A Multi-Phase ICT-Driven Model for Sustainable Community Support in Super-Aged Societies: From Psychological Engagement to Multigenerational Mutual Aid M. Mitsuoka[1], S. Ishihara[1], T. Nishimura[1]
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Purpose Japan will face the peak of its older population around 2040, while the working-age population continues to decline. This demographic shift has intensified social isolation, reduced community resources, and created a shortage of supporters in municipalities. This study proposes a comprehensive three-phase framework that integrates ICT-based psychological engagement (Point), behavioral transformation (Line), and multigenerational ecosystem implementation (Plane). The model builds on previously published evidence and ongoing fieldwork with local governments in Japan. **Method** Phase 1 (Point – Individual-Level ICT Engagement): This phase draws on our published Gerontechnology study involving 79 older adults (mean age 75.8; 14 living alone). The study demonstrated that older adults living alone maintained consistently higher reply rates over three years when using a two-way "Nouwaka 365" LINE chatbot, highlighting ICT's role as "psychological infrastructure." Additional sentiment analysis will examine mixed emotions, such as "acceptance," using manually corrected datasets. Phase 2 (Line – Behavioral Transformation Pathway): Phase 2 is based on survey data from 95 preventive-care supporter training participants, including adults in their 70s and 80s. Random Forest and regression trees will be used to model how awareness, motivation, and perceived self-efficacy influence the shift from "being supported" to "supporting others." Phase 3 (Plane – Multigenerational Community Implementation): Phase 3 is planned and has not yet been completed. It will develop a mosaic-type matching model integrating older volunteers, students, companies, and community actors. GIS will be used to identify geographic mismatches between needs and resources, supporting efficient task allocation and strategic supporter development. **Results / Expected Findings** The results presented here derive only from Phase 1 and Phase 2. Phase 3 findings are not yet available. Key findings from prior and ongoing analyses indicate that: ICT-based daily touchpoints effectively sustain engagement among older adults, especially those living alone. Emotional transitions such as "sadness → acceptance → joy" can be visualized through hybrid sentiment analysis. Supporter training programs achieved a 95.8% registration rate, including approximately 90% participation among people in their 80s.Behavioral transformation follows a positive reciprocal loop, in which psychological improvement strongly predicts community participation. These findings suggest that integrating ICT, behavioral change, and multigenerational collaboration can create a scalable mutual-aid cycle. **Conclusion** The proposed three-phase model provides a practical approach for addressing challenges in super-aged societies. By integrating psychological engagement, behavioral transformation, and multigenerational collaboration, this research aims to build a sustainable community-support ecosystem adaptable to regions with limited human resources. Future work will focus on developing a domain-specific RAG/LLM system to further support autonomous and scalable community-support mechanisms.

References
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Figure 1. Three-phase conceptual framework (Point–Line–Plane). Phases 1 and 2 represent completed empirical studies; Phase 3 represents planned implementation.