Bridging Nutrition Gaps in Urban Workforces: Evaluation of an AI-Enhanced Meal Subscription System for Corporate Employees in Colombo

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Abstract*—The rapid urbanization of developing economies has fundamentally altered dietary patterns among corporate workforces, with non-communicable diseases accounting for 83% of premature deaths in Sri Lanka. This paper presents a comprehensive evaluation of user acceptance and prototype validation for an AI-enhanced meal subscription system targeting corporate professionals in Colombo. Through a mixed-methods approach combining user surveys (n=100) and prototype testing using Figma-based mockups, we investigated the effectiveness and acceptance of technology-enhanced nutritional interventions. Our findings reveal that 86.7% of corporate employees struggle with maintaining healthy diets, while 90% express interest in personalized meal delivery services. The prototype validation demonstrates high acceptance rates for key features including AI-driven personalization (88%), subscription management (85%), and nutrition tracking (74%). Pricing analysis reveals optimal acceptance for three-tier subscription models: Week Saver Plan (1 week, LKR 2,900, 78% acceptance), Fortnight Feast (2 weeks, LKR 5,500, 64% acceptance), and Monthly Munch (1 month, LKR 10,500, 54% acceptance). The study contributes practical insights for developing culturally appropriate, technology-enabled nutrition solutions in developing economies, with AI recommendations identified as a critical enhancement for optimizing user experience and health outcomes.

Keywords*— AI recommendations, corporate nutrition, meal prototype validation, user acceptance

I. INTRODUCTION

The proliferation of non-communicable diseases among urban corporate employees necessitates innovative dietary interventions leveraging digital technologies. The World Health Organization's 2023 country report indicates that non-communicable diseases account for 83% of premature deaths in Sri Lanka, with dietary factors serving as the primary modifiable risk factor [1]. This epidemiological shift coincides with the digitalization of food services, creating opportunities for technology-enhanced nutritional interventions. Corporate employees in urban centers face unique dietary challenges stemming from demanding work schedules, limited access to nutritious food options, and inadequate nutritional knowledge. Our preliminary research identified that approximately 78% of workers report workdays exceeding 12 hours including commute time, effectively eliminating opportunities for thoughtful meal preparation. Additionally, mapping exercises revealed that only 18% of food establishments near major office complexes offer nutritionally balanced meals under LKR 500, placing healthy options beyond reach for many employees [2]. Research findings indicate that 86.7% of corporate employees struggle to maintain healthy eating habits, while 90% express strong interest in personalized meal subscription services that combine convenience with nutritional value. This research addresses the critical gap between nutritional needs and practical constraints by evaluating user acceptance of an AI-enhanced meal subscription prototype targeting Colombo's corporate workforce, specifically focusing on Colombo 6 as the initial deployment area. The study establishes foundations for AI integration that could revolutionize workplace nutrition through intelligent recommendation systems, addressing both individual dietary preferences and broader public health objectives in the Sri Lankan context.

II. LITERATURE REVIEW

A. Digital Health Interventions and Technology Acceptance

The theoretical foundation for digital nutritional interventions rests on established technology acceptance models. Davis's Technology Acceptance Model (TAM) identifies perceived usefulness and ease of use as primary determinants of technology adoption [3]. Building upon TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) incorporates additional factors including social influence and facilitating conditions [4].

Fiordelli et al. demonstrate how mobile health platforms can effectively facilitate behavior change when designed with user-centric principles [5]. Their systematic review of 107 studies reveals that personalization and real-time feedback mechanisms significantly enhance intervention effectiveness. In the context of meal subscription services, Pohle and Kuhn's analysis reveals that success factors include convenience, customization, and quality assurance [6].

B. AI-Driven Personalization in Nutrition

Chen and Pu's introduction of HealthyMeal, a diet recommendation app using reinforcement learning, demonstrates the potential of AI-driven personalization in nutritional interventions [7]. Their system achieved 78% user satisfaction and 23% improvement in dietary adherence over a 12-week trial. Research by Zhao et al. emphasizes the

importance of trust and personalization in mobile health application adoption, with their study of 1,247 users revealing that perceived personalization significantly influences continued usage intention (β=0.34, p<0.001) [8].

C. Cultural Considerations in South Asian Context

Any nutrition intervention in Sri Lanka must acknowledge the deep cultural significance of food practices. Fernando's ethnographic work highlights how traditional Sri Lankan meal structures, centered around rice with multiple complementary vegetable and protein curries, historically ensured nutritional diversity [9]. However, urbanization has simplified these structures under time pressure, with many meals reduced to rice accompanied by a single curry, losing nutritional benefits while retaining carbohydrate load.

III. Methodology

A. Research Design

This study employs a sequential explanatory mixed-methods design, combining quantitative surveys with qualitative prototype testing. The research unfolds in three phases: Phase 1 - Needs Assessment through cross-sectional survey; Phase 2 - Prototype Development using Figma; Phase 3 - User Testing through structured evaluation sessions.

B. Sampling Strategy

Target population comprised corporate employees aged 25-50 working in Colombo's central business district. Stratified random sampling ensured representation across sector (50% private, 50% government), gender (55% male, 45% female), income levels (three categories), and organizational levels (30% executive, 40% mid-level, 30% entry-level).

C. Prototype Development Framework

The prototype was developed using Figma, incorporating user-centered design principles. Key features included: User Registration and Profiling capturing dietary preferences, allergies, and health conditions; Meal Selection Interface with intuitive browsing and filtering; Subscription Management with flexible pause, modify, and cancel capabilities; Nutrition Tracking Dashboard with visual representation; AI Recommendation Framework showing future AI integration.

D. Data Analysis Framework

Quantitative analysis employed SPSS version 28, utilizing descriptive statistics, Chi-square tests, one-way ANOVA, multiple regression analysis, and System Usability Scale (SUS) scoring. Qualitative data was thematically analyzed to identify usability issues.

IV. Results and Discussion

A. Sample Characteristics

The final sample comprised 100 corporate employees: Mean age 34.2 years (SD=6.8); Gender: 55% male, 45% female; Education: 48% bachelor's, 32% postgraduate, 20% secondary; Monthly income: 35% LKR 150,000; Mean work experience: 8.5 years (SD=4.2).

B. Dietary Challenges and Current Practices

TABLE I. DIETARY CHALLENGES AMONG CORPORATE EMPLOYEES (N=100)

Challenge	Percentage Reporting	Mean Severity Rating (1-5)
Insufficient time for meal preparation	86.7%	4.2 ± 0.8
High cost of healthy options	79%	4.0 ± 0.7
Limited healthy choices near workplace	73%	3.8 ± 0.9
Lack of nutritional knowledge	68%	3.6 ± 1.0
Irregular eating schedule	81%	4.1 ± 0.6

Time constraints emerged as the primary barrier (86.7%, severity 4.2/5), followed by irregular eating schedules (81%) and high costs (79%). These findings align with global trends while demonstrating particular severity in Sri Lanka, where 78% of workers report workdays exceeding 12 hours. The data reveals 90% interest in subscription-based meal services addressing these challenges.

C. Technology Adoption Patterns

TABLE II. CURRENT TECHNOLOGY USAGE FOR HEALTH AND NUTRITION (N=100)

Technology	Current Users	Interested Non-Users	Total Interest
Health/fitness tracking apps	35%	42%	77%
Food delivery apps	68%	18%	86%
Nutrition tracking apps	12%	51%	63%
Meal planning apps	8%	47%	55%

High adoption of food delivery platforms (68%) contrasts with limited use of nutrition-focused applications (12% nutrition tracking, 8% meal planning). This gap represents significant opportunity for specialized meal subscription services combining convenience with nutritional guidance.

D. Prototype Feature Acceptance

Budget optimization achieved highest adoption intent (93%), reflecting economic constraints. Cultural preference integration (91%) and AI-driven personalization (88%) demonstrated strong acceptance, indicating culturally sensitive, intelligent systems resonate with users.

E. System Usability Scale Results

The prototype achieved mean SUS score of 78.4 (SD=12.3), indicating "good" usability. Specific findings: 89% found interface intuitive; 84% expressed confidence in regular use; 76% believed system would improve eating habits; 92% appreciated cultural sensitivity.

TABLE III. Feature

Feature	Usefulness Rating (1-5)	Ease of Use Rating (1-5)	Adoption Intent (%)
AI-driven meal recommendations	4.3 ± 0.6	4.1 ± 0.7	88%
Subscription management	4.2 ± 0.7	4.4 ± 0.5	85%
Nutritional tracking dashboard	4.0 ± 0.8	3.8 ± 0.9	74%
Vendor rating system	4.1 ± 0.6	4.3 ± 0.6	82%
Cultural preference settings	4.4 ± 0.5	4.2 ± 0.6	91%
Budget optimization	4.5 ± 0.4	4.1 ± 0.7	93%

F. Predictors of Technology Acceptance

TABLE IV. REGRESSION ANALYSIS OF ADOPTIONINTENTION PREDICTORS

Predictor	β Coefficient	Std. Error	P - values
Perceived usefulness	0.67	0.08	<0.001*
Ease of use	0.43	0.09	<0.001*
Cultural relevance	0.52	0.10	<0.001*
Price acceptability	0.38	0.11	0.002*
Technology readiness	0.29	0.12	91%
Budget optimization	4.5 ± 0.4	4.1 ± 0.7	0.018*

The model explains 84% of variance in adoption intention. Perceived usefulness (β=0.67) emerged as strongest predictor, followed by cultural relevance (β=0.52) and ease of use (β=0.43).

V. PROPOSED AI ENHANCEMENT MODEL

A. AI Architecture Framework

The proposed AI recommendation system incorporates: Input Variables including user dietary preferences, historical ratings, nutritional goals, cultural preferences, and budget constraints; AI Processing Framework utilizing machine learning for preference prediction, collaborative filtering, nutritional optimization algorithms, and real-time adaptation; Output Recommendations providing personalized meal suggestions, nutritional balance optimization, cultural preference integration, and budget-conscious alternatives.

B. Implementation Strategy

Qualitative feedback revealed specific expectations: 94% emphasized personalization priority; 89% wanted cultural sensitivity; 76% expected health goals integration; 88% required budget awareness.

VI. BUSINESS MODEL AND IMPLEMENTATION

A. Pricing Strategy

Results demonstrate strong price sensitivity. WeekSaver Plan (LKR 2,900) achieved highest acceptance (78%), followed by Fortnight Feast (LKR 5,500, 64%) and Monthly Munch (LKR 10,500, 54%). All plans include AI-driven recommendations, free delivery around Colombo 6, flexible menu selection, free desserts, and validity periods (7-30 days). Corporate bulk discounts of 5-10% enhance accessibility for employer-sponsored wellness programs.

TABLE V. PRICE SENSITIVITY ANALYSIS (N=100)

Subscription Tier	Duration	Price (LKR)	Acceptance Rate (%)
WeekSaver Plan	1 week	2,900	78%
Fortnight Feast	2 weeks	5,500	68%
Monthly Munch	1 month	10,500	54%

B. Implementation Roadmap

Phase 1 (Months 1-6*):* Launch basic subscription service targeting Colombo 6. Establish HACCP-certified kitchen (500 sq ft). Target 50-110 subscribers through corporate partnerships and free trials.

Phase 2 (Months 7-12)*:* Integrate AI recommendation algorithms. Scale to 180-250 subscribers through social media campaigns and corporate wellness partnerships. Expand to Colombo 3 and 7. Achieve break-even by Month 8.

Phase 3 (Year 2): Develop mobile applications with nutrition tracking. Establish corporate partnerships with 15% bulk discounts. Target 2,000+ subscribers across greater Colombo.

Phase 4 (Year 3+)*:* Geographic expansion to major cities. Introduce breakfast and dinner options. Explore franchise models and regional expansion.

VII. LIMITATIONS AND FUTURE WORK

Limitations include single-city focus, prototype-based evaluation without actual service delivery, and absence of long-term behavioral change measurement. Future implementations should include expanded geographic scope, longitudinal health improvement studies, AI algorithm optimization for Sri Lankan dietary patterns, and economic impact analysis including healthcare cost savings.

VIII. Conclusion

This research demonstrates significant potential for AI-enhanced meal subscription services to address nutritional challenges among corporate employees in Sri Lanka. Key findings include: 90% interest in subscription services; R^2=0.84 technology acceptance correlation; 91% cultural preference integration adoption intent. Pricing analysis reveals optimal positioning through three-tier structure achieving 78%, 64%, and 54% acceptance rates respectively. Success depends on balancing technological innovation with affordability, cultural authenticity, and user-centric design principles. The proposed implementation roadmap provides clear milestones for phased rollout beginning in Colombo 6, demonstrating actionable insights for entrepreneurs and policymakers addressing nutrition challenges in urbanizing developing economies.

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