

Design Research on an AI-Assisted Everyday Food Therapy Service System: A Case Study of the "Food Rhythm" Digital Food Therapy 4S Store

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Abstract. This study addresses three problems in everyday food therapy services: insufficient explanation of recommendations, weak continuity between digital advice and offline fulfilment, and unclear boundaries of AI assistance. Taking the "Food Rhythm" Digital Food Therapy 4S Store as a design case, this research adopts a research-through-design approach that combines literature review, competitor analysis, semi-structured interviews, and service system design. The proposed system connects low-burden need expression, explainable AI recommendation, physical constraint-card interaction, offline ingredient display, open preparation, and feedback. Its core design logic is to treat AI not as a medical decision-maker, but as an auxiliary service capability that helps users understand, adjust, verify, and continue everyday food-therapy suggestions. By coordinating the mobile app, interaction terminal, physical cards, store environment, and backstage support, the design translates algorithmic output into an inspectable service journey. The study contributes a service-system framework for applying AI to daily health-related services while maintaining transparency, user control, and non-medical safety boundaries.

Keywords: artificial intelligence, everyday food therapy, service system, service design, explainable recommendation

1. Introduction

Young professionals often seek dietary advice for fatigue, stress, poor sleep and irregular eating. Personalized nutrition and food recommendation can support relevant guidance [1, 2], but adoption also depends on explanation, risk boundaries and access to actual food services. This paper studies AI as an auxiliary service capability.

The study asks how AI recommendation can be embedded in everyday food therapy, how digital and offline touchpoints support trust, and how user control is maintained.

2. Related research and design positioning

Research on personalized nutrition and food recommendation shows that digital systems can generate individualized guidance by combining health status, dietary preferences, and contextual

information [1, 2]. However, adoption is also influenced by trust, explanation quality, user control, and clear non-medical boundaries [3-6].

Following human-centred design principles [7], this study positions "Food Rhythm" as an everyday food-therapy service system connecting need identification, AI-assisted advice, explanation and choice, offline fulfilment, and feedback. Editable preferences, visible recommendation grounds, and coordinated online-offline touchpoints help translate digital advice into user action.

3. Research methods and service system framework

The study adopts a research-through-design approach. Literature review clarified AI explanation, personalized nutrition and service-system requirements. Competitor analysis examined related service cases. Interviews with six users explored advice acquisition, credibility, AI boundaries and online-offline continuity.

Interview coding produced six needs: understandable advice, relevance, alternatives, credibility, offline evidence and boundary reminders. They were translated into low-burden input, layered explanation, physicalized constraints and feedback.

3.1. Service system framework



Figure 1. Service blueprint of the "Food Rhythm" AI-assisted everyday food therapy service

As shown in Figure 1, the service system consists of digital touchpoints, offline store touchpoints and operational support. The app supports condition expression, recommendation reports, reservation and feedback. The store provides ingredient display, open preparation and service evidence. Backstage support includes knowledge content, inventory, risk prompts and order coordination.

4. Design of the "Food Rhythm" AI-assisted everyday food therapy service system

The app begins with low-burden need identification through everyday expressions such as fatigue, late-night work, stress and poor appetite. Users can add preferences, restrictions and usage scenarios before recommendation generation, keeping key constraints visible without forcing medicalized input.

Recommendation presentation follows a layered structure of input, generation, explanation and action. The report gives a concise suggestion, explains the matching reason and shows unsuitable conditions or alternatives. When pregnancy, chronic disease, medication, severe allergy or persistent discomfort is detected, the system provides boundary prompts and diverts users to professional consultation.

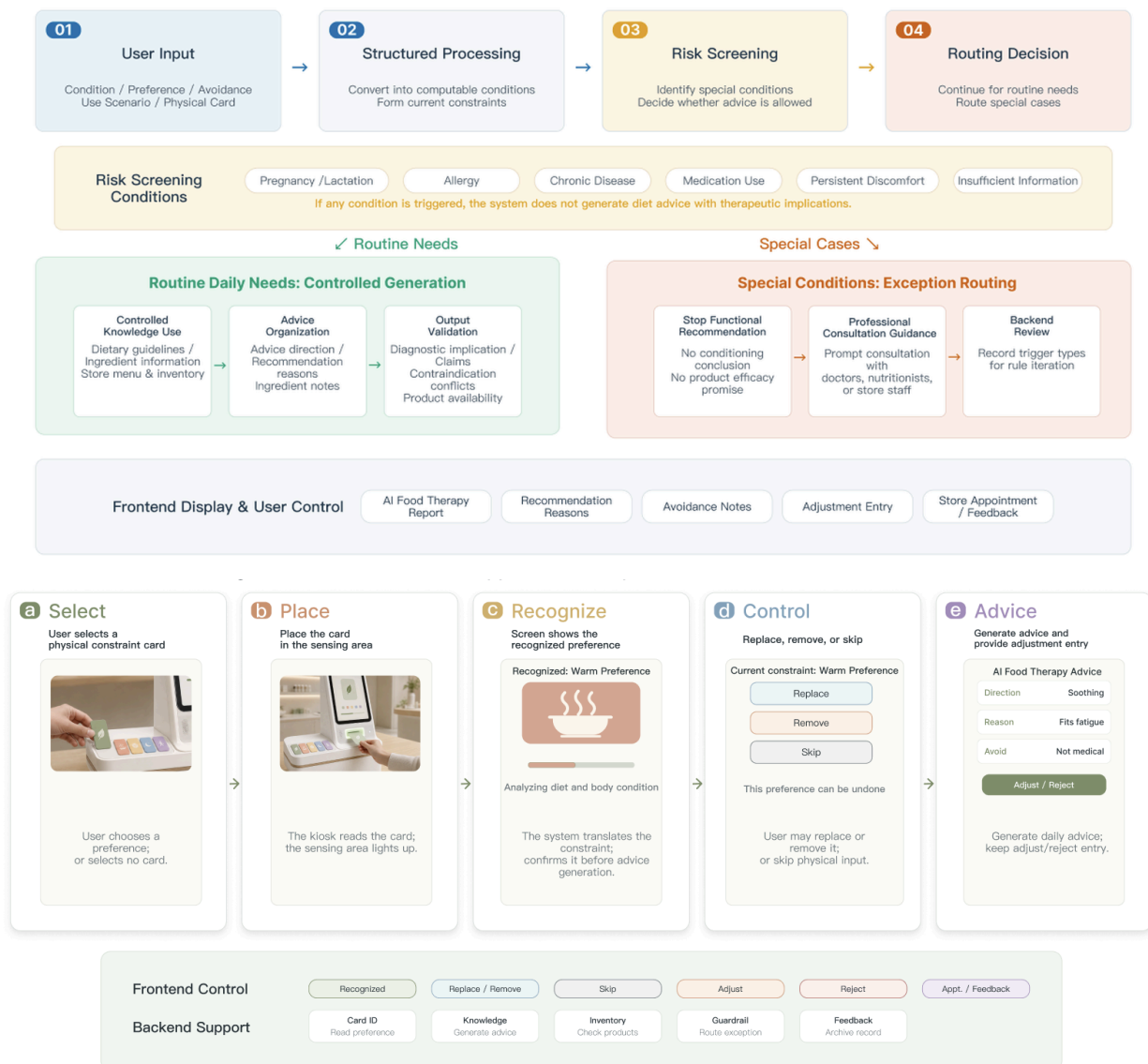


Figure 2. AI recommendation generation and terminal interaction process in "Food Rhythm"

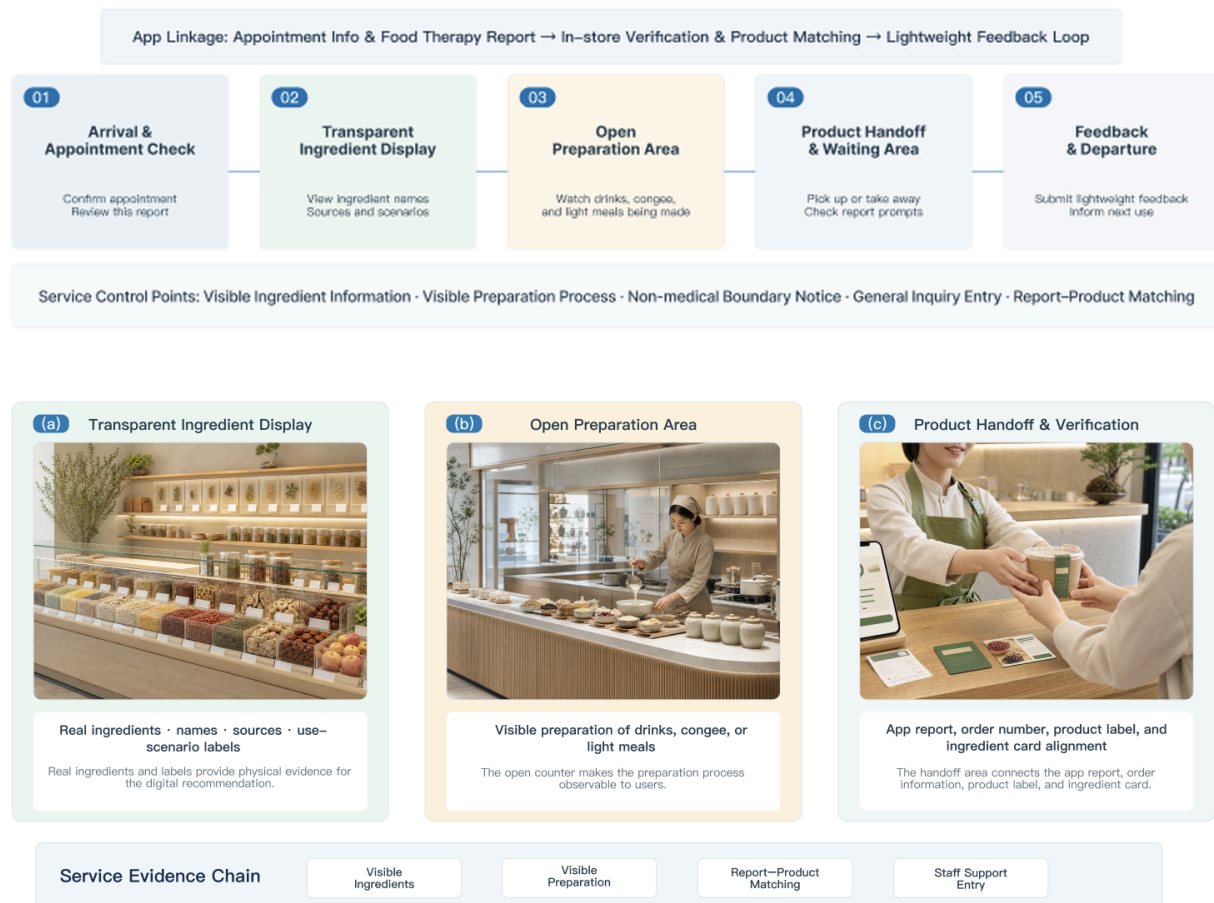
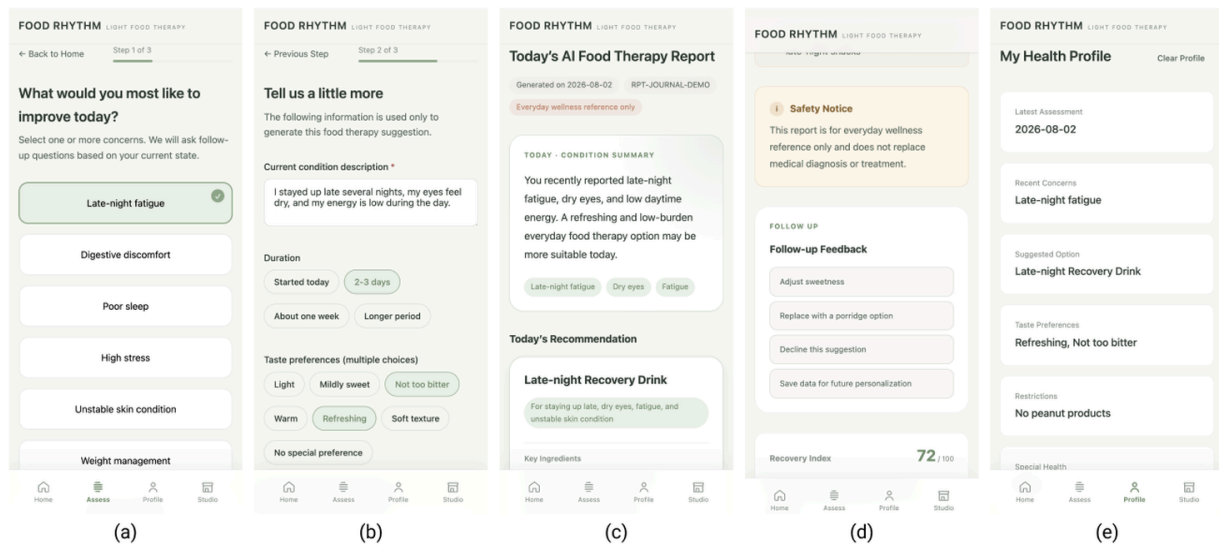


Figure 3. Core mobile app pages and offline service touchpoints of "Food Rhythm"

The offline store is designed as a physical continuation of digital recommendation. Ingredient display, open preparation, product delivery and staff consultation turn abstract AI output into an inspectable process. Users can verify what is recommended before purchase or consumption.

The AI food therapy interaction terminal extends app-based information service into offline space. Users select or skip physical constraint cards representing preferences, restrictions and temporary conditions. After card reading, the terminal displays the current constraints and generates recommendations within ingredient and service rules.

The design rationale is user control, explanatory interaction and physical verification. User control is reflected in editable conditions and rejectable recommendations; explanation appears through rationales and boundary prompts; verification appears through offline display, preparation and staff support.

The service process starts from an everyday concern, continues through AI recommendation and user adjustment, and ends with offline confirmation or feedback. Across stages, it emphasizes transparency, visible process, adjustable choice and explicit safety boundaries.

5. Discussion and validation

5.1. Discussion and limitations

The contribution of this study is the service-system framing of AI-assisted food therapy. Compared with single-point recommendation, the proposed model embeds AI into a chain of expression, explanation, physical confirmation and feedback, making trust depend on whether users can see, adjust and verify the recommendation.

The design clarifies the non-medical boundary of everyday food therapy. AI output is presented as dietary support for ordinary conditions, not as diagnosis or treatment. When risk signals appear, the system provides warning and diversion rather than continuing to generate confident advice.

The current work remains a design-stage study. The interview sample is small, the app is an interactive prototype, and the terminal and physical cards are conceptual prototypes. Future work should connect the prototype to controlled knowledge content, test card reading and inventory interfaces, and evaluate the service with real users.

5.2. Validation plan

The next validation step is to recruit five to eight target users for task testing, including condition expression, constraint-card selection, explanation reading, boundary-prompt recognition, offline reservation and feedback. Evaluation will focus on task completion, explanation comprehension, perceived control and consistency between online recommendation and offline service evidence.

6. Conclusion

Taking "Food Rhythm" as the design practice, this study constructs an AI-assisted everyday food therapy service system composed of digital touchpoints, an interaction terminal, physical constraint cards and offline store services. The proposed model offers a design reference for applying AI to daily health-related services with transparency, user control and clear boundaries.

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