

OPTIMIZING RESTAURANT PERFORMANCE METRICS THROUGH MENU COST MANAGEMENT

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ABSTRACT

Effective cost management is an essential foundation for achieving operational efficiency and financial success across industries, including the restaurant sector. The study analyzes the relationship between cost management practices and operational performance metrics, based on principles that are globally applicable to enterprises striving for sustainability and gaining a competitive edge. Utilizing a quantitative research design, data were collected through a structured questionnaire that captured key factors of cost management in restaurant operations, such as budgeting, inventory control, and waste reduction, alongside operational performance indicators like ingredient utilisation, profitability, and efficiency. The findings provide valuable insights for managers and policymakers worldwide, offering a framework to implement cost management strategies that enhance organizational performance in restaurants. The study demonstrates that cost management serves as a transformative, globally applicable instrument for adapting to the challenges of a dynamic and complex business environment.

Keywords: Cost Management, Restaurant Menu, Performance Metrics, Restaurant Management.

INTRODUCTION

The food and beverage industry is a dynamic and essential component of the global hospitality and tourism Industry (Yatsenko, 2018). The restaurant industry encompasses a complex network of product, processing, packaging, distribution, and retailing (Zaridis & Logotheti, 2020). It is an integral part of human survival and societal well-being and plays a major part in economy of any country. From little artisanal units in alleys of our cities to massive multinational businesses, the industry is distinguished by its great diversity (Muller & Woods, 1994).

The Food and Agriculture Organization (FAO) of the United Nations has observed that due to motives that include increasing urbanization, population expansion, and rising levels of affluence, the global food sector has been steadily expanding (FAO, 2019). Over USD 1.5 trillion was exported globally in agricultural and food commodities, a testament to the industry's influence in global trade (Trade Statistics | ITC, 2023). Growing consumer demand for options of convenience and processed meals, especially in emerging nations, is the key factor for this growth (Harris & Shiptsova, 2007).

Background of the Study

As an important component of the world economy, the restaurant sector contributes much more than meals. As a major employment provider, it gives a wide range of employment and

entrepreneurial options and is an immense contributor to economic stability (Yerdavletova & Mukhambetov, 2014). It stimulates the growth of local business, draws tourists, and acts a hub for cultural exchange.

Industry Favourable Conditions

A significant transformation can be seen in the consumer preferences in the past few years. The economic success of the industry is fuelled by a relative stability of the global economy, characterized by increasing disposable incomes of the general population (Chattopadhyay & Shah, 2014). It is driven by an intense focus on health and wellness and the shift from home-cooked food to pre-cooked meals. The interest towards meals that offer tangible health benefits is evident from the push for naturally produced, organically nurtured, and minimally processed foods (Malissiova et al., 2022; Topolska et al., 2021). Simultaneously, the fast-paced lifestyles in urban settings have fuelled the demand for convenient, ready-to-eat meals (Stewart & Yen, 2004). The complex nature of consumer demand for both nutritious food and time-saving solutions is shaping the food industry.

Customer engagement has improved with the innovations in digital ordering and payment systems and social media marketing (Drummond et al., 2020). Groundbreaking technological innovations like high-pressure processing and the use of nanotechnology are revolutionizing food safety and prolonging its keeping quality, thereby paving the way for a more reliable food supply (Alfadul & Elnehwly, 2010). The industry is taking advantage of this scenario by collaborating on relationships within the intricate web of the global supply chain (Dani, 2015).

Challenges Facing the Industry

The contemporary restaurant industry is defined by its rapid rate of advancement and also its vulnerability to setbacks. Inflation, increases in wages, and higher costs for ingredients and utilities squeeze profit margins (Amerta & Surasmi, 2023). Supply chain disruptions due to the COVID-19 pandemic and natural disasters introduce a great deal of uncertainty and push up the input costs (Gunessee & Subramanian, 2020). Global food trade has become complex due to the multiplicity of laws and standards in different regions of the world (Hobbs, 2010). Access to safe and nourishing food needs to be prioritized for a large percentage of the population that has remained deprived due to income inequality in various parts of the world (Hossain et al., 2021).

Cost and Performance: Their Significance

The global business market is increasingly becoming competitive and facing challenges like never before. Financial uncertainty stems primarily from the economic volatility, characterised by sudden shifts in foreign exchange rates, commodities price inflation, and cyclical monetary downturns (Tong et al., 2023). Technological advancements, particularly in the domain of Artificial Intelligence (AI), are creating new forms of business models, while many are perishing due to irrelevance (Wang et al., 2023). Integration of cost control and sustainability can only assure the long-term survival of any enterprise.

Restaurants, much like other industries, must understand the economic factors influencing consumer spending and proactively initiate processes to mitigate any negative impact. In the current business environment, cost control has become a vital element impacting restaurants' viability and success (Elshaer, 2022). Restaurants must evolve cost-control strategies to preserve

profitability and boost operational efficiency in a market defined by growing operating expenses, shifting consumer preferences, and heightened competition. The food and beverage sector offers a unique setting for researching and understanding the effect of cost-control strategies on operational effectiveness (Shu & Bosman, 208b).

RESEARCH OBJECTIVES

The existing literature has extensively examined the impact of cost management practice in various industries. The interplay between the cost control strategies and qualitative factors like customer satisfaction, service quality, employee productivity, etc. is not fully captured.

The study aims to analyze the impact of cost management strategies on the operational performance of restaurants. The study will identify and evaluate the current cost management strategies employed by restaurants. It will examine the manner in which these strategies influence key performance indicators, including revenue growth, profit margins, customer satisfaction, and operational efficiency. Finally, it will determine the predictive power of cost management practices on overall operational performance through statistical imputations. The result of the research seeks to offer valuable insights for restaurant managers, policymakers, and industry stakeholders, providing them with a practical framework for improving outcomes and efficiency in the restaurant sector.

Research Hypothesis

The contextual information makes it evident that cost management processes are crucial parameters in shaping the performance efficiency of a restaurant. There is a dearth of conspicuous study in India which has its own distinct economic and business practices. To close this disparity, the study formulates the following hypothesis

Null Hypotheses for the Study

- ***H0₁:*** *There is no significant relationship between cost management practices and operational performance metrics in restaurants.*

The importance of cost management in improving operational performance and profitability is proven across industries. The researches in the field of restaurants have been focused on outlets of developed countries that have better systemic data management facilities. Research in developing countries will be able shed light on the applicability of these systems under a unique socio-cultural and culinary environment.

- ***H0₂:*** *The extent of cost management practices does not significantly predict operational performance metrics in restaurants.*

Decision-making and operational performance in the restaurant industry can be improved with formal cost management. However, not all restaurants are able to adopt them due to reasons of implementation costs, size, or lack of awareness (Mun & Jang, 2018). Empirical assessment will reveal if such systems are able to craft any measurable difference in the performance of outlets. It can have a notable impact on the choice of such systems and practices by the enterprises.

Significance of the Study

The ability to control costs is paramount for restaurant operators in a market characterized by fierce competition and slim profit margins. A data-driven perspective on how efficient cost management affects operational performance within the restaurant industry is the focus of the research. The existing literature, with its generalized analysis on cost management, fails to capture the nuances that interplay between specific tactics and their measurable impact on menu performance. There is a need for empirical evidence, which can offer guidance to restaurant operators to optimize their financial and operational efficacy. Dissecting the directly targeted strategies of cost management is necessary to create a framework for financial performance evaluation. Apart from filling up the theoretical gap between the variables, the restaurant operators need a tool to navigate through economic challenges faced by their units.

The derived insights will support the creation of standardised cost control systems and facilitate the choice of processes and requisite technological investments (Tyagi & Bolia, 2022). More context-specific research can be achieved by detailed investigations directly applicable to the geographical area of Punjab, India, having distinct challenges and prospects (Bakshi et al., 2024). Recognition of the impact of various influences on the restaurant industry will enable policymakers to create a conducive regulatory environment by removing barriers and ultimately promoting the region's economy (Lehman et al., 2020). The study will discuss the constraints encountered by restaurants when implementing cost-control strategies, providing suggestions to get past these barriers.

LITERATURE REVIEW

The restaurant industry operates in a persistent cycle of innovation and hyper-competitive landscape, demanding a sharp focus on cost management. The existing literature recognises the role of cost management on a broader framework but undermines the granular reality of the restaurant industry. The review addresses the deficiency by building a bridge to link cost management with tangible performance levels of restaurant menu.

Theoretical Framework of Cost Management

Restaurant cost management hinges on intertwined elements involving many vital cost categories, including food expenses, staffing costs, administrative costs, operational effectiveness, and external factors (Amy Kima, et al., 2024). Food costs involve expenditure on ingredients, food waste percentage, and seasonal market variation. The cost fluctuations have a severe impact on profit margins (Lymar, 2019). Labour costs of a restaurant are dependent upon production levels, wage structure, and the effectiveness of production scheduling (Yandrasevich, 2011). A restaurant's overhead costs cover rent, utilities, maintenance, and the interplay between fixed and variable costs and are key to developing pricing strategies (Mun & Jang, 2018).

Budgeting and Financial Forecasting

The demand for restaurant services is subject to significant and unpredictable fluctuations. Minor changes in customer turnover significantly impact the profitability (Kholili, 2022). Budgeting enables the tracking of every expense of the operations and identification of possible areas of savings. It involves planning and predicting customer demand by analysis of a

restaurant's historical sales data and current market trends, and allocating resources accordingly (Ashley et al., 2000). This forms the basis for laying the control systems for comparison of the outlet's performance against budgeted figures. Timely initiation of corrective measures can prevent any major cost overrun or revenue shortfall in the outlet (Jørgensen & Wallace, 2000). Financial forecasting, on the other hand, calls for a strategic insight into the restaurant's likely financial scenario. Conscientious assessment of menu items of the restaurant facilitates examining their profitability and customer appeal (Huang et al., 2010). The restaurant can respond by eliminating underperforming items and promoting profitable dishes. By incorporating such judicious practices, restaurant managers can navigate economic uncertainties and manage an outlet's cash flow for better financial outcomes.

Cost Control Measures

In the high-stakes environment of the contemporary restaurant industry, controlling costs is not merely a formality but an indispensable part of its operations. It transcends simple bookkeeping, evolving into strategic tools to gain protection from erosion of profit margins (Riabenska, 2022). The foundation of a restaurant's financial control lies in expense monitoring. This needs a keen understanding of the flow of money in the organisation and eliminating the inefficiencies (Judina, 2019). Securing favourable procurement terms through prudent supplier negotiation is another expense reduction strategy. It is advised to build strong, mutually advantageous relations with suppliers to attain high-quality standard ingredients at the best deals supplied reliably on time (Cho et al., 2019). Menu price optimization involves evaluating restaurant sales data and weighing it against the cost of production and competitor pricing. The focus should be on creating a balance between profitability and customers' price sensitivities (Raab et al., 2009). Restaurants utilise different types of pricing techniques to maximise their revenue. Regular menu analysis by using menu engineering techniques will help in building strategies for menu items sold during a particular time period (Noone & Cachia, 2020). Implementing standardisation in purchase procedures, menu item recipes, portioning, and service methods adds to financial control (Naumov, 2023).

Inventory Management

Supply chain expenses of restaurants are largely dependent upon effective tracking and regulation of food and beverage inventories to minimize losses. An effective inventory management system minimizes losses from spoilage and holding costs due to overstocking while also negating customer dissatisfaction caused by the unavailability of ordered items due to understocking (Siek & Guswanto, 2021). PAR (Periodic Automatic Replenishment) levels for various perishable and non-perishable ingredients required for menu production must be thoughtfully decided along with selecting the first-in-first-out (FIFO) and/or just-in-time (JIT) inventory management method (Baylen, 2020). Technological advancements in software and analytics can be leveraged for undertaking automated inventory practice (Swink et al., 2022).

Waste Reduction

The importance of waste reduction has moved beyond a mere ethical consideration to a core strategy that affects a restaurant's bottom line and environmental footprint (Sakaguchi et al., 2018). Monitoring and addressing food and other resource waste in a methodological manner

substantially lowers operational costs, improves the financial baseline, and gains customer loyalty (Tehrani et al., 2020). Transformation commences with the implementation of efficient stock management and portion control processes. Kitchens can repurpose leftover trims and surplus into new items (Pirani & Arafat, 2016). Attention towards waste management of packaging containers, paper use, and chemicals in the form of cleaning supplies is required. Electricity and water consumption in restaurants can be reduced by investing in and maintaining fixtures and appliances. A comprehensive recycling program for various types of waste is crucial (Vinck et al., 2019).

Labour Cost Management

A significant amount of a restaurant's total operating expense goes toward meeting manpower expenses. A roadmap for optimizing the human resource utilization is needed without compromising the service quality (Papademetriou et al., 2023). This entails rigorous analysis to identify areas for cost control through sensible scheduling that arranges staffing levels with customer traffic patterns (Akhundov et al., 2022). Training and job rotation of employees to handle multiple roles maximises performance and responsiveness, ensuring effortless service during both busy and slow periods (Arroyo-López et al., 2017). Integrating labour management features into technological solutions can track employee performance and manage workload distribution. Costs due to employee turnover and onboarding expenses can be controlled by keeping the workforce motivated by fostering a positive work environment and offering competitive financial benefits (Sichka, 2022).

Regular Cost Management Analysis

Consistency in monitoring of financial health and restaurant's operational smoothness is required through regular audits (V. Portana et al., 2023). This will help in uncovering cost-related patterns, consumer consumption trends, and detecting areas of waste. Restaurant managers gain insights into key cost drivers and are able to refine resource allocation (Alonso & Krajsic, 2014). The process allows proactive decision-making through adjustments in purchase mechanisms, menu pricing, and focusing on high-performing areas. Such actions foster a culture of constant improvement to achieve long-term sustainability.

Operational Performance Metrics

Evaluating the outcome of cost management practices in a restaurant is just as crucial as putting the strategies in place. Various quantitative and qualitative performance metrics have been identified by scholars and experts. Measurable data can be obtained from income and expenditure data, table turnover rate, and sales data per cover in a restaurant. Customer satisfaction and service quality are subjective measurements of the outcome of cost control.

Financial Performance Indicators

Financial statistics serve as one of the most important quantifiable tools for assessing the effectiveness of cost management strategies. Multilevel monetary markers such as sales growth, profit margins, value of sold goods, and return on investments offer an outlook as to the extent to which a restaurant is managing its expenses against the revenue generated (Díaz-Puche et al., 2020). A positive operating profit and cash flow is a desirable financial indicator of a restaurant's

performance. Various metrics are used to assess the average revenue per available cover or area in the restaurant to measure the effectiveness of management strategies (Kalaitan et al., 2023). Such indicators are used to establish benchmarks for performance to enable comparisons for long-term efficacy.

Customer Satisfaction and Experience

The objective of cost management is to control expenses and channel the resources towards actions that enhance the dining experiences of the customers. This needs investment in staff training, restaurant ambiance, and service techniques aimed at gaining customer satisfaction (Alhelalat et al., 2017). The impact of customer-centric activities needs to be evaluated to identify areas of achievement and improvement. Customer surveys and feedback cards with both quantitative and qualitative questions can be employed for feedback. Online reviews provide a wealth of data to understand public perception (Tian et al., 2021). Customer loyalty is assessed using Net Promoter Scores to determine the likelihood of them recommending the restaurant to others.

Operational Efficiency and Productivity

Rationalization of core restaurant processes like food production, service delivery, and management of orders results in a reduction of waste and increased output (Blum, 2020). It gets reflected in higher table turnover rates, shorter average service time, better order accuracy, and resource utilization. The consistency and quality of service and food, along with cleanliness, should improve with standardizing processes (Pan & Ha, 2021).

Employee Performance and Productivity

Employee morale and efficiency get a boost with comprehensive training and development programs and performance-based incentives. Diversifying the employee job roles helps minimize the need for excess staffing in the restaurant operations (Oparanma & Nwaeke, 2015). This translated to a more progressive and responsive service environment, securing a competitive edge for the outlet.

Technology and Innovation Metrics

The ability of the restaurant to absorb technological innovations into its regular operational processes is an important yardstick for measuring the impact of cost management. Advanced point-of-sale systems, integrated property and inventory management software, and the use of data analytics smooth the operations (Blöcher & Alt, 2021). Measurable differences can be found through these investments in the form of reduced errors, better processing times, and more accurate sales forecasting.

RESEARCH METHODOLOGY

Research Design

To investigate the relationship between the cost management and operational performance metrics in restaurants, the study employs a quantitative research design. Data was collected from

restaurants using a structured questionnaire, assessing the variables on a 5-point Likert scale. The numerical data will allow systematic measurement and analysis of the relationship. It helps identify patterns, trends, and statistically critical correlations of variables of restaurant management, ensuring objectivity and reliability to the findings.

Population and Sample

The dynamic and economically significant food and beverage backdrop of the state of Punjab, India, drawing in both domestic and foreign customers, has been chosen as the geographical study area. The diversity and vastness of Punjab's culinary landscape encompass a mélange from traditional dhabas to modern restaurants, which allows the possibility of a logistically and financially comprehensive sampling. Punjab's restaurant industry is navigating the complexities of rising operational costs, intensive competition, and evolving consumer preferences (EconomicSurvey-2019-20, 2020).

A representative sample of restaurants for a focused study is necessary to delve into the efficacy of cost management measures within the sector. It will allow an insightful analysis by providing quintessential data on the implementation of strategies related to efficient purchasing and inventory management, manpower administration, waste reduction measures, and energy-saving technologies contributing to the sector's sustainability and competitive edge. A stratified random sampling approach was carried out, dividing the restaurant population into distinct categories based on average menu price per person - fine dining, mid-range/casual dining, and budget-friendly/economical restaurants. It ensured proportional representation from each category, capturing the heterogeneity in cost structures and operational distinctions within the restaurant industry. This stratification minimized selection bias and supported a holistic analysis of the relationship between cost management practices and operational performance metrics across various restaurant types.

Data Collection Method

A structured questionnaire designed for the assessment of operational performance measures and cost management practices in restaurants was used to acquire data for this study. Through the help of opinion on a 5-point Likert scale, respondents were able to express how much they agreed or disagreed with different assertions. The ability of a Likert scale to grasp multifaceted perspectives and produce ordinal data appropriate for statistical analysis led to its selection (Harpe, 2015). In order to ensure wide participation from fine dining, mid-range/casual dining, and budget-friendly venues, the questionnaire was distributed to restaurant managers and owners throughout Punjab. Respondents were informed of the study's objectives, and answers were gathered with minimum personal data to promote honest evaluation in order to ascertain accuracy and dependability. Data was gathered over the course of three months. This systematic approach was instrumental in establishing the validity and reliability of the studied data. The independent variable for the study, Cost Management, was measured using 17 factors generated from existing literature and industry practices. These factors included elements such as purchasing policy, budgeting, cost control techniques, inventory management, waste reduction methods, and manpower administration. These indicators captured the various facets of cost management practices in restaurants. For the dependent variable, Performance Metrics, 10 key factors were evaluated, including customer satisfaction, revenue growth, food quality standards,

operational efficiency, employee productivity, and profitability. These metrics were selected to represent the operational and financial outcomes critical for the success of restaurant businesses.

Data Analysis Plan

The data analysis plan of the study aims to extensively examine the relationship between cost management practices and operational performance in Punjab's restaurants. With the help of the SPSS tool, we will initiate with descriptive statistics to summarize the data, followed by Cronbach's Alpha to check the reliability of measurement scales. After checking the normality of the data, correlation analysis will be conducted to assess the strength and direction of associations between variables. Linear regression test will quantify the predictive power of cost management on performance, with collinearity diagnostics (Tolerance and VIF) and ANOVA ensuring model validity. In the concluding part, the study will analyze and present results, offering actionable solutions and recommendations for restaurant industry practitioners and policymakers to improve operational efficiency and financial outcomes.

Data Analysis and Findings

In order to credibly establish the relationship between cost management and operational performance metrics of restaurant menu, the use of quantitative investigation was required. Spearman's Rank-Order Correlation and Kendall's Tau-b Correlation tests will be able to assess the effectiveness and inclination of such associations (Puth et al., 2015). The predictive power of cost management practices on operational performance metrics on restaurant menus will be examined using regression analysis.

Study Sample

Responses gathered from 415 restaurants; spanning a wide variety of dining facilities, constitute the study sample. The sample consisted of 110 fine dining restaurants, where the menu cost per person is INR 1001 and above, exhibiting high-end dining experiences. Mid-range and casual dining restaurants, with expenditure per person ranging from INR 251 to INR 1000, composed the largest segment of the sample with 178 responses. These establishments offer a more reasonable price yet a diverse dining experience. Furthermore, 127 budget-friendly or economical restaurants, where the cost per person is between INR 100 and INR 250, were the cost-conscious diners' choice for their food. This stratified sample ascertains a comprehensive portrayal of different types of restaurants across various price points, supporting a strong analysis of cost management practices and their impact on operational performance metrics across the restaurant industry in the region. Tables 1-9.

Table 1 PROFILE OF RESPONDENT RESTAURANTS		
Restaurants	Cost per person	Number of Responses
High-end / Fine Dining Restaurant	INR 1001 & above	110
Mid-range / Casual Dining Restaurants	INR 251 - 1000	178
Budget-Friendly / Economical Restaurants	INR 100 – 250	127

Reliability Analysis

Cronbach's Alpha, which assesses the closeness of a related set of items as a group, was used to determine the reliability of the survey instrument (questionnaire) used in the research. Scores span from 0 to 1, with higher values indicating greater reliability (Streiner, 2003). Both the cost management and performance metrics scales show very high internal consistency that is indicated by their Cronbach's Alpha values (0.963 and 0.970, respectively). These values are significantly above the generally accepted criterion of 0.7. This high level of reliability affirms the validity of the data collected for the research on cost management practices and performance metrics in restaurants.

Table 2 CRONBACH'S ALPHA RESULTS FOR SAMPLE STUDY FIGURES			
S. No.	Variables	No. of Items	Cronbach's Alpha
	Cost Management	17	0.963
	Performance Metrics	10	0.970

Hypothesis Testing

In order to select the appropriate statistical tests and reliable test results, it is important to test the normality distribution of the collected data. The results of the tests show the p-values of both the Kolmogorov-Smirnov and Shapiro-Wilk tests are 0.000. The p-value is significantly below the threshold value of 0.05, which infers that studies on restaurant performance should use non-parametric tests for further analysis (Hanusz & Tarasińska, 2015).

Table 3 TESTS OF NORMALITY FOR THE DATA OF DEPENDENT VARIABLE PERFORMANCE METRICS						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Performance Metrics	.114	415	.000	.932	415	.000
a. Lilliefors Significance Correction						

Hypothesis 1

H₀₁: *There is no significant relationship between cost management practices and operational performance metrics in restaurants.*

The aim of the testing is to determine whether a statistically significant relationship exists between cost management practices and operational performance metrics of restaurants. The study uses Spearman's Rank-Order Correlation and Kendall's Tau tests to assess the hypothesis.

Spearman's Rank-Order Correlation

Using the data gathered, Spearman's rank correlation coefficient (ρ) is used to determine the monotonic relationship among the means of the variables cost management and restaurant performance metrics (Sedgwick, 2014). Spearman's ρ was the ideal fit for the data gathered since it could offer an accurate indication of the direction and strength of connection for assessment. The data included both ordinal and non-normally distributed continuous variables. Values of Spearman's ρ vary from -1 to 1, with 0 denoting no association. A significant positive correlation is indicated by a value close to 1. A high inverse correlation is demonstrated by values that are near -1 (Schober et al., 2018).

Cost Management mean and Performance Metrics means have a 0.773 correlation coefficient. The two variables under assessment have a strong positive relationship, as indicated by the result that is closer to 1. It suggests that the standard of restaurant performance and the level of attention paid to cost management are strongly correlated.

The p-value (Sig,2-tailed) is 0.000 in the current study, which is less than the conventional correlation significance criterion of 0.01. It is highly unlikely that the association between the variables happened erroneously, as this demonstrates that the correlation is significant. We reject the null hypothesis (H_0) in light of the aforesaid observation.

Table 4				
SPEARMAN'S CORRELATION BETWEEN COST MANAGEMENT AND PERFORMANCE METRICS				
			Cost Management	Performance Metrics
Spearman's rho	Cost Management	Correlation Coefficient	1.000	.773**
		Sig. (2-tailed)	.	.000
		N	415	415
	Performance Metrics	Correlation Coefficient	.773**	1.000
		Sig. (2-tailed)	.000	.
		N	415	415
**. Correlation is significant at the 0.01 level (2-tailed).				

Kendall's Tau test

Kendall's tau-b Correlation Coefficient is a vital statistical measure that has been used to measure the strength and direction of the association between cost management and performance metrics. It can reliably assess the extent of the relationship and robustness of the tied variables, where the data is not normally distributed. The correlation measure spans from -1 to +1, with +1 implying positive correlation and -1 pointing to a perfect negative correlation, and 0 signifying no correlation. The coefficient value of 0.573 indicates a moderate to strong positive correlation between the variables (Walker, 2016).

The p-value of 0.000 is less than the benchmark of 0.05, pointing to strong evidence against the null hypothesis.

Table 5				
KENDALL'S TAU BETWEEN COST MANAGEMENT AND PERFORMANCE METRICS				
			Cost Management	Performance Metrics
Kendall's tau_b	Cost Management	Correlation Coefficient	1.000	.573**
		Sig. (2-tailed)	.	.000
		N	415	415
	Performance Metrics	Correlation Coefficient	.573**	1.000
		Sig. (2-tailed)	.000	.
		N	415	415

**_. Correlation is significant at the 0.01 level (2-tailed).

Both the Spearman's Rank-Order Correlation and Kendall's Tau-b Correlation signify a statistically strong positive relationship between cost management practices and performance metrics in restaurants.

Hypothesis 2

H0₂: The extent of cost management practices does not significantly predict operational performance metrics in restaurants.

Hypothesis testing aims to explore the predictive relationship between the extent of cost management practices and operational performance metrics of restaurants. The use of linear regression analysis helps in determining whether variations in cost management practices significantly influence indicators of key performance.

Linear Regression test for Cost Management and Performance Metrics

The relationship model between dependent and independent variables can be explained through the use of a linear regression test. In the context of the research, linear regression will be employed to assess the extent to which cost management practices (independent variable) predict the operational performance (dependent variable) of the restaurant menu Figure 1.

The data presented in the scatter plot displays an upward trend, indicating a positive correlation between cost management counts and restaurant performance. This positive relationship is additionally backed by the positive slope of the line of best fit, demonstrating that higher cost management counts tend to enhance with better restaurant performance (Nugroho et al., 2024).

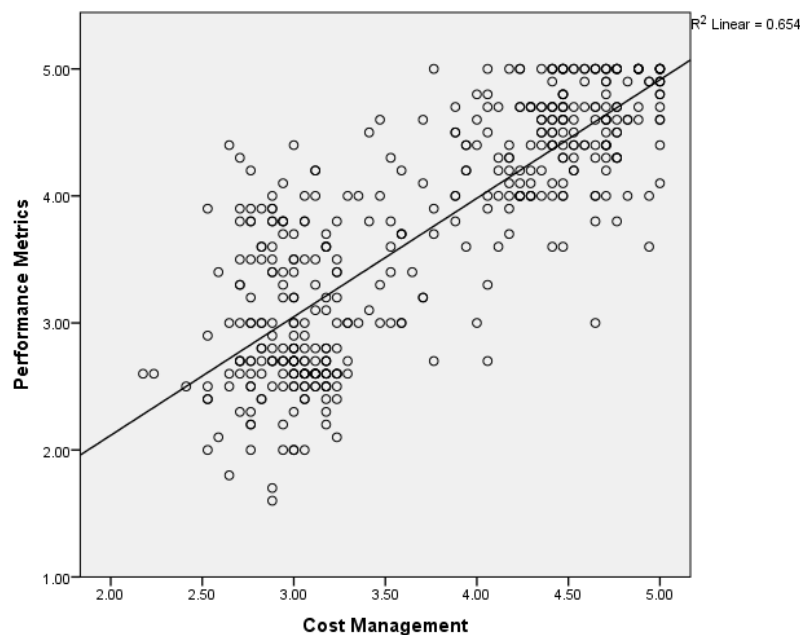


FIGURE 1
SCATTER PLOT OF LINEAR REGRESSION TEST FOR COST MANAGEMENT AND PERFORMANCE METRICS

The linear relationship between cost management (independent variable) and restaurant menu performance metrics (dependent variable) was evaluated using Pearson's correlation coefficient R (Senthilnathan, 2019). A strong positive correlation ($R = 0.809$) was identified. The

predictive power of cost management on performance metrics was further assessed via the coefficient of determination (R^2). The regression model demonstrated a significant explanatory adequacy, with cost management accounting for 65.4% ($R^2 = 0.654$) of the variance in performance metrics. This R^2 value between 0.50 and 0.99 is considered acceptable within the framework of social science research, provided there is no observation of artificial causation or significant multicollinearity (Ozili, 2023). The agreement between R^2 and adjusted R^2 strengthens the model's validity. A standard error of estimate (SEE) of 0.53409 indicates a satisfactory model fit. The regression analysis thus confirms that cost management is a significant predictor of restaurant performance metrics.

Table 6 REGRESSION MODEL SUMMARY FOR COST MANAGEMENT AND PERFORMANCE METRICS				
Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.809 ^a	.654	.653	.53409
a. Predictors: (Constant), Cost Management				
b. Dependent Variable: Performance Metrics				

ANOVA Test for Cost Management and Performance Metrics

The statistical significance between Cost Management and Performance Metrics of restaurant menu can be measured through an ANOVA test (Kozak & Piepho, 2018).

The F-statistic, extracted from the ratio of the Regression Mean Square to the Residual Mean Square ($222.720 / 0.285 = 780.785$), functions as an authenticated test of the regression model's overall fit (Riffenburgh & Cummins, 2006). It assesses whether the variance illustrated by the model significantly exceeds the unexplained variance. The observed F-statistic of 780.785, exceeding established critical values, conclusively demonstrates that the model possesses substantial explanatory power, suggesting a statistically significant relationship between the predictor variable (cost management) and the dependent variable (performance metrics).

The p-value, representing the probability of witnessing the obtained findings under the null hypothesis of no relationship, is critical in evaluating the statistical significance of the outcomes. A p-value approaching 1 would uphold the null hypothesis, indicating a high possibility of the observed data occurring by chance. In contrast, a p-value approaching 0 provides strong indications against the null hypothesis, suggesting that the observed relationship is unlikely to be a matter of chance (Kim, 2014). In this study, the p-value of .000 ($p < .001$) indicates a statistically significant result, providing robust evidence to reject the null hypothesis of no relationship between cost management and performance metrics. This result accentuates the model's ability to describe the variance in performance metrics through variations in cost management, establishing a highly significant predictive capacity.

Table 7 ANOVA TEST RESULTS FOR COST MANAGEMENT AND PERFORMANCE METRICS						
ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	222.720	1	222.720	780.785	.000 ^b
	Residual	117.809	413	.285		
	Total	340.529	414			

a. Dependent Variable: Performance Metrics
b. Predictors: (Constant), Cost Management

Regression Analysis for Cost Management and Performance Metrics

A regression equation, serving as a regression model, was built to state the relationship between cost management and performance metrics.

A linear regression model was introduced to investigate the relationship among cost management practices and performance metrics. To enable the inference of the relative influence of cost management, standardized beta coefficients were derived through z-score transformation, producing a distribution with a mean of zero and a standard deviation of one. These beta coefficients, spanning from -1 to +1, gauge the strength and direction of the linear association (Cribari-Neto & Zeileis, 2010). In this analysis, a beta coefficient of 0.809 indicates a strong positive relationship between cost management and performance efficiency, suggesting that elevated levels of cost management are associated with significantly improved performance metrics.

The statistical relevance of individual regression coefficients was weighed using t-statistics and linked p-values. The model yielded an intercept of 1.966 and a mean cost management score of 27.943. The high absolute t-values for both the intercept and cost management variable suggest that they are statistically different from zero, indicating a significant impact on performance metrics. While the intercept exhibited a p-value of 0.050, demonstrating marginal significance at 0.05 level, the cost management variable displayed a p-value of 0.000, signifying a highly significant relationship.

Collinearity diagnostics carried out using tolerance and variance inflation factor (VIF) measured the anticipated effects of multicollinearity on the regression coefficients. Both the tolerance and VIF values were 1, indicating the nonexistence of multicollinearity and confirming the independence of the predictor variables.

Table 8
REGRESSION ANALYSIS RESULTS FOR COST MANAGEMENT AND PERFORMANCE METRICS

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.249	.127		1.966	.050		
	Cost Management	.933	.033	.809	27.943	.000	1.000	1.000

a. Dependent Variable: Performance Metrics

In simple linear regression, the collinearity diagnostics table demonstrates a very weak form of collinearity with "cost management mean" establishing over "performance metrics mean". The condition index of 1.000 and 9.570 is much lower than the accepted threshold of 15 and is relatively low despite large variation between Eigenvalues (1.978 and 0.022), suggesting that multicollinearity does not pose a major issue. The observed weak collinearity is likely a consequence of the scaling of the predictor variable.

Table 9					
COLLINEARITY DIAGNOSTICS TABLE					
Collinearity Diagnostics^a					
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Cost Management
1	1	1.978	1.000	.01	.01
	2	.022	9.570	.99	.99
a. Dependent Variable: Performance Metrics					

In accordance with the results of the scatter plot, regression model summary, ANOVA test, and regression analysis, we reject the null hypothesis H_{02} . It indicates that the extent of cost management practice significantly boosts the performance metrics of a restaurant menu.

DISCUSSION

Interpretation of Results

The analysis of the collected data uncovered significant insights regarding the relationship between cost management practices and operational performance metrics of restaurant menus. The correlation analyses, both Spearman's Rank-Order and Kendall's Tau-b, demonstrate a strong positive relationship between the two variables, with correlation coefficients of 0.773 and 0.573, respectively. The finding indicates that as cost management practices improve, operational performance metrics show notable enhancement. The regression analysis further corroborates this relationship, demonstrating that cost management practices are a significant predictor of performance metrics. The unstandardized coefficient of 0.933 and an extremely significant p-value of 0.000 underscore the predictive power of cost management practices. Moreover, the F-statistic of 780.785 and its associated p-value validate the overall relevance of the regression model. These results consistently and collectively support the rejection of the null hypothesis, providing evidence on how effective cost management practices play a crucial role in enhancing the operational performance of restaurants.

Implications: Theoretical Implications

The theoretical framework on the interplay between cost management practices and operational performance on the menus of restaurants is further advanced with the study. It empirically fills in the gap by establishing the strong positive correlation between the two variables in the context of restaurant operations. By confirming its relevance in an earlier understudied geographical area, it lays impetus on the need for strategic cost management.

Practical Implications

The study provides actionable insights for restaurant managers and stakeholders, intensifying the importance of cost management strategies to attain superior operational outcomes. Restaurant managers and owners need to assess their current cost management processes critically and consider upgrading them where they are deficient. Staff must be trained in implementing cost-effective techniques. Leveraging new-generation technology can assist in improving cost monitoring (Nebaba et al., 2024).

CONCLUSION AND RECOMMENDATIONS

The study demonstrates a strong relationship between effective cost management and enhanced performance in restaurants through the use of meticulous statistical analysis. It confirms that restaurants can achieve superior operational efficiency, profitability, and overall performance metrics by controlling their cost components. Effective optimization of performance metrics through strategic cost management is vital for ensuring the long-term viability and expansion of the restaurant industry. It needs a multifaceted approach that involves careful tracking of food and beverage purchasing processes, minimizing production wastage, and optimizing ordering structure. Advances in inventory management systems can predict accurate demand of raw materials and suggest their utilization before they expire. Manpower costs could be managed through production scheduling, employee training, technological inputs, and judicious staffing. Investing in energy-efficient equipment could further help by reducing the cost of energy expenditure.

The degree of compliance by restaurants with cost control practices will observe a consequential impact on their ability to price dishes competitively and food service standards, leading to greater customer satisfaction. The industry should invest in maintaining data on their outlets and take the assistance of technology in the analytics of menu offerings. A thorough grasp of the interrelation between cost control and operational efficiency allows restaurant managers to optimize both profitability and customer satisfaction through informed decision-making (Mun & Jang, 2018)

Recommendations

Several actionable inferences can be drawn from the study for owners, managers, stakeholders, and policymakers of the restaurant industry. Formalized cost management systems need to be strategically incorporated in budgeting, operations, and the audit process. Successful cost control enables the restaurant to reinvest their savings in quality enhancements and innovation that distinguishes them from competitors. Mindful management of operational components from sourcing of ingredients to their dispensation as finished dishes to consumers, are the key growth ingredients for attaining strong financial results (Almquist et al., 2022). Technology can help reduce errors and give much needed real-time information for undertaking corrective measures. Training programs can sensitize employees on issues of cost-saving, waste reduction, and overall operational productivity. Frequent audits and analysis of sales data help the restaurant managers to make informed decisions. Concepts such as just-in-time inventory and maintaining optimal inventory levels of food ingredients will require precise demand planning and logistics. It should be taken care of that such measures do not compromise on the dining experience of the customer. Proactive implementations of such strategies will be able to ensure sustainable long-term growth in the highly competitive restaurant industry.

Limitations of the Study

The research was conducted within the confinement of a geographical area of Punjab, India, which may limit its application because of cultural and economic disparities. The data was collected during a set time period, which prevents establishing causality relationships over a wider period scale. The limited number of factors for considering responses on costing practices

and measuring performance from restaurant impacts analysis. Response bias by managers for their outlets could be another limitation.

Suggestions for Future Research

Based on the study, future research could be performed on a wider geographical area to capture diverse market dynamics of the restaurant industry. Longitudinal research design will be able to link causality between cost management and performance efficiency. More variables could be added to gain a comprehensive understanding of key drivers. Qualitative methods and the application of nonlinear models can further refine the perspective of the restaurant industry.

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