, and other aspects, aiming to provide more humanized, efficient, and targeted services. Interactive platforms enable the elderly to stay connected with family, friends, and caregivers through video calls, instant messaging, and other online tools. This social interaction is vital for the psychological health and emotional well-being of the elderly, especially for those with mobility impairments. Remote services offer the elderly a way to receive comprehensive online services without needing to leave their homes, such as remote medical consultations, legal advice, and psychological counseling, thereby safeguarding personal privacy and reducing the need for long-distance travel[4].

These interactive and remote service platforms, by providing more convenient, efficient, and personalized services, not only improve the quality of life for the elderly but also enhance the service efficiency and effectiveness of elderly care institutions. The application of these technologies plays a significant role in enhancing the autonomy and participation of the elderly. At the same time, they present new challenges and opportunities for elderly care institutions in resource allocation and service provision.

2. Positive Impacts of Digital Transformation on the Management of Elderly Care Institutions

2.1 Enhanced Management Efficiency

Elderly care institutions can achieve enhanced management efficiency through digital transformation. Firstly, by introducing digital record-keeping and data management systems like Electronic Health Records (EHR) and Customer Relationship Management (CRM) systems, institutions can process daily administrative and medical records more quickly and accurately. This efficient data

management reduces the use of paper documents, lowers the risk of errors, and improves the speed and accuracy of information retrieval. Secondly, digital tools such as online scheduling and resource management systems enable institutions to arrange personnel and resources more effectively. These tools allow managers to monitor staff allocation, inventory levels, and facility usage in real-time, thus flexibly adjusting resources to meet changing needs. Lastly, digital transformation automates routine tasks such as billing, appointment scheduling, and report generation, freeing up time for management and caregiving staff to focus more on providing high-quality care. This automation not only improves work efficiency but also enhances employee job satisfaction, as they can devote more time and energy to more challenging and rewarding tasks[5].

2.2 Optimized Resource Allocation

After digital transformation, elderly care institutions can better optimize resource allocation. Through retrospective and prospective analysis of advanced data and the establishment of corresponding AI predictive models, managers can more accurately forecast or schedule work hours and workloads for staff, medical supply needs, and facility usage rates, effectively preventing resource surplus or shortage. Digital tools like intelligent scheduling systems increase the transparency and efficiency of resource allocation, ensuring optimal use of caregivers and facilities and reducing resource wastage. Additionally, integrated supply chain management systems enable institutions to manage inventories more effectively, ensuring timely replenishment of essential supplies while reducing the costs of overstocking. These optimization methods not only improve operational efficiency but also enhance service quality, allowing institutions to allocate resources more flexibly and strategically[6].

2.3 Improved Service Quality

The initial phase of digital transformation allows elderly care institutions to perform cloud data analysis while providing more personalized and detailed care services effectively. For example, through electronic health record systems, medical staff can quickly access and update the health information of the elderly, achieving more accurate health monitoring and timely medical intervention. Digital transformation also enables institutions to offer various interactive activities and entertainment through online platforms, enhancing social participation and emotional fulfillment for the elderly. Moreover, the introduction of remote medical services allows the elderly to receive professional medical consultations and care at home, further improving the accessibility and convenience of services. Overall, digital transformation enhances service quality by increasing the personalization and immediacy of services, better meeting the diverse needs of the elderly[7].

3. Challenges in the Digital Transformation Process

3.1 Talent Acquisition and Technical Training

During the digital transformation of elderly care institutions, employee skill training and adaptation pose a significant challenge. With the introduction of new

management systems, technologies, and platforms, the demand for multi-skilled talents in these institutions is gradually increasing. However, there are considerable differences in the ability of different staff members to adapt to these systems and platforms, especially among older employees who may feel unfamiliar with, or even resistant to, these new technologies. On the other hand, personnel in these institutions are constantly faced with new introductions, requiring them to continuously learn and update their knowledge in a rapidly evolving era, which is a considerable challenge for many employees[8].

3.2 Data Security and Privacy Protection Challenges

Digital transformation inevitably brings challenges related to data security and privacy protection. The digital storage and processing of sensitive information, such as personal health information, lifestyle habits, and financial data, increase the risks of data breaches and misuse. As elderly care institutions deepen their digital transformation, data security and privacy protection become another challenge. Cyberattacks, data leaks, or improper use of personal data could seriously infringe upon the privacy rights of the elderly and impact the reputation of the institutions. Therefore, compliance with data protection laws and regulations is crucial for the digital transformation of these institutions.

3.3 Considerations of Cost and Funding

In the process of digital transformation, the establishment of hardware and the maintenance of software in elderly care institutions require careful consideration of costs and funding. Acquiring and maintaining advanced digital technology involves significant investment, including the costs of purchasing hardware devices, software systems, related installation and configuration fees, and ongoing technical support for updates. Moreover, ongoing operational costs, such as software updates, system maintenance, and staff training, cannot be overlooked. For many elderly care institutions, these expenses can put a strain on their financial situation, especially for non-profit or financially constrained institutions. Therefore, how to achieve effective digital transformation within a limited budget is an issue that requires careful consideration.

3.4 Enhancing Suitability for the Elderly

In the process of digital upgrading, elderly care institutions can easily overlook the special needs of older adults. Elderly users may face various physiological and cognitive limitations, requiring higher usability for new technologies. Thus, when undergoing digital transformation, it's important for institutions to consider the opinions and suggestions of the elderly, understanding their real needs and usage habits. This requires not only the innovative thinking of technology developers but also ongoing interaction and feedback between elderly care institutions and the elderly. Through this approach, digital transformation can progress not just technologically, but also truly meet the actual needs of the elderly, thereby improving their quality of life[9].

4. Strategic Suggestions for Implementing Digital Transformation

4.1 Establishing Effective Employee Training Programs

In the process of implementing digital transformation, timely and comprehensive training for employees is crucial. This includes training on the operation of new technologies and platforms as well as adaptive education on changes in work processes brought about by digitalization. Training programs should be multi-tiered, ranging from basic skills to advanced applications, to accommodate the varying skill levels and learning capacities of different employees. For instance, methods like simulation training, online courses, or workshops can gradually familiarize and equip employees with new technologies.

Additionally, training programs should focus on practicality and interactivity, enabling employees to apply learned knowledge in their actual work. Along with this focus, it is necessary to regularly collect employee feedback and evaluate the training to ensure its effectiveness and make timely adjustments. Encouraging employee participation in the decision-making process of digital transformation can increase their engagement and enthusiasm, thereby establishing a positive and supportive work culture adapted to digital transformation.

4.2 Strategies for Data Security and Privacy Protection

Formulating strategies for data security and privacy protection is crucial when implementing digital transformation. This includes ensuring the security of technological infrastructures, such as using encryption and firewalls to protect stored data. Regular security audits and vulnerability testing should also be conducted to identify and fix potential security flaws.

Elderly care institutions should implement strict data access and control policies to ensure that only authorized personnel can access sensitive data and monitor and record data usage. Training employees on data security and privacy protection is also necessary to increase their awareness of potential risks and teach them how to handle sensitive information securely. Institutions must also comply with relevant data protection regulations to ensure that the collection, storage, and use of personal data are legally compliant. Through these measures, elderly care institutions can not only protect the privacy of the elderly but also enhance the trust of service users and the public.

4.3 Increasing Communication and Technological Innovation

In implementing digital transformation strategies, cross-departmental collaboration and technological innovation are crucial. Internally, elderly care institutions should encourage different departments to increase communication and collaboration through digital means, ensuring that technological solutions truly meet the care needs of the elderly. For example, close cooperation between IT and nursing departments can ensure that technological solutions genuinely meet care requirements. Institutions should also actively explore and adopt new technologies, such as artificial intelligence, the Internet of Things, and big data analytics, to improve service quality

and efficiency. Externally, institutions should actively explore the application of new technologies and seek technological innovation through cooperation with universities, research institutions, and technology companies, constantly seeking to accelerate digital transformation and enhance service levels and operational efficiency[10].

4.4 Focusing on the Real Needs of the Elderly

When elderly care institutions develop digital transformation, it's easy to overlook the elderly who receive the services. Understanding the real needs, capability limitations, and usage habits of elderly users is crucial. It's important to consider the physiological and cognitive limitations of the elderly, ensuring that applications are designed to be simple, easy to operate, and provide continuous support services to help the elderly adapt and accept new changes. This will help fully realize the potential of digital transformation in elderly care institutions, truly serving the needs of the elderly.

5. **V. Future Research Directions**

5.1 Integration and Application of Advanced Technologies: Research should focus on how to integrate technologies like artificial intelligence, the Internet of Things, and big data with traditional elderly care. This includes developing targeted and personalized care plans and exploring how these technologies can help more accurately monitor health conditions, predict disease risks, and offer customized care and treatment plans.

5.2 Long-term Impact Assessment: Future studies should assess the long-term impact of digital transformation on the operational efficiency of elderly care institutions, employee welfare, and the quality of life of the elderly. This includes researching how digital transformation affects the cost-effectiveness of institutions, employee job satisfaction, and the overall well-being of the elderly.

5.3 Digital Privacy and Ethical Issues: With the increase in personal data, research should focus on how to effectively use this data to improve services and care while protecting the privacy of the elderly. This includes studying regulations, policies, and best practices for ensuring the security and compliant use of data.

5.4 User Acceptance and Adaptability Studies: Delve into understanding the acceptance and adaptability of elderly individuals and staff of elderly care institutions to new technologies. Research how to enhance their technology acceptance and usage efficiency to ensure the successful implementation of digital transformation.

5.5 Interdisciplinary Collaboration Models: Explore ways of collaboration between different disciplines such as information technology, healthcare, and sociology to promote innovative integrated solutions. Research how interdisciplinary cooperation can more effectively address the challenges faced by elderly care institutions.

5.6 Economic Evaluation: Assess the cost-effectiveness of digital transformation and its impact on elderly care institutions, researching how to achieve efficient digital

transformation within budget constraints. This includes exploring strategies for cost savings and investment returns, as well as how to use technological innovation to optimize resource allocation and service provision.

Through in-depth research in these areas, a more comprehensive understanding of the impact of digital transformation on the management of elderly care institutions can be developed, providing scientific evidence and practical guidance for future development.

6. Conclusion

Digital transformation can bring significant improvements in management efficiency, resource allocation, and service quality to elderly care institutions, but this process also comes with a series of new challenges. To overcome these challenges and fully utilize the potential of digital transformation, elderly care institutions need to adopt comprehensive strategies. These include emphasizing employee training, strengthening data security and privacy protection, and promoting cross-departmental collaboration and technological innovation, with a focus on suitability for the elderly. Through these measures, elderly care institutions can not only enhance their service efficacy but also better adapt to the rapidly changing social and technological environment, meeting the diverse needs of the aging population.

References:

[1] Zhu Pei, Dai Xinyi. Research on the Current Status of Digital Transformation in Elderly Care Institutions in Changzhou Area. Journal of Harbin Vocational and Technical College. 2023(03) 123-125.

[2] Yu Jinhui, Wang Xin. A Review of Research on the Digital Transformation Framework of Elderly Care Institutions. Science, Technology and Industry. 2022, 22(08) 167-171.

[3] Zhang Min, Meng Jia, Zhou Lixin, Tian Xueying. Reflections on Digital Transformation in the Elderly Care Service Industry. Cooperative Economy and Technology. 2023(20) 22-23.

[4] Kailibi Nuer, Wang Ziyi, Tian Ningfeng, Zhang Shuqian. Analysis of Digitalized Elderly Care Service Scenarios. China Science & Technology Panorama. 2023(12) 117-119.

[5] Zhang Xiaoyi, Ma Dexiu, Huang Jianfeng. Study on the Accessibility of Smart Elderly Care Services in the Context of Digital Transformation. Today's Science Park. 2022(06) 7-21.

[6]Klimberg Ronald;Ratick Samuel,Benchmarking nursing homes using the Order Rated Effectiveness model [J] Socio-Economic Planning Sciences. Volume 89 , Issue . 2023

[7]Qing Ji,A Study on the Quality of Life of Elderly Nurses in Two Selected Elderly Care Institutions in Shandong Province [J] Journal of Clinical and Nursing Research. Volume 7 , Issue 4 . 2023

[8]ZHOU Zaijuan;FENG Han,Study on the Matching Degree of the Quality of Employees in Pension Institutions and the Needs of the Elderly [J] Canadian Social Science. Volume 19 , Issue 1 . 2023. PP 63-66

[9]Yang Li;Peng Hongmei;Yang Yunfan;Ouyang Linqi;Li Yunfeng,Situation and Countermeasures of the Management Team of the Elderly Care Institutions from the Perspective of the Combination of Medical and Health Care: A Cross-Sectional Study. [J] Journal of healthcare engineering. Volume 2020 , Issue . 2020. PP 8826007-8826007

[10]Xu Zhiwei;Li Peng;Wei Cuiping,Evaluation on service quality in institutional pensions based on a novel hierarchical DEMATEL method for PLTSs[J] Journal of Intelligent & Fuzzy Systems. Volume 43 , Issue 5 . 2022. PP 6229-6251