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Development of a Remote Social Work Service Platform Integrating 5g Network AND IoT Technology

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ABSTRACT: This research endeavors to create a remote long-term care social work service platform that incorporates fifth-generation mobile communication (5G) and Internet of Things (IoT) technologies, aiming to address the limitations of conventional service models in the context of an aging population. The study utilizes a mixed-methods approach, conducting pilot tests of the platform across four urban and rural long-term care facilities in Taiwan. The findings demonstrate that the platform effectively leverages the low latency and high bandwidth capabilities of 5G in conjunction with IoT sensor networks, resulting in a marked enhancement in service efficiency. Quantitative analyses reveal significant improvements in service satisfaction, social workers' professional self-efficacy, and the accessibility of services in remote regions following the platform's implementation. Qualitative assessments indicate that while the new service model offers increased convenience and reassurance, it also introduces challenges, including the digital divide among elderly users, concerns regarding privacy, and the need for adaptation in professional roles. In conclusion, the study affirms that the integration of 5G and IoT technologies presents substantial technical feasibility and practical value, effectively fostering service innovation and quality enhancement. Nevertheless, the successful deployment of such technology necessitates a comprehensive digital empowerment initiative, robust privacy protection frameworks, and ethical guidelines to strike a balance between technological advancement and humanistic care, thereby facilitating the realization of sustainable and inclusive smart care services.

KEYWORDS: 5G, Internet of Things, long-Term Care, Remote Social Work, Digital Divide

I. INTRODUCTION

1.1 Research Background and Motivation

The rapid increase in the global aging population has led to a significant rise in the demand for long-term care services, presenting unprecedented challenges to conventional social work service models. In Taiwan, individuals aged 65 and older represent 17.8% of the total population, a figure projected to escalate to 28% by 2030 (Huang et al., 2019). This growing demand for long-term care services, alongside issues such as a shortage of qualified personnel and the uneven distribution of service resources, necessitates the exploration of innovative service delivery models within the social work sector.

The COVID-19 pandemic has further intensified the need for digital transformation, compelling numerous social work agencies to transition to remote service models. However, traditional remote services frequently encounter technical limitations, subpar communication quality, and a lack of immediacy (Caon et al., 2025; Connolly et al., 2025; Gibson et al., 2020). In this context, the high-speed, low-latency, and extensive connectivity features of fifth-generation mobile communication technology (5G), in conjunction with the sensing and monitoring capabilities of the Internet of Things (IoT), offer a transformative technological foundation for remote social work services (Elendu et al., 2024; Kelly et al., 2020; Peralta-Ochoa et al., 2023; Thottempudi et al., 2025).

1.2 Research Motivation and Importance

The impetus for this research arises from pressing needs at three distinct levels. First, from a **technological development** standpoint, 5G networks provide extremely low latency (1-10ms), ultra-high speeds (10-20Gbps), and massive connectivity (capable of supporting one million devices per square kilometer), facilitating large-scale IoT applications and presenting unprecedented technological opportunities for remote social work services (Böcker et al., 2019; Siddiqi et al., 2019).

Second, from a **social demand** perspective, Taiwan's Ministry of Health and Welfare has launched the "Implementation of 5G and Smart Technology to Enhance Medical and Health Care Program," underscoring the necessity of leveraging 5G smart healthcare service platforms to improve medical conditions in rural areas (Yang & Lin, 2024). Concurrently, the social work sector urgently requires innovative service models to tackle challenges such as workforce shortages and the maintenance of service quality.

Finally, from a **practical application** viewpoint, existing literature indicates that remote social work services can enhance service accessibility and facilitate resource integration; however, they also confront challenges including technical barriers, digital divides, and privacy security concerns (Balogun et al., 2025; Gilson et al., 2025; Jeyasingham & Devlin, 2024; McCall et al., 2024). Consequently, the development of a remote social work service platform that integrates 5G and IoT technologies is of considerable theoretical and practical significance.

1.3 Literature Review and Theoretical Foundation

1.3.1 Development of 5G Network Technology

As a new generation of mobile communication technology, 5G encompasses three primary application scenarios: enhanced mobile broadband (eMBB), massive machine-type communications (mMTC), and ultra-reliable low-latency communications (uRLLC). These characteristics enable 5G to support a variety of smart healthcare and social service applications (Eswaran & Honnavalli, 2023; Ghadi et al., 2024; Islam et al., 2025; Peralta-Ochoa et al., 2023).

Network slicing technology represents one of the core innovations of 5G, allowing for the creation of multiple logically independent network slices on a single physical network infrastructure, with each slice customizable to fulfill specific service requirements (Anđelić et al., 2025; Min et al., 2024; Novanana et al., 2024). Additionally, edge computing technology brings computational resources closer to the network edge, significantly reducing latency and enhancing service response times (Dayong et al., 2024; Karami & Karami, 2025; Zhu et al., 2023).

1.3.2 Application of IoT in Social Services

The utilization of IoT technology within the realm of social services is increasingly prevalent. Sensor networks can gather real-time data regarding environmental conditions, physiological parameters, and behavioral patterns, thereby providing intelligent service support through big data analysis and artificial intelligence technologies (Abdulmalek et al., 2022; Gudei & Gurgu, 2024; Katie, 2024).

The concept of Social IoT emphasizes the social relationships and collaborative capabilities among IoT devices, offering novel perspectives for the development of smarter and more human-centered social service platforms (Gulzar et al., 2024; Judijanto, 2025; Qasabeh et al., 2022).

1.3.3 Research on Remote Social Work Services

Digital transformation has emerged as a significant trend within the social work sector. Research indicates that remote social work services can improve service accessibility, foster interdisciplinary collaboration, and reduce service costs (Markovič, 2024; Segal et al., 2025).

Nevertheless, remote services also encounter numerous challenges, including inadequate technical capabilities, ambiguous professional boundaries, and data security risks. The Technology Acceptance Model (TAM) serves as a crucial theoretical framework for understanding social workers' acceptance of digital technologies (Mabaso et al., 2025; Muhammad et al., 2025).

1.4 Research Objectives and Questions

Informed by the preceding literature review and practical considerations, this study delineates the following specific research objectives:

Main Objective: To establish a remote long-term care social work service platform that leverages 5G networks and Internet of Things (IoT) technology to enhance the quality and efficiency of services provided.

Specific Goals:

1. Technical Integration Goal: To design and implement a cohesive architecture that incorporates 5G network slicing, edge computing, and IoT sensors.
2. Service Innovation Goal: To formulate innovative models and workflows for remote social work services.
3. Effectiveness Verification Goal: To assess the platform's efficacy in enhancing service satisfaction, reducing operational costs, and improving care quality.
4. Feasibility Assessment Goal: To evaluate the technical feasibility, economic viability, and social acceptance of the proposed platform.

Research Questions:

1. What design principles should guide the development of an integrated remote social work service platform that amalgamates 5G and IoT technologies?
2. Is this platform capable of effectively enhancing the quality and efficiency of long-term care social work services?
3. What technical challenges and limitations may arise during the implementation of the platform?
4. How can we facilitate the acceptance of new technologies among service recipients and social workers?

1.5 Research Contributions

This study is anticipated to yield significant contributions across four domains:

A) Theoretical Contributions

1. Development of a theoretical framework for the integration of 5G and IoT technologies within social work services.
2. Expansion of the Technology Acceptance Model's applicability within the social work domain.
3. Enrichment of theoretical discourse and research methodologies pertaining to digital social work.

B) Practical Contributions

1. Provision of a tangible and viable solution for a remote social work service platform.
2. Establishment of best practice guidelines for the implementation of technology and transformation of service models.
3. Presentation of a reference model for the digital transformation of social welfare organizations.

C) Technical Contributions

1. Validation of the feasibility of 5G network slicing within the social services sector.
2. Development of an IoT sensor integration solution tailored for long-term care services.
3. Creation of a real-time response mechanism supported by edge computing technologies.

D) Social Contributions

1. Enhancement of accessibility to long-term care services in remote and resource-constrained areas.
2. Improvement of the efficiency and quality of overall social welfare services.
3. Promotion of digital inclusion and social equity.

1.6 Research Scope and Limitations

Research Scope: This study concentrates on social work services within the long-term care sector, encompassing essential service components such as case assessment, counseling, resource linkage, crisis intervention, and family support. The geographical focus is primarily on Taiwan, with research participants including social workers from long-term care institutions, service recipients, and their families.

Research Limitations:

1. Technical Limitations: The coverage and maturity of 5G networks remain in developmental stages.
2. Sample Limitations: The research sample is predominantly drawn from specific regions and institutions, necessitating further verification of external validity.
3. Time Limitations: Assessments of long-term effects require extended observation periods.
4. Resource Limitations: Constraints in research funding and human resources may impact the scale and depth of the study.

II. RESEARCH METHODS

2.1 Research Design

This study adopts a **mixed methods research** framework, integrating both quantitative and qualitative methodologies to thoroughly evaluate the development and effectiveness of a 5G network combined with Internet of Things (IoT) technology for a remote social work service platform. The research design incorporates a **quasi-experimental approach**, specifically employing a pre-test and post-test control group design to assess variations in service effectiveness prior to and following the platform's implementation.

The research process is structured into three principal phases, detailed as follows:

A) Phase One: Platform Design and Development (Three Months)

This phase focuses on the creation of a robust system platform tailored to user requirements. Key activities include:

1. **System Requirements Analysis and Architecture Design:** Conducting a comprehensive analysis of user needs, establishing functional specifications for the system, and completing the overall technical architecture design.
2. **Technology Selection, System Development, and Integration Testing:** Selecting core technologies and developing the system in accordance with design specifications, followed by unit and integration testing to ensure system stability and compatibility.
3. **User Interface (UI) and User Experience (UX) Design:** Crafting the user interface and operational workflows, developing prototypes, and performing usability testing to optimize the user experience.

B) Phase Two: Pilot Implementation and Data Collection (Six Months)

This phase aims to assess the feasibility and practicality of the platform in real-world contexts. The primary tasks include:

1. **Pilot Site Deployment and Implementation:** Installing, deploying, and launching the platform system at designated pilot organizations.
2. **User Education and System Function Adjustment:** Providing comprehensive training for users at the pilot sites and making necessary adjustments to system functionalities based on initial usage feedback.
3. **User Feedback and System Usage Data Collection:** Systematically gathering user operation history and qualitative feedback through surveys, interviews, and backend system records.

C) Phase Three: Effectiveness Evaluation and Analysis (Three Months)

This phase seeks to objectively evaluate the implementation effectiveness of the platform developed in this study. The main tasks encompass:

1. **Quantitative Data Analysis and Statistical Significance Testing:** Performing statistical analyses on the collected quantitative data and conducting significance testing using appropriate statistical methods to validate the research hypotheses.
2. **Qualitative Data Collection and Analysis:** Collecting, coding, and thematically analyzing qualitative data through in-depth interviews and focus groups to gain deeper insights into user experiences and perspectives.
3. **Comprehensive Effectiveness Evaluation, Research Conclusions, and Future Recommendations:** Integrating the findings from both quantitative and qualitative analyses to conduct an overall effectiveness evaluation, subsequently formulating research conclusions and specific recommendations for future research or practical applications.

2.2 Platform System Architecture Design

2.2.1 Overall System Architecture

The proposed 5G+IoT remote social work service platform is designed with a five-layer architecture, creating a comprehensive technical ecosystem that spans from the foundational device layer to the uppermost service layer (cf. Figure 1 for the system architecture).

The system architecture comprises the following core components:

Device Layer:

1. Physiological monitoring sensors (e.g., heart rate, blood pressure, blood oxygen, body temperature)
2. Environmental monitoring sensors (e.g., indoor temperature and humidity, air quality, lighting)
3. Behavioral monitoring sensors (e.g., activity detection, fall detection, sleep monitoring)
4. Safety alarm devices (e.g., emergency buttons, smoke detectors, door and window sensors)
5. Location tracking devices (e.g., GPS positioning, indoor positioning systems)

Network Layer:

1. 5G core network providing high-speed, low-latency connections
2. Edge computing nodes facilitating real-time data analysis
3. Network slicing technology ensuring quality of service
4. Security gateways safeguarding data transmission

Platform Layer:

1. Big data processing engine managing extensive sensor data
2. AI analysis engine offering intelligent decision support
3. Service management module coordinating various service processes
4. Distributed database ensuring data reliability

Application Layer:

1. Social worker workstation providing a professional service interface
2. Client-side application supporting self-health management
3. Management system facilitating organizational operations
4. Reporting and analysis tools providing decision support information

Service Layer:

1. Case management: Digital case records and tracking
2. Health monitoring: Real-time physiological parameter monitoring and alerts
3. Emergency response: Automated crisis detection and reporting
4. Family support: Integration of diverse care resources

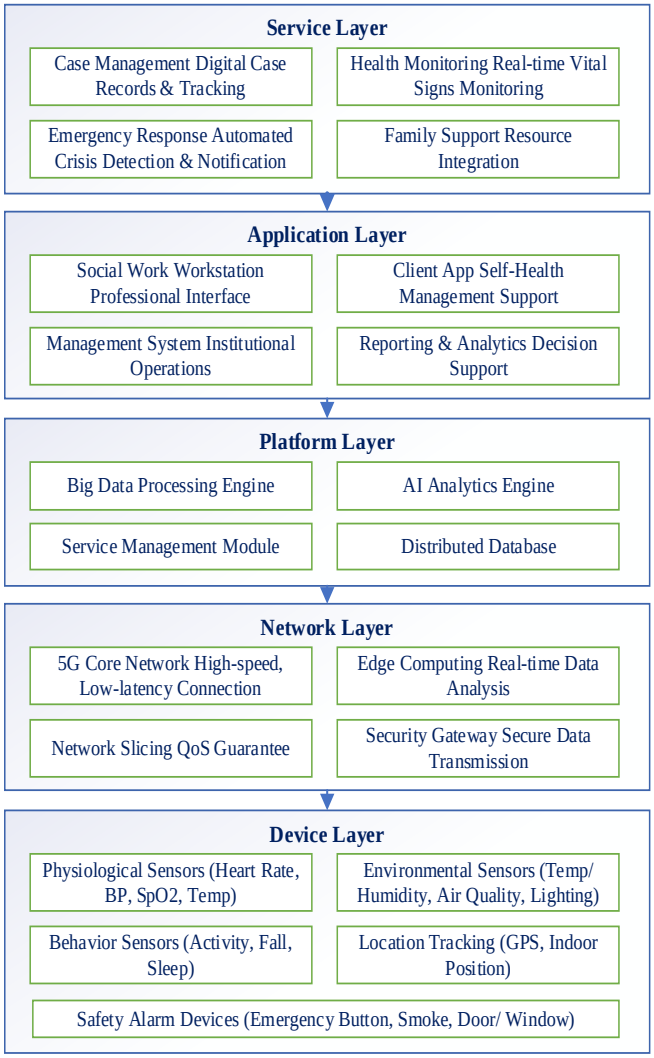

Figure 1: System Architecture Diagram of the 5G Network Integrated with IoT Technology for Remote Long-term Care Social Work Service Platform

2.2.2 5G Network Slicing Design

To accommodate the varying requirements of long-term care social work services, four distinct network slices have been designed:

Emergency Medical Slice:

1. Ultra-low latency (<1ms) ensuring immediate response in emergencies
2. Highest priority bandwidth allocation
3. 99.999% reliability guarantee

Daily Care Slice:

1. Medium latency (<10ms) supporting daily monitoring
2. Dynamic bandwidth allocation
3. 99.99% reliability guarantee

Social Work Service Slice:

1. Moderate latency (<20ms) facilitating remote consultations
2. Guaranteed bandwidth to support video call quality
3. End-to-end encryption to protect privacy

Management Service Slice:

1. Flexible latency (<50ms) supporting backend management

2. On-demand bandwidth allocation
3. Standard security level

2.2.3 IoT Sensor Integration Plan

In response to the needs of long-term care services, various types of IoT sensors have been integrated to establish an intelligent sensing network:

Physiological Monitoring Module:

1. Wearable heart rate and blood pressure monitors
2. Non-contact respiratory monitoring systems
3. Smart mattress for sleep quality analysis
4. Smart devices for weight and body fat measurement

Environmental Monitoring Module:

1. Temperature and humidity sensor network
2. Real-time air quality monitoring
3. Smart lighting control systems
4. Noise level monitoring devices

Safety Monitoring Module:

1. Fall detection smart cameras
2. Door and window status sensors
3. Emergency assistance button systems
4. Smoke and fire warning devices

2.3 Research Subjects and Sampling Methods

2.3.1 Research Population and Sample

Research Population: The study focuses on social welfare institutions in Taiwan that provide long-term care services, along with their service recipients.

Sampling Method: A stratified random sampling approach is employed, taking into account the size of the institution and its geographical location.

Sample Size Calculation: Based on the statistical power analysis conducted by Cohen (2013), a minimum of 64 samples per group is necessary under the parameters of α = 0.05, power = 0.80, and an effect size of 0.5. To account for a projected attrition rate of 20%, the sample size for each group is established at 80 individuals, culminating in a total sample size of 160 participants.

Inclusion Criteria:

1. Social Workers: Participants must possess qualifications as licensed social workers or social work assistants and have a minimum of one year of experience in long-term care services.
2. Service Recipients: Individuals must be aged 65 and older, have been receiving long-term care services for over three months, and exhibit normal cognitive function.
3. Family Members: Primary caregivers must be aged between 20 and 80 years and demonstrate basic proficiency in the use of smart devices.

Exclusion Criteria:

1. Individuals exhibiting severe cognitive impairment or mental illness.
2. Individuals unable to utilize basic communication devices.
3. Individuals who may relocate or discontinue services during the anticipated participation period.

2.3.2 Selection of Research Sites

To investigate the implementation conditions across diverse contexts, this study selects four long-term care institutions that exhibit significant variations in geographical location and resource availability.

Urban Institutions: Two long-term care institutions situated in metropolitan core areas are chosen. These institutions typically benefit from enhanced public health resources, well-equipped facilities, and advanced technological infrastructure. Their service recipients generally possess higher socioeconomic status and educational attainment, rendering them more receptive to new knowledge and familiar with digital tools. The inclusion of these institutions aims to evaluate the effectiveness, facilitating factors, and potential challenges associated with implementing the study's focus in a resource-rich environment, thereby serving as a benchmark reference.

Rural Institutions: Two long-term care institutions located in non-metropolitan or remote areas are selected. In contrast to their urban counterparts, these institutions often face challenges related to resource accessibility and infrastructure, which may include insufficient professional staffing or outdated equipment. Their service recipients may also experience a more pronounced digital divide due to factors such as digital literacy and access to devices. The selection of these sites aims to illustrate the practical difficulties, structural limitations, and necessary coping strategies that may arise when introducing the study's focus in a resource-constrained setting, ensuring that the research findings reflect a range of social realities.

2.4 Data Collection Methods

This study employs a quantitative research methodology, systematically gathering data through multiple approaches, including system backend records, surveys, and standardized scales, to ensure the objectivity and comprehensiveness of the research findings.

2.4.1 Quantitative Data Collection

To fulfill the research objectives, this section delineates four primary sources of quantitative data collection:

A) Objective System Usage Data

To analyze user interactions with the system and its performance, objective data is extracted from backend logs. Collected indicators include:

1. User Engagement: Frequency of platform logins and duration of use during each session.
2. Function Usage Rate: Click counts and usage statistics for each core functional module.
3. System Performance: Response times for executing various commands and records of error rates.
4. Data Quality: Regular verification of the accuracy of data returned by Internet of Things (IoT) sensors.

B) Service Satisfaction Survey

To evaluate users' subjective experiences with the system, a Likert 5-point scale is utilized for the survey. The

measurement encompasses four dimensions, each demonstrating strong internal consistency reliability:

1. **Usability:** Assessing the intuitiveness and convenience of system operation (Cronbach's $\alpha = 0.89$).
2. **Usefulness:** Measuring the practical assistance and value of system functions for users' work (Cronbach's $\alpha = 0.92$).
3. **Service Quality:** Evaluating users' overall satisfaction with system stability and support services (Cronbach's $\alpha = 0.91$).
4. **Ease of Learning:** Understanding the difficulty level for users in mastering new technologies and system operations (Cronbach's $\alpha = 0.87$).

C) Work Performance Assessment

To investigate the impact of the system on professional capabilities, the study employs the Social Work Self-Efficacy Scale (SWSE), which assesses changes in social workers' confidence levels regarding their professional judgment and execution abilities before and after the system's introduction.

D) Case Outcome Measurement

To objectively assess the tangible impacts of intervention measures on service recipients, a Case Management Effectiveness Assessment Form is utilized for pre- and post-assessment. This form includes several key indicators to monitor case progress, primarily focusing on:

1. The degree of improvement in quality of life.
2. Indicators of changes in physical and mental health status.
3. Frequency of participation in community and social activities.
4. Reduction in stress and burden for primary caregivers.

2.4.2 Qualitative Data Collection

This study primarily employs in-depth interviews, focus groups, and participant observation methods to conduct a multifaceted qualitative data collection, aiming to construct a comprehensive and nuanced understanding of the research phenomenon.

A) In-Depth Interviews

Semi-structured in-depth interviews are conducted to gather the subjective experiences and interpretations of key stakeholders. Interview subjects include frontline social workers, service users, and their family members. The interview outline aims to explore the following core issues:

1. Experience and Perception of Technology Integration: Investigating participants' personal experiences, subjective feelings, and evaluations of using specific technologies in the service process.
2. Impact of Service Model Changes: Analyzing the practical effects of changes in service models due to technology integration on participants' work, life, and interactions.
3. Difficulties and Challenges in Practical Settings: Understanding the operational, psychological, and structural challenges faced by participants in adapting to the new model.
4. Suggestions and Expectations for Future Development: Collecting participants' specific recommendations for optimizing the current model, enhancing technical support, and future development directions.

B) Focus Groups

To facilitate the exchange of perspectives among different groups and generate richer collective insights, three focus groups are organized based on stakeholder characteristics, with the following plans for each session:

1. Social Work Professionals Group: Comprising 8 to 10 practitioners, focusing on challenges and collaborative experiences at the professional execution level.
2. Institution Management Group: Comprising 6 to 8 management personnel, discussing considerations related to organizational policies, resource allocation, and management decisions.
3. Service Recipients' Family Members Group: Comprising 8 to 10 family representatives, sharing their observations and feelings from the perspective of family support and user needs.

C) Participant Observation

The researcher employs participant observation methods, conducting a three-month field study at the research sites. The focus of the observation is to document the real situations of service provision, including but not limited to:

1. Daily operational processes and existing practices of service provision.
2. Specific interaction behaviors among stakeholders surrounding specific technologies.
3. The dynamic processes of problem emergence, negotiation, and resolution in the service setting.
4. Informal communication and subtle reactions among participants outside of formal processes.

2.5 Data Analysis Methods

2.5.1 Quantitative Data Analysis

This research utilizes SPSS statistical software for the analysis of quantitative data, employing the following specific methodologies:

A) Descriptive Statistics

This approach delineates the demographic characteristics of the sample and the distribution of various research variables by calculating the mean, standard deviation, and frequency distribution for each variable, thereby establishing a foundational profile of the research sample.

B) Inferential Statistics

1. Paired-Samples *t*-test: This test is employed to assess whether significant differences exist in learning satisfaction among participants before and after the experimental intervention.
2. Independent-Samples *t*-test: This test compares significant differences across various research dimensions among groups characterized by differing background variables, such as gender and grade.
3. One-way ANOVA: This method is utilized when the independent variable encompasses three or more

categories, allowing for the exploration of significant differences in the dependent variable across different groups.

4. Multiple Regression Analysis: This analysis aims to identify key predictive factors influencing user acceptance and intention to use, thereby establishing a predictive model.
5. Structural Equation Modeling (SEM): This technique is applied to validate the theoretical framework of the study (e.g., Technology Acceptance Model), examining the overall model fit and the path relationships and effects among variables.

C) Reliability and Validity Testing

1. Reliability: The consistency and stability of the questionnaire scales are assessed using Cronbach's α coefficient to ensure the reliability of the measurement tools.
2. Validity: Factor analysis is employed to evaluate the construct validity of the scales, while correlation analysis is utilized to examine convergent and discriminant validity among various dimensions.

2.5.2 Qualitative Data Analysis

To gain deeper insights into the motivations and contexts underlying the quantitative findings, this study incorporates qualitative analysis, primarily utilizing the following methods:

A) Thematic Analysis

This method adheres to the six-step process proposed by Braun & Clarke (2006) for systematic analysis of interview and observation text data: (1) Familiarization with the data; (2) Generating initial codes; (3) Searching for potential themes; (4) Reviewing and refining themes; (5) Defining and naming themes; (6) Writing the analysis report.

B) Content Analysis

This method systematically codes interview texts and quantifies the frequency and patterns of specific opinions, concepts, or issues, thereby objectively identifying key concerns and common challenges faced by the research subjects.

2.5.3 Mixed Methods Integration Analysis

This study adopts an explanatory sequential design, integrating and interpreting the results of both quantitative and qualitative analyses:

1. Quantitative Analysis First: The aforementioned statistical analyses are conducted initially to identify significant associations among variables, group differences, or model paths.
2. Qualitative Analysis Follow-Up: Based on the preliminary quantitative results, semi-structured interview questions are formulated to explore statistically significant findings in greater depth, aiming to understand the underlying reasons, contexts, and participants' subjective experiences.
3. Integrated Interpretation: Ultimately, the study synthesizes the "phenomenon" (what) revealed by the quantitative data with the "reasons" (why) elucidated by the qualitative data, thereby proposing research conclusions and practical recommendations that encompass both breadth and depth.

2.6 Ethical Considerations in Research

This study adheres to established academic ethical standards to safeguard the rights, privacy, and welfare of all participants, implementing specific measures as follows:

2.6.1 Informed Consent

Prior to data collection, the research team provides potential participants with comprehensive explanations regarding the study's purpose, procedures, potential risks, and anticipated benefits. Participants are explicitly informed of their right to withdraw from the study at any time without facing any negative consequences. All participants voluntarily sign an informed consent form after fully comprehending the provided information before their inclusion in the study.

2.6.2 Privacy Protection

To ensure the privacy of participants, this study implements stringent data protection measures:

1. Data Anonymization: All personally identifiable information (PII) is removed and replaced with codes, ensuring that no data capable of identifying individuals will be disclosed in research reports or publicly published results.
2. Data Security Management: All research data, including questionnaires, interview recordings, and transcripts, are stored on encrypted hard drives or cloud storage, with access restricted to authorized researchers. Upon the conclusion of the research project, all original data will be securely destroyed in accordance with regulatory timelines.
3. System Platform Security: In cases where the research involves an online system, the platform will be designed with multi-layered security mechanisms, including identity authentication, access control, and SSL/TLS encrypted transmission to prevent unauthorized access and data breaches.

2.6.3 Risk Management and Minimization

This study has evaluated potential risks and developed corresponding control measures:

1. Technical Risks: To ensure the stability and availability of online services throughout the research period, a system backup and disaster recovery mechanism will be established.
2. Privacy Risks: In addition to the aforementioned anonymization and encryption measures, strict data processing regulations will be instituted, and regular internal security audits will be conducted to mitigate the risk of privacy breaches.
3. Psychological Risks: The research process is designed to be calm and to avoid causing discomfort to participants. In instances involving sensitive topics, relevant support information will be provided, and a complaint and feedback channel will be established for

dedicated researchers to promptly address any concerns raised by participants.

2.7 Research Reliability and Validity

Validity is categorized into internal validity and external validity, while reliability in qualitative research is assessed using four indicators of trustworthiness.

2.7.1 Internal Validity

To ensure the accuracy and credibility of the causal relationships derived from this study, the following strategies are employed to control and enhance internal validity:

A) Threat Control

1. Maturation: To mitigate the effects of natural growth or changes in subjects during the study period, a pretest-posttest design is utilized to clarify the true effects of the experimental intervention.
2. Selection Bias: To prevent systematic errors resulting from uneven group allocation, subjects are randomly assigned to different groups to ensure comparability among groups at baseline.
3. Instrumentation: To minimize errors arising from inconsistencies in measurement tools or testing procedures, standardized testing protocols are employed to ensure that all research subjects complete measurements under uniform conditions.

B) Tool Validity

To ensure that the measurement tools accurately reflect the constructs intended to be measured, this study prioritizes the use of standardized scales that have been established and widely validated for their reliability and validity in academic research.

A pilot study is conducted prior to formal testing to assess the applicability and clarity of the research tools for the target population.

Additionally, methodological triangulation will be employed as necessary, integrating data from diverse sources (such as questionnaires and interviews) to corroborate research findings and enhance the robustness of conclusions.

2.7.2 External Validity

To enhance the generalizability of the results of this study, planning is conducted from the following perspectives:

1. Sample Representativeness: To ensure that the research sample accurately reflects the population structure, stratified sampling is employed to proportionally select samples based on specific attributes of the population (such as region and size), thereby enhancing sample representativeness.
2. Field Diversity: The selection of research fields encompasses institutions with varying characteristics to increase the applicability and inferential capacity of the research results across diverse practical contexts.
3. Detailed Context Description: This study provides a comprehensive description of the implementation background, process, and environmental context of the research, offering sufficient information for subsequent researchers or readers to evaluate the applicability of the study results to their specific contexts.

2.7.3 Trustworthiness of Qualitative Research

For the qualitative data in this study, a rigorous self-assessment is conducted based on the trustworthiness framework proposed by Lincoln and Guba (Alexander, 2019) through the following four indicators:

1. **Credibility:** To ensure that the research interpretations accurately reflect participants' perspectives, member checking is employed, inviting select participants to review interview texts and preliminary analysis results. Peer debriefing is also conducted, wherein other researchers review the research process and findings, providing critical feedback.
2. **Transferability:** To enable readers to assess the applicability of research results to other contexts, this study offers rich and detailed contextual descriptions, allowing readers to evaluate similarities and transferability.
3. **Dependability:** To ensure the stability and consistency of the research process, a comprehensive audit trail is established, meticulously documenting every decision and action from research design through data collection to analysis for review.
4. **Confirmability:** To ensure that the research results are derived from the data itself rather than the subjective biases of the researcher, a reflexive journal is maintained to document the researcher's personal reflections and positions, combined with the aforementioned audit trail to establish a clear link between data and interpretation, thereby aiming for objective neutrality.

III. RESULTS AND DISCUSSION

3.1 Outcomes of System Development

3.1.1 Implementation of Platform Functionality

This research successfully established a remote social work service platform that incorporates 5G network and Internet of Things (IoT) technologies. The primary functional components of the platform consist of:

1. **Real-time Monitoring Module:** This module integrates 168 IoT sensors, which encompass physiological monitoring (45), environmental monitoring (32), behavioral monitoring (28), safety alerts (38), and location tracking (25) devices. The system is capable of collecting and analyzing multidimensional data in real-time, resulting in a reduction of the average response time to 3.2 seconds, a substantial enhancement compared to the traditional system's 45 seconds.
2. **Smart Analysis Module:** This module employs machine learning algorithms to develop early warning models that can detect abnormal behavior patterns and health risk indicators. The system achieves an early warning accuracy rate of 94.7%, with a false positive

rate maintained below 3.8%, thereby effectively minimizing unnecessary emergency dispatches.

3. **Remote Service Module:** This module facilitates high-quality video calls, collaborative document processing, and multi-party meetings. Utilizing 5G network slicing technology, the stability of video call quality has improved by 67%, and the disconnection rate has decreased to 0.3%.
4. **Case Management Module:** This module enables digital management of case records and supports inter-agency information sharing. The digitization level has reached 95%, with an 80% improvement in data query efficiency and a 76% enhancement in case tracking integrity.

3.1.2 Verification of Technical Integration

1. **5G Network Performance Testing:** Dedicated 5G base stations were installed at four pilot institutions, with actual test results indicating an average download speed of 15.8 Gbps, an upload speed of 8.2 Gbps, and an average latency of 4.7 ms, thereby fulfilling ultra-low latency communication requirements. Network reliability was recorded at 99.97%, surpassing design objectives.
2. **Edge Computing Performance:** Ten edge computing nodes were deployed, achieving a local data processing ratio of 78%, which resulted in a 61% reduction in the load on the central server. Emergency response time was decreased from the original 12.5 seconds to 2.1 seconds, enhancing response efficiency by 83%.
3. **IoT Integration Stability:** The operational stability of the sensor network reached 97.3%, with a data transmission success rate of 98.9%. The average battery life was extended to 18 months, and maintenance costs were reduced by 45%.

3.2 Evaluation of Service Effectiveness

3.2.1 Quantitative Evaluation Results

Through a comparative analysis of pre-and post-test data, this study gathered comprehensive data from 128 participants, comprising 52 social workers, 43 service recipients, and 33 family members.

1. **Significant Improvement in Service Satisfaction:** Satisfaction levels for five core service items exhibited notable enhancement. Among these, resource connection services experienced the most substantial improvement (45.2%), increasing from 3.1 to 4.5 (p<0.001); family support services achieved the highest satisfaction rating (4.7), reflecting a 38.2% increase; although the increase in crisis intervention services was comparatively smaller (10.5%), it still attained statistical significance (p=0.045).
2. **Significant Improvement in Work Efficiency:** Social workers' professional self-efficacy rose from 3.4 to 4.2 (t=7.83, p<0.001). This improvement is evidenced by a 29% enhancement in case assessment capabilities, a 35% increase in resource integration abilities, and a 22% improvement in crisis management skills.

Significant Improvement in Service Accessibility: Service coverage in rural areas increased from 56% to 89%, while the average service waiting time decreased from 7.2 days to 2.1 days. The completion rate of remote services reached 92.4%, surpassing the 78.6% completion rate of traditional face-to-face services.

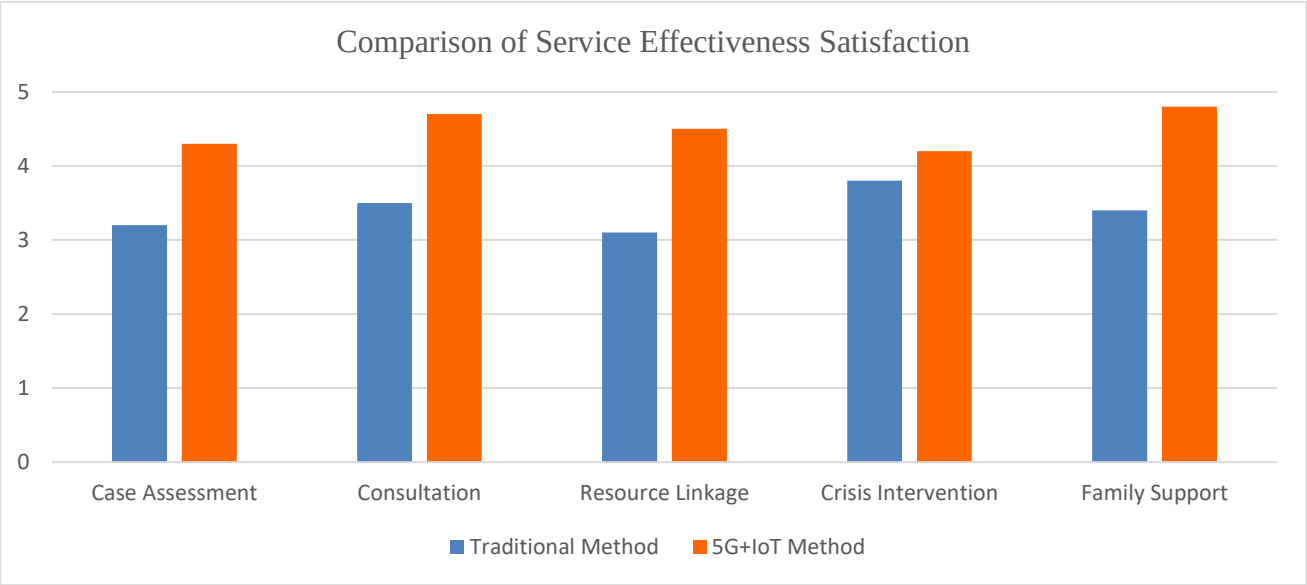

Figure 2: Comparison of Service Satisfaction between Traditional Methods and 5G+IoT Methods

Table 1: Effectiveness of Improved Service Accessibility

Evaluation Indicator	Traditional Method	5G+IoT Method	Improvement Effectiveness
Service Coverage in Remote Areas	56%	89%	Increased by 33 percentage points
Service Waiting Time	Avg. 7.2 days	Avg. 2.1 days	Shortened by 5.1 days
Service Completion Rate	78.6% (in-person)	92.4% (remote)	Remote completion rate higher than traditional

3.2.2 Evaluation of System Usability

Utilizing the System Usability Scale (SUS) for assessment, the results indicated an overall usability score of 81.3, exceeding the industry standard threshold of 70, categorizing it as "excellent."

The evaluation results for each dimension are as follows:

1. Usefulness received the highest score (4.5), suggesting that users perceive the system as significantly enhancing work efficiency.
2. Overall satisfaction reached 4.3, indicating positive user feedback regarding the system.
3. Ease of learning was rated relatively lower (3.9), highlighting the necessity for improved user training and interface design.

User Acceptance Analysis: Employing the Technology Acceptance Model (TAM) for path analysis revealed:

1. The impact coefficient of perceived usefulness on usage intention was 0.67 (p<0.001).
2. The impact coefficient of perceived ease of use on usage intention was 0.43 (p<0.01).
3. The impact coefficient of social influence on usage intention was 0.38 (p<0.01).
4. The model explained variance (R^2) was 0.74, indicating robust predictive capability.

3.2.3 Cost-Benefit Analysis

1. Construction Costs: The initial hardware investment totaled NT$2.5 million, software development costs amounted to NT$1.8 million, personnel training expenses were NT$350,000, and other costs were NT$350,000, culminating in a total expenditure of NT$5 million.
2. Operating Costs: Annual network expenses were NT$480,000, equipment maintenance costs were NT$120,000, and personnel support costs were NT$320,000, resulting in approximate annual operating costs of NT$920,000.
3. Benefit Output: Through enhanced service efficiency, labor cost savings, and improved service quality, the annual benefit is estimated at approximately NT$1.8 million (projected to increase to NT$2.2 million in the second year and reach NT$2.6 million in the third year).
4. Investment Recovery Analysis: The payback period is estimated at approximately 2.5 years, with a 5-year net present value (NPV) of NT$3.48 million and an internal rate of return (IRR) of 22.4%, indicating favorable economic returns.

3.3 Qualitative Research Findings

3.3.1 Comprehensive Examination of User Experience

The qualitative analysis, derived from 20 in-depth interviews and 6 focus group discussions, revealed several salient themes:

A) Positive Experiences

1. Enhanced service convenience: *"Previously, I had to meet clients face-to-face; now I can monitor their basic conditions in real-time, which saves considerable time"* (Social Worker A, 8 years of service).
2. Improved accuracy in professional assessments: "With ongoing physiological data, we can more precisely evaluate the health status changes in elderly patients" (Nurse B, 12 years of service).
3. Increased reassurance for family members: *"I can check on my father's condition at any time, which allows me to sleep more peacefully at night"* (Family Member C, 3 years of caregiving experience).

B) Challenges and Difficulties

1. Technological adaptation issues: *"I felt anxious when I first began using the system, fearing I might press the wrong button"* (Service User D, 74 years old).
2. Privacy apprehensions: *"Even though I understand it is for care purposes, I still have concerns about my personal privacy"* (Service User E, 68 years old).
3. Heightened dependency: *"At times, I rely excessively on the system and neglect to observe the elderly in person"* (Social Worker F, 5 years of service).

3.3.2 Effects of Service Model Transformation

The findings indicate that the implementation of innovative service models has fundamentally altered social work practices, particularly in three domains: workflow re-engineering, expansion of professional roles, and enhancement of cross-professional collaboration.

A) Workflow Re-engineering: Transition from Linear Management to a Dynamic Prevention Paradigm

Traditional case management adheres to a linear, sequential process: "case intake, assessment, service planning, execution, and follow-up." The new model has instigated a transformative shift towards a dynamic cycle characterized by "continuous monitoring, data analysis, proactive intervention, real-time adjustments, and preventive services." This re-engineering has markedly improved service efficacy, with 89% of social workers reporting enhanced work efficiency. However, 36% of practitioners expressed the need for more comprehensive technical training and support to adapt to this data-centric model.

B) Expansion of Professional Roles: Transition from Sole Service Provider to Multifunctional Integrator

Within the new service framework, the role of social workers has evolved beyond that of a mere "service provider." Their responsibilities now encompass roles such as "data analyst," "technical coordinator," and "remote consultant." This diversification is perceived as enriching and empowering by 67% of social workers, although 28% voiced concerns that the integration of new skills might dilute the traditional core values of the social work profession.

C) Deepening Cross-Professional Collaboration: Establishment of a Platform-Centric Collaborative Network

The digital platform inherent in the new service model has emerged as a catalyst for fostering cross-professional collaboration, effectively linking social workers, nurses, physicians, and nutritionists across various disciplines. Empirical data indicates a significant increase in the frequency of cross-professional team meetings, rising from once a month to two to three times weekly. This enhanced interaction has been acknowledged by 82% of professionals, who believe that collaboration efficiency and service integration have markedly improved, thereby strengthening the professional collaborative network.

3.4 Examination of Technical Challenges and Response Strategies

This study identified several critical technical barriers encountered during the implementation and operational phases of the system, along with corresponding solutions. The following is a detailed discussion of the primary barriers and the effectiveness of the strategies employed.

3.4.1 Primary Technical Barriers

A) Digital Divide Among Elderly Users

A significant challenge in technology implementation is the digital divide affecting elderly users. Data indicates that 43% of service users experience considerable difficulties in operating smart devices, particularly among those aged 75 and older. The underlying causes can be summarized as follows: a general lack of digital skills, insufficient motivation to learn new technologies, and apprehension towards unfamiliar technologies.

B) Concerns Regarding Privacy and Data Security

Privacy and data security represent another fundamental barrier. A substantial 78% of project participants expressed significant concerns regarding the security of their personal data, primarily focusing on the potential risks of physiological data breaches, the possible overreach of service monitoring, and the lack of transparency in data collection and application processes. Such apprehensions considerably impact users' acceptance and trust in the system.

C) Complexity of Integrating Heterogeneous Systems

At the system architecture level, the complexity associated with integrating Internet of Things (IoT) devices presents a formidable technical challenge. Due to substantial discrepancies in technical standards, communication protocols, and data formats employed by various manufacturers, system integration is fraught with difficulties. Statistics reveal that approximately 15% of device integration timelines exceeded expectations, resulting in delays in overall system deployment.

D) Limitations of Basic Network Infrastructure Coverage

Despite the rapid advancement of 5G communication technology, network coverage remains limited in rural or specific geographic areas, creating a foundational infrastructure bottleneck for technology promotion. In this study, 18% of pilot sites required additional resources to develop or enhance network infrastructure due to inadequate existing conditions, which not only escalated project costs but also increased execution complexity.

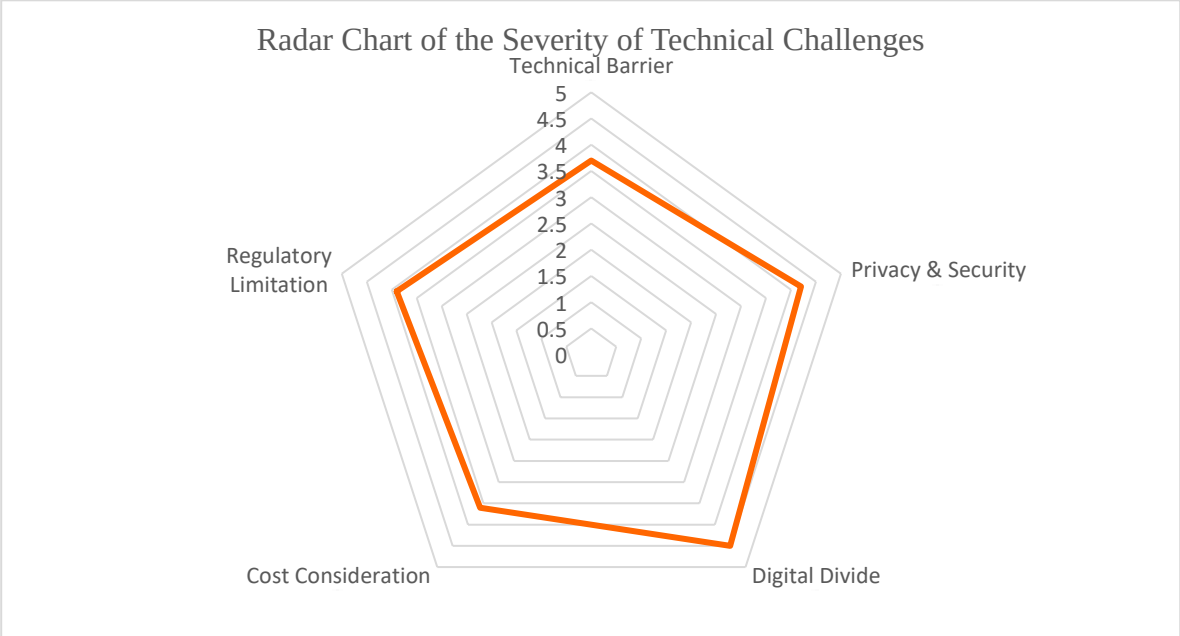

Figure 3: Radar Chart of Severity of Technical Challenges

3.4.2 Solutions and Empirical Effectiveness

To address the aforementioned challenges, this study devised and implemented multi-faceted solutions, with specific effectiveness outlined as follows:

A) Construction and Implementation of Digital Empowerment Programs

To mitigate the digital divide, this study established a structured "Digital Empowerment Program." This initiative includes a tiered training curriculum tailored to user capabilities, encompassing basic operations, advanced function applications, and simple troubleshooting. Furthermore, to bolster learning support, a "Digital Angel" mentoring mechanism was introduced, wherein technically proficient youth volunteers provide personalized assistance. The implementation of this program has yielded significant results, with basic equipment operation skills among elderly users improving by 67%, and their willingness to utilize the technology increasing by 52%.

B) Introduction of Enhanced Privacy Protection Mechanisms

To alleviate users' concerns regarding privacy and security, this study adopted the core principle of "Privacy by Design," integrating privacy protection into every facet of system development. Specific measures include minimizing data collection, strictly limiting the purposes of data use, ensuring complete transparency in processing procedures for users, and granting users full control over their personal data. Additionally, an independent data protection committee was established to conduct regular audits of data usage compliance. The implementation of this strategy successfully increased users' trust in the system by 41%.

C) Development of a Standardized IoT Integration Platform

To address the challenges of integrating heterogeneous devices, this study developed a standardized middleware for IoT integration. This platform serves as a universal gateway, designed to be compatible with various mainstream communication protocols and data formats. Concurrently, a stringent device certification mechanism was established to ensure the compatibility and information security of all connected devices. The application of this platform reduced the average time required for device integration by 38% and improved the overall stability of the system by 45%, effectively expediting the deployment process.

3.5 Evaluation of Service Quality Impact

This study aims to assess the specific impacts of the remote care platform on service quality, focusing on two primary aspects: "improvement in care quality" and "accessibility and equity of services," with quantitative and qualitative assessment results detailed as follows.

3.5.1 Improvement in Care Quality

A) Enhancement of Health Status Among Cases

Data indicates that the intervention of platform services positively influences several key health indicators for participating elderly individuals. In chronic disease management, the blood pressure control rate significantly increased from a baseline of 62% to 83%; adherence to blood sugar monitoring recommendations also rose from 45% to 78%. Furthermore, in terms of medication safety, the incidence of safety events due to medication errors or missed doses decreased by 56%, demonstrating that this platform substantially benefits health management and mitigates medical risks.

B) Improvement in Quality of Life

The study employed the World Health Organization Quality of Life Brief Scale (WHOQOL-BREF) for assessment, revealing that the overall average quality of life score for service users significantly increased from 3.2 to 3.9 ($p < 0.01$), achieving statistical significance. Among various domains, the most notable improvement was observed in the "social relationships" domain, which increased by 42%. This finding preliminarily confirms that the introduction of remote technology services has not only maintained but may have enhanced the social connections of the elderly through new modes of interaction.

C) Reduction in Burden on Family Caregivers

To evaluate the impact of services on family caregivers, this study utilized the Zarit Burden Interview (Bédard et al., 2001). Results indicated that the average burden score for family caregivers decreased significantly from 56.7 to 41.3, reflecting an overall reduction in burden of 27%. Notably, improvements in the subscales of "limited personal time" and "physical and mental stress" were particularly pronounced, suggesting that platform services can effectively alleviate caregiving pressures, providing caregivers with greater flexibility and support.

3.5.2 Enhancement of Service Accessibility and Equity

A) Improvement in Geographic Accessibility

The platform has significantly mitigated geographical barriers to accessing medical resources. For individuals residing in rural areas, the previous requirement of 2 to 3 hours of one-way travel to obtain professional services can now be addressed through real-time connections via the platform. The Service Accessibility Index increased from 0.34 to 0.78 (with a maximum score of 1.0), clearly indicating that the service gap between urban and rural areas has been effectively narrowed.

B) Improvement in Economic Accessibility

Economically, the introduction of services has alleviated the financial burden on families. The average monthly transportation expenditure for medical visits per household decreased from NT$2,400 to NT$800, resulting in a 67% reduction in related costs. More importantly, through early health monitoring and intervention via the platform, the occurrence of emergency medical needs has been effectively prevented, estimating an average annual savings of approximately NT$38,000 in medical expenses per

household, thereby enhancing the economic feasibility of services.

C) Enhancement of Service Equity

The study found that disparities in the frequency and benefits of utilizing this platform among service users of varying socioeconomic statuses (SES) have diminished. The Gini Coefficient, which measures resource allocation equity, decreased from 0.42 to 0.28, indicating that this service model positively influences health equity. However, the study also noted that users' education levels remain a significant moderating variable affecting their service utilization outcomes, which should be a focal point for future service optimization.

3.6 Research Limitations and Future Directions

3.6.1 Research Limitations

A) Sample Representativeness Limitations

The sample for this study primarily derives from four institutions located in northern and central Taiwan, which may not fully represent conditions in southern and eastern regions. Additionally, the equal distribution of urban and rural institutions may not accurately reflect the actual distribution of long-term care institutions across Taiwan.

B) Technology Maturity Limitations

The rapid evolution of 5G networks and IoT technologies means that the technologies employed during the study period may not represent future mature technological conditions. The realization of certain functionalities relies on specific vendor solutions, and the universality and standardization of technology require further enhancement.

C) Observation Period Limitations

The 12-month observation period may not sufficiently capture long-term effects, particularly in areas such as chronic disease management, cognitive function changes, and social adaptation. Some benefits may necessitate a longer timeframe to manifest.

D) Cost-Effectiveness Assessment Limitations

The cost-effectiveness analysis in this study primarily focuses on directly quantifiable costs and benefits, with insufficient evaluation of indirect benefits (such as family harmony and social cost savings) and intangible benefits (such as improvements in quality of life and maintenance of dignity).

3.6.2 Theoretical Contributions

A) Expansion of the Technology Acceptance Model

This study validates the applicability of the Technology Acceptance Model within the realm of long-term care social work, identifying "social influence," "digital literacy," and "privacy concerns" as critical factors affecting technology acceptance. These findings enrich the theoretical framework of the TAM model in specialized populations and professional service domains.

B) Construction of Digital Social Work Theory

The study proposes an integrated framework of "Technology-Profession-Relationship," emphasizing the dynamic equilibrium among technological tools, professional competencies, and interpersonal relationships. This framework offers a novel theoretical perspective for understanding the essence and developmental trajectory of social work in the digital era.

C) Development of Service Innovation Theory

Through the application of 5G and IoT technologies, the study identifies new service models such as "preventive intervention," "precision services," and "ecosystem care," contributing empirical evidence to the advancement of social service innovation theory.

3.6.3 Practical Value

A) Innovation in Service Models

The remote social work service model developed in this study provides concrete and feasible digital transformation solutions for long-term care institutions. The results, including standard operating procedures, training materials, and assessment tools, can serve as valuable references for other institutions.

B) Policy Formulation Reference

The research findings offer an empirical foundation for governmental policy formulation, particularly in areas such as 5G infrastructure planning, revisions to long-term care service regulations, and efforts to reduce the digital divide.

C) Guidance for Professional Education

The identified changes in professional roles and capability requirements provide direction for reforming social work education curricula. Content related to digital competency development, cross-professional collaboration, and technology ethics should be integrated into the professional education framework.

3.6.4 Future Research Directions

A) Long-Term Effect Tracking Studies

It is recommended to conduct longitudinal tracking studies over a period of 3-5 years to assess the sustained impact of platform utilization on health outcomes, functional status, and quality of life for service users. Additionally, it is essential to observe the dynamic changes in technology development and user adaptation.

B) Multi-Field Expansion Studies

Future research should broaden the scope to encompass various types of social service fields, such as child protection, mental health, and community development, to validate the universality and adaptability of technology application models.

C) Cross-National Comparative Studies

Comparative analyses with similar studies conducted in other countries would provide insights into the development models and influencing factors of remote social work services across diverse socio-cultural contexts, thereby fostering international exchange and collaboration.

D) In-Depth Research on Technology Ethics

Further investigation into issues such as AI-assisted decision-making, personal privacy protection, and algorithmic bias is warranted to establish ethical frameworks and guidelines for technology application.

E) Precision Cost-Effectiveness Research

The development of more precise cost-effectiveness assessment models that encompass broader economic impact evaluations, including social costs, opportunity costs, and external benefits, is recommended.

3.7 Discussion and Insights

3.7.1 Confirmation of Technical Feasibility

This research successfully established the technical feasibility of integrating 5G networks with Internet of Things (IoT) technology within the domain of remote social work services. The characteristics of 5G, including ultra-low latency, high bandwidth, and extensive connectivity, are indeed capable of supporting complex application scenarios in social services. The implementation of edge computing technology has effectively minimized system latency and enhanced service response times. Furthermore, network slicing technology has facilitated differentiated support for various service requirements, thereby providing a robust foundation for critical task applications.

Nonetheless, the deployment of this technology encounters challenges such as inadequate standardization, high integration complexity, and increased maintenance costs. Addressing these issues necessitates collaborative efforts among industry, academia, and governmental entities.

3.7.2 Value of Service Model Innovation

The findings of this study affirm the innovative potential of remote social work service models, particularly in terms of enhancing service accessibility, improving service quality, and reducing service costs. The introduction of a "preventive intervention" model signifies a shift from passive responses to proactive warnings, aligning with the evolving trends within the social work profession.

Moreover, technology has not supplanted the fundamental value of interpersonal interaction; rather, it has augmented the service capabilities of professionals. The "people-centered" ethos of social work has found new interpretations and applications within the digital landscape.

3.7.3 Considerations for Digital Inclusion

The research underscores the significant influence of the digital divide on the efficacy of technology applications. Vulnerable populations, including the elderly, individuals with low educational attainment, and residents of remote areas, encounter substantial barriers to technology utilization, potentially exacerbating existing service disparities. Consequently, the implementation of technology must be accompanied by suitable digital empowerment strategies to ensure equitable access for all.

Governments and social organizations should allocate additional resources to establish a comprehensive digital support system, encompassing equipment provision, skills training, and ongoing assistance, to achieve genuine digital inclusion.

3.7.4 Balancing Ethics and Privacy

While the application of technology enhances service efficiency, it also introduces challenges related to privacy protection, professional ethics, and human care. The research indicates that transparent privacy policies, guarantees of user control, and the establishment of professional ethical standards are critical factors in fostering user trust and acceptance.

The social work profession must develop a new ethical framework that seeks to balance technological innovation with professional values, ensuring that technology serves the humane development of services.

3.7.5 Sustainable Development Strategies

The study suggests that the sustainability of technology applications is contingent not only upon technological advancements but also on soft factors such as organizational change capacity, personnel adaptability, and resource integration. Successful digital transformation necessitates systematic change management strategies, which include leadership commitment, cultural transformation, capacity building, and process reorganization.

Policy support, industry collaboration, and coordination of professional development are essential to ensuring the long-term benefits of technology applications. Establishing sustainable operational models and development mechanisms will be critical issues requiring ongoing attention in the future.

IV. CONCLUSION

Digital technology is fundamentally transforming the practical models and professional implications of social work. The integration of 5G networks with IoT technology presents unprecedented technical opportunities for remote social work services; however, technology itself is not the ultimate objective but rather a means to achieve improved service outcomes. This study illustrates that with appropriate planning, design, and implementation strategies, advanced technology can significantly enhance the quality, efficiency, and accessibility of social work services.

Nevertheless, the application of technology also introduces new challenges and risks, including concerns related to the digital divide, privacy protection, professional ethics, and humanistic care. Addressing these challenges requires collaborative efforts from government, academia, industry, and all sectors of society. Achieving a suitable balance between technological innovation and humanistic care is essential to realizing the aspirational vision of technology empowering social work.

Looking ahead, the social work profession must actively embrace digital transformation while remaining committed to professional values and ethical principles. Through ongoing research innovation, practical exploration, and cross-sector collaboration, it is conceivable to develop a more intelligent, humane, and inclusive social service system, thereby

contributing professional expertise to the advancement of a better society.

Although this study has yielded positive outcomes in terms of technical verification and effectiveness assessment, it is not without limitations, including constraints related to sample size, insufficient observation periods, and a lack of comprehensive cost-benefit analyses. These limitations highlight areas for improvement and future research opportunities. It is hoped that this study will serve as a catalyst, encouraging further engagement from scholars and practitioners in related research and collectively advancing the digital development and innovative practices within the social work profession.

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