

Methods of Managing the Cost of Meals in Public Catering Establishments

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Abstract

This article examines comprehensive cost management approaches in public catering establishments, emphasizing the interplay of technological innovation, organizational standardization, and sustainable development principles. It addresses the complexity of cost control by discussing various strategies such as automated inventory management, data-driven demand forecasting, portion control, waste reduction, and personnel optimization. Drawing on existing literature and practical case observations, the study highlights how long-term supplier contracts, menu engineering, and integrated software solutions enhance operational efficiency and financial stability. The findings suggest that combining traditional methods—like standardized recipes and staff training—with advanced digital tools—such as real-time warehouse monitoring and big data analytics—produces synergistic benefits. While each approach independently may improve certain metrics, an overarching framework that converges economic performance, ecological responsibility, and customer satisfaction appears most effective. Moreover, the discussion underscores barriers to technology adoption, especially for small and medium-sized enterprises, including high implementation costs and insufficient technical expertise. By proposing a holistic model, this research contributes to the ongoing discourse on cost optimization in the hospitality sector. The proposed framework underscores the necessity of harmonizing diverse strategies—procurement planning, sustainability measures, and continuous process improvement—to achieve resilient, profitable, and socially responsible operations in today's dynamic market.

Keywords

Cost of Meals, Automation, Restaurant Business, Cost Optimization, Inventory Management, Demand Forecasting, Sustainable Development

1. Introduction

Cost management in the restaurant business is a key factor in ensuring the financial stability of enterprises. Amid growing competition and changing consumer preferences, restaurateurs increasingly rely on comprehensive tools for expense control, combining detailed financial analysis, the implementation of advanced technologies, and the improvement of management practices (Yakhina et al., 2024; Drejeris & Samuolaitis, 2024; Tsiutsiak & Tsiutsiak, 2021). This approach not only reduces excessive costs, but also maintains product quality, which is crucial for promptly adapting to changes in the external environment.

However, rising resource costs (raw materials, labor, energy) and fluctuations in consumer demand complicate the task of keeping expenses under control (Malfors et al., 2021). In response to these challenges, restaurant management practices have embraced automation methods (digital platforms for resource tracking and production planning systems), the standardization of technological processes, and measures to improve staff qualifications (Lin et al., 2020). At the same time, some studies highlight barriers to the widespread adoption of these methods, including high initial investments, a lack of specialists capable of adapting new technologies to the specific conditions of enterprises, and organizational difficulties in small and medium-sized establishments (Ivanenko et al., 2022; Katz-Shufan et al., 2022).

An analysis of recent academic and practical studies shows that the most effective approach involves the combined application of several methods: inventory management, reduction of food waste, efficient menu planning (menu engineering), and flexible pricing strategies (Tsiutsiak & Tsiutsiak, 2021; Chaudhary & Sharma, 2023; Kurochkina et al., 2023; Wu et al., 2023). However, some studies examine individual aspects (e.g. process standardization or waste management) in isolation, which complicates the development of a holistic cost-reduction model. Additionally, issues of long-term sustainability and environmental responsibility require the integration of “sustainable development” and “green practices” principles into the overall management system (Chaudhary & Sharma, 2023; Dzhum et al., 2023).

Thus, there is a need for a more detailed examination of existing methods and the search for an optimal scheme for combining them, which would ensure both economic efficiency and organizational flexibility. This study focuses on analyzing methods of dish cost management under conditions of technological and managerial changes. The research systematizes traditional and modern tools for cost reduction, evaluates their strengths and weaknesses considering the specifics of the restaurant market, and proposes a comprehensive approach that combines digital solutions, rational process organization, and sustainable development principles.

2. Materials and Methods

This study is based on a systematic analysis of scientific publications addressing

cost management methods and strategies for improving economic efficiency in the food service industry. The primary goal of this stage was to identify key areas for the development of modern cost management tools and determine existing gaps and barriers to their practical implementation.

The analysis focused on studies that:

- 1) Explore technological solutions aimed at process optimization (e.g. the implementation of ultrasonic cavitation for cleaning kitchen equipment (Yakhina et al., 2024) or the use of algorithmic cost management methods (Tsiutsiak & Tsiutsiak, 2021));
- 2) Examine financial and economic aspects, including target costing, flexible pricing, and cost control based on big data (Lin et al., 2020; Dzhum et al., 2023; Pajrok, 2014; Drejeris & Samuolaitis, 2024);
- 3) Describe marketing tools for profitability enhancement, such as menu analysis and differentiated pricing (Ivanenko et al., 2022; Kurochkina et al., 2023);
- 4) Address issues of sustainable development and food waste minimization (Malefors et al., 2021; Katz-Shufan et al., 2022; Chaudhary & Sharma, 2023);
- 5) Study lean production principles and their impact on operational efficiency (Wu et al., 2023).

The methodological approach involved several stages. Initially, open sources were analyzed (electronic scientific journals, databases, and materials available on the Internet) containing descriptions of cost management methods in the restaurant business and related industries (hospitality services, general food services). The selection criteria included relevance to the topic (references to “cost management”, “sustainable development”, “food service management”, “waste minimization”, etc.) and the practical orientation of the studies (descriptions of implemented technologies or real business cases).

The collected publications were then grouped according to the dominant areas of focus:

- Digital and technological solutions (automation of accounting, implementation of innovative equipment, algorithmic forecasting methods);
- Financial tools (target costing, flexible pricing, cost and margin analysis);
- Marketing approaches (menu analysis, study of consumer behavior, and demand elasticity);
- Sustainable development and waste management (implementation of eco-technologies, food loss minimization);
- Lean approaches and organizational innovations (process standardization, logistics improvements, and employee skill enhancement).

In each group, the advantages and limitations of the presented methods were analyzed, considering the type of enterprise (buffet model, fine dining restaurant service, chain establishments, etc.). Special attention was given to the costs of technology implementation, payback periods, impact on service quality, and the level of employee engagement. Organizational factors (such as the need for staff training and restructuring of business processes) and environmental aspects (such as

reduced water consumption and efficient use of raw materials) were also examined separately.

Since the study focuses on cost-reduction methods without compromising quality, the following key effectiveness criteria were adopted:

- The level of direct costs for raw materials and auxiliary supplies;
- The degree of reduction in food waste and disposal expenses;
- Improvement in financial metrics (profitability of sales, margins on individual dishes);
- Scalability and resilience to demand fluctuations (the ability to quickly implement methods across various types of establishments).

The results of the comparative analysis of methods proposed in various studies (Yakhina et al., 2024; Tsiutsiak & Tsiutsiak, 2021; Malefors et al., 2021; Lin et al., 2020; Ivanenko et al., 2022; Katz-Shufan et al., 2022; Chaudhary & Sharma, 2023; Kurochkina et al., 2023; Wu et al., 2023; Dzhum et al., 2023; Pajrok, 2014; Drejeris & Samuolaitis, 2024) formed the basis for developing an integrated cost management framework. This framework takes into account the need for simultaneous application of digital tools, logistics process optimization, marketing strategies, and sustainable development principles. Particular attention was given to identifying limitations faced by small and medium-sized enterprises, which may lack sufficient resources for large-scale innovations.

Thus, the proposed methodology not only provided a review of existing approaches but also identified a general “framework” for effective cost management, adaptable to the specifics of various restaurant formats.

3. Results and Discussion

The findings confirm that cost management for meals in the food service industry requires a comprehensive approach that combines thorough analysis of procurement policies, optimization of technological processes, and the implementation of digital tools for quality and cost control. This multidisciplinary nature of expense management ensures not only the stability of financial indicators but also the sustainable development of enterprises in the long term (Tsiutsiak & Tsiutsiak, 2021; Wu et al., 2023). At the same time, the analysis indicates that for maximum efficiency, traditional methods (standardization, portion control) must be combined with innovative solutions (automation, big data analysis systems), creating an integrated model for adapting to dynamic market conditions. **Figure 1** illustrates the key elements of a cost control system, clearly demonstrating the interconnections between procurement, production processes, marketing, and financial management.

One of the most critical factors in cost optimization is the careful selection of suppliers and the establishment of long-term contracts, as this reduces the risk of price fluctuations and simplifies procurement planning. Combined with automated inventory management systems, restaurants can promptly monitor changes in the cost of each batch of raw materials and adjust orders accordingly (Lin et al.,

2020; Ivanenko et al., 2022; Kurochkina et al., 2023). Notably, chain restaurant complexes gain additional advantages due to scalability: a unified inventory control system can be easily adapted to new branches. However, the high-cost threshold and the need for staff training remain significant barriers for small and medium-sized enterprises.

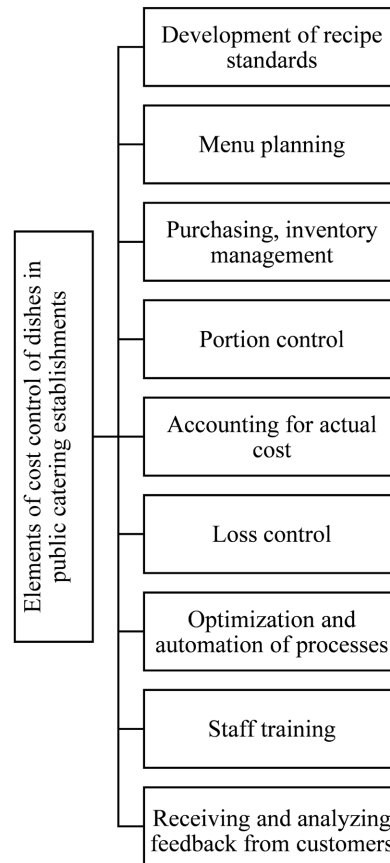


Figure 1. Cost control elements of meals in public catering establishments (Lin et al., 2020; Ivanenko et al., 2022; Kurochkina et al., 2023).

The standardization of technological processes plays an essential role in reducing variable costs. The development and implementation of unified recipes (so-called process flow charts) prevent deviations in portion sizes, methods of thermal processing, and the order of ingredient usage. This reduces raw material waste and ensures consistent dish quality (Ivanenko et al., 2022). Menu optimization through analytical tools (including menu engineering) further contributes to creating a balanced assortment: restaurants can timely eliminate low-margin and unpopular items, redirecting resources to highly profitable dishes (Malefors et al., 2021; Katz-Shufan et al., 2022; Dzhum et al., 2023; Drejeris & Samuolaitis, 2024). To assess the effectiveness of such measures over time, restaurant management uses a range of metrics presented in **Table 1**. The application of metrics such as Food Cost Percentage, Contribution Margin, and others provides an objective basis for evaluating the profitability of specific menu items and the effectiveness of implemented standards.

Table 1. Key metrics for evaluating the effectiveness of standardized recipes and menu optimization.

Metric	Description and Purpose	Significance for Cost Management
Food Cost Percentage (FCP)	The ratio of ingredient costs to sales revenue. Enables monitoring of cost dynamics.	The lower the percentage, the more efficiently resources are utilized and the higher the profitability.
Contribution Margin (CM)	The difference between a dish's selling price and its variable costs (primarily ingredient costs).	Shows which dishes contribute more to covering fixed costs.
Menu Mix (MM)	Analysis of a menu item's popularity within total sales volume.	Provides insight into how often a dish is ordered (demand).
Star/Dog Analysis	Classification of dishes into "stars" (high profit/high demand) and "dogs" (low margin/low demand).	Helps manage the assortment by removing inefficient dishes and promoting popular ones.

Another major component in cost management is proper inventory control and stock management. It has been established that automated warehouse management systems (WMS) significantly reduce costs by:

- Minimizing surplus inventory and the risk of product spoilage;
- Quickly identifying discrepancies between actual and recorded stock levels;
- Flexibly managing delivery schedules based on real-time demand data.

This is particularly relevant for restaurants with a broad menu range and fluctuating seasonal demand, where "traditional" inventory methods often result in errors and resource overuse (Tsiutsiak & Tsiutsiak, 2021; Wu et al., 2023).

Modern technological innovations (such as vacuum cooking, induction cook-tops, portion dispensers, etc.) also have a substantial impact on dish quality and cost. By accelerating processes and utilizing resources more efficiently, variable costs are reduced, and precise adherence to ingredient usage norms ensures predictable dish costs (Wu et al., 2023). However, these benefits can only be fully realized with a properly trained workforce: without a clear understanding of how to operate innovative equipment, profitability may even decrease due to errors and downtime.

Equally important is optimizing personnel management and automating administrative processes. Programs designed for efficient shift scheduling, time tracking, and task monitoring reduce the risk of overtime, improve discipline, and minimize human error (Ivanenko et al., 2022; Pajrok, 2014). Transitioning to such a management model requires the implementation of modern data collection and analysis systems, enabling restaurants to respond promptly to demand fluctuations and price changes, creating a transparent financial model (Malefors et al., 2021; Kurochkina et al., 2023).

The most common issues encountered in workforce management, along with practical solutions summarized from existing studies and practical experience, are presented in **Table 2**. These recommendations assist restaurants in preventing situations where inefficient labor organization negates efforts to improve profitability.

Table 2. Common issues in workforce management and their solutions.

Issue	Potential Consequences	Recommended Solutions
Lack of a clear shift schedule	Overtime, errors due to staff fatigue	Use scheduling software, account for employee preferences and skills
Insufficient training on new equipment	Low efficiency of technological solutions	Conduct regular training sessions, provide clear instructions, and implement motivational programs
Absence of standardized procedures	Disparate approaches to preparation, resource losses	Introduce process flow charts, checklists, and enforce compliance with established standards
Difficulty in evaluating performance	Unclear criteria, subjective assessments	Implement KPIs (Key Performance Indicators) and automated monitoring systems

From the perspective of sustainable development, special attention is given to portion control and the reduction of food waste. The use of weight control systems, tracking dish returns, analyzing customer feedback, and designing a thoughtful menu help achieve an optimal balance between guest satisfaction and resource efficiency (Katz-Shufan et al., 2022; Chaudhary & Sharma, 2023). This approach not only reduces direct costs for raw materials but also creates a more positive image by demonstrating a responsible attitude toward ecology and social responsibility (Chaudhary & Sharma, 2023; Wu et al., 2023). In practice, this can lead to increased customer loyalty and a greater likelihood of guests recommending the establishment.

Digitalization plays a significant role in modern cost management, with big data analytics modules processing information on sales, inventory, and price dynamics. This enables restaurants to more accurately predict seasonal fluctuations, adjust dish pricing flexibly, and avoid excess inventory (Malefors et al., 2021; Kurochkina et al., 2023). The main challenges in this area remain the high cost of implementing such IT solutions and the shortage of qualified personnel capable of adapting them to the specific conditions of an establishment. Nevertheless, for large chains, the profitability of IT investments is often high, as economies of scale and unified digital platforms ensure rapid payback.

The analysis and systematization of collected data indicate that restaurant managers have access to a wide range of tools, from basic monitoring of actual expenses to a full-fledged digital ecosystem for enterprise management. However, each approach has its own advantages and limitations, and no single method delivers sufficient results in isolation from the others. A strategy based on the comprehensive integration of technologies—standardization, automation, portion control, and the implementation of eco-friendly practices—enhances a restaurant’s competitiveness, reduces operational costs, and establishes a sustainable operating model even in a highly competitive environment. Therefore, the optimal solution is a holistic integration of these measures, taking into account both financial and socio-environmental factors.

4. Conclusion

In summary, efficient cost management in public catering establishments demands a multifaceted strategy that intertwines resource planning, technological modernization, and an ongoing commitment to sustainable practices. The research underlines how effective supplier selection, diligent inventory control, and standardized technological processes can mitigate unnecessary expenses. Simultaneously, advanced analytics and automation platforms bolster real-time decision-making capabilities, streamline labor utilization, and facilitate dynamic menu adjustments in response to market fluctuations.

Equally significant is the human dimension: well-structured training programs and clear operational guidelines ensure that the workforce remains aligned with organizational objectives, thus minimizing errors and reducing waste. The empirical evidence and literature synthesis presented in this study suggest that cost savings do not necessitate quality compromises; rather, strategically integrating digital solutions and lean methodologies can yield improvements across financial, operational, and ecological performance indicators.

Future research should explore integrative models that incorporate marketing strategies and regional consumer behavior within cost management frameworks, particularly focusing on small enterprises with limited resources. Such an approach may deepen understanding of how environmentally conscious operations, data analytics, and flexible pricing converge to create robust, sustainable business models in an increasingly competitive hospitality sector.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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