The Adoption of Menu Engineering as an Electronic Management System in Cairo Five-Star Hotels

Khloud Ebrahim*, Mohamed Gad El Rab, Magdy Mauof

Faculty of Tourism and Hotels, Fayoum University, Egypt.

KEYWORDS

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Cost
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ABSTRACT

The menu engineering is one of the electronic systems that hotels rely on its practices to operate the food and beverage department. Therefore, the study aims to investigate the extent to which food and beverage management applies the menu engineering system in five-star hotels and what the perceptions of employees about the impact of applying menu engineering systems on cost. 84 employees of the Food and Beverage department and related departments were targeted be the study population. The primary data for the study was collected by using an electronic questionnaire on the target respondents in the five-star hotels located in Cairo. The data obtained were analyzed by using (SPSS V. 26) and the results of the study confirmed that the practices of the menu engineering system positively effect on the cost control of the food and beverage department operations. The main contribution of this study is to fill in the literature gap on the impact of adopting menu engineering systems on costs control in the food and beverage department. This should guide future research for further studies.

1. Introduction

Menu engineering system is a management tool for evaluation, increment the profitability of menus, analytic of dishes, measuring the cost that spends on the preparation of each menu item, effective and less cost, in addition striving to produce the largest products with the least purse, which increases the profitability of the enterprise and decrease costs in addition to increase satisfaction customers (de Souza Vianna et al., 2020).

So the menu must not only be well formulated in terms of good design but also be well planned in terms of costs and pricing structure. This is the food and beverage manager's greatest challenge. Conducting the plan process successfully, starting from the choice of dishes that will be offered and plans for their production, ensures the correct operation of the processes to produce these items and, finally, manages to serve these dishes in a manner appropriate to the customer profile, both in terms of the type of service chosen and of the costs and the price to the customer. It is very important that these issues be given due consideration because there is a tendency to see the hotel business as an easy source of profitability, but it is good management that ensures that these enterprises provide financial revenue and is a factor of competitive advantage, attracting customers (Yuk & Kwong, 2005; Linassi et al., 2016)

Using Menu engineering system, once each item on the menu has been classified, a more critical

analysis of the dishes can be performed, making decisions about which items will be retained or removed, or even increased in price (Fang & Hsu, 2014)

Menu engineering is a popular technique deployed by hotels operators to assess menu item popularity and cost, and guide key decisions including menu item pricing, selling strategies, and menu design. While there has been little focus in the literature on addressing this shortcoming in menu engineering system (Cho & Wong, 2000; Lamminmaki, 2008; Guilding et al., 2011; Noone & Cachia, 2020)

Through a pilot study carried out by the researcher on a sample of five hotels from the five-star hotels category, it was found that some of these hotels have already adopted some electronic Menu engineering systems in their food and beverage department to control the cost. But there is something that may reduce the benefits gained from the application of such systems, because hotels still rely heavily on the manual system to control costs, which may cause some errors, unlike modern electronic systems, which have very few errors. Accordingly, the study problem can be formulated as follows: the insufficient adoption of electronic menu engineering systems and their modern adoption s in the food and beverage department within the targeted hotels. This problem was confirmed by the pilot study.

2. Literature Review

2.1. The menu engineering as an electronic management system

Miller (1980), improved the first pricing strategy model which focused on menu items and their food cost percentage and percentage of sales, consequently, in 1982, Smith and Casanova proposed their first guide of menu engineering, and in 1985 they modified their model and add the profit into their analysis matrix, therefore, the main task of menu engineering is to control food and beverage costs through the menu items matrix analysis which includes menu items, food cost percentage, percentage of sales and profit. (Raab et al., 2008), where ME is a management tool for evaluation, increasing the profitability of menus, analyzing of dishes, determining the cost of each menu item, effective and less cost, in addition striving to produce the largest products with the least purse, which increases the profitability of the enterprise and decrease costs in addition to increase satisfaction customers. Menu engineering system

helps to change products according to their tastes and demand variations, as well as follow up the activities of food and beverages and whether useful or not in order to get the operations better and reduce the cost. So the Menu engineering system combining menu management with costing methods, can provide an important tool for achieving sustainable development of companies in the industry by compiling reports containing a detailed breakdown of the costs of each item on the menu (Linassi et al., 2016), menu engineering system helps managers make their decisions with reliable techniques and tools, as well as strives to produce the largest products with the least resources (de Souza Vianna et al., 2020).

The menu is evaluated by the performance of the contents, where it contributed a great deal to analyzing food menus to determine performance, in addition, is easy to implement, simple, inexpensive, easy access to stock records, standard recipes, and costs used for food and beverages, as well as continuous development of menus which leads to good food and beverage management (Yiğitoğlu, 2020), also involves making adjustments on the placement order, classification or description of items included on food menus (Attwood et al., 2020).

Menu engineering system in hotels provides information about useless added activities and get rid of waste, then delivered all cost information that encourages low-cost and high-quality product designs and target markets aids in make-or-buy decisions in a support kitchen and simplification suitable pricing strategies, which leads to staff grasp, the true benefits of a menu engineering system, they can perform tasks in a profitable manner, improving the business' sustainability (Raab and Zemke, 2016).

One of the purposes of Menu engineering system is to specify the ability of the menu to meet the needs of guests, as well as to specify the contribution of profits by the hotel from the sale of food and beverages that can help increase sales targets and improve decision making in the event of unintended errors to happen, for example low stocking turnover (Ardiansyah, 2020), it also forms expectations of improvement and distinction regarding the customers because the more important method for ME offerings is decided by the target market customer preferences, where researchers emphasized that the ME the second-

best system projected for gross profit (Fang & Hsu, 2014).

Menu engineering helps evaluate the Progress in current sales, future menu, prices, and designs, after calculating menu items by using Menu engineering system, food menu distribution is obtained by the menu mix and contribution margin which is based on selling prices and the food cost or gross profits (Putra et al., 2018), also by using activity-based costing; in other words adopting a modified menu engineering analysis approach using activity-based which reduces costs, especially after the sales cost is modified (Kang et al., 2010).

Financial performance is better when using Menu engineering system, which helps hotels managers to make changes in seasons to develop their menu performance, then specified if they retain or cancel and promote or downplay particular items, in other way Menu engineering system helping establishments to understand the operating performance of different items, and decrease the cost of some items or reshape food ingredient sizes to ensure that they can achieve income (Chou & Fang, 2013).

Researches had found that Menu engineering system helps food and beverage managers to control labor costs without sacrificing the quality of service, as well some hospitality studies suggested that merge labor costs into menu item pricing, also demonstrate that analyze the main traditional contribution margin could be useful by selecting activities that have no added value, in addition provide other ways to calculate costs by controlling overhead cost to individual product units, which help for finer unit costing and pricing (Raab et al., 2008).

2.2 The impact of menu engineering system on cost

The menu engineering system developed the structure of all operations of the hotels industry through the ICT in which the total system is operated using applications that are communicated operated using applications that communicated, and synchronize among all segments of the production process. Thus, entrepreneurs can fulfill their dream by establishing an industry at a very low cost, with less paper works as well as they can make their products more versatile compared to the other traditional industry (Badiuzzaman and Rafiquzzaman, 2016)

Using the menu engineering system puts an end to some practices such as intuitive pricing, incomplete costing methods, and methods based on materials alone or on the competition, without complete measurement of costs, by complete assessment of all costs to the production of food, labor costs, and administrative costs, which helps to correct the allocation of the costs to food production by adopting empirical methods of allocating, which minimizes the inefficient use of raw material (Dalci et al., 2010; Vaughn et al., 2010; Lueg & Morratz, 2017)

The Menu engineering system motivates self-innovation and the evolution of internal service standards, which may also increase the efficiency of making costs saving decision by better analyzing human resources and reducing data input and search expenses through system services (Shobaki et al., 2018)

2.3 Study framework

The study aims to verify the existence of a significant effect between the applying of the menu engineering system practices and the employee perceptions to control food and beverage costs. On the other hand, the extent there are statistically significant differences between the number of years of experience of respondents and the of the menu engineering adoption. The study hypotheses consist of two hypotheses as shown in Figure (1)

Figure 1

Research Hypothesis
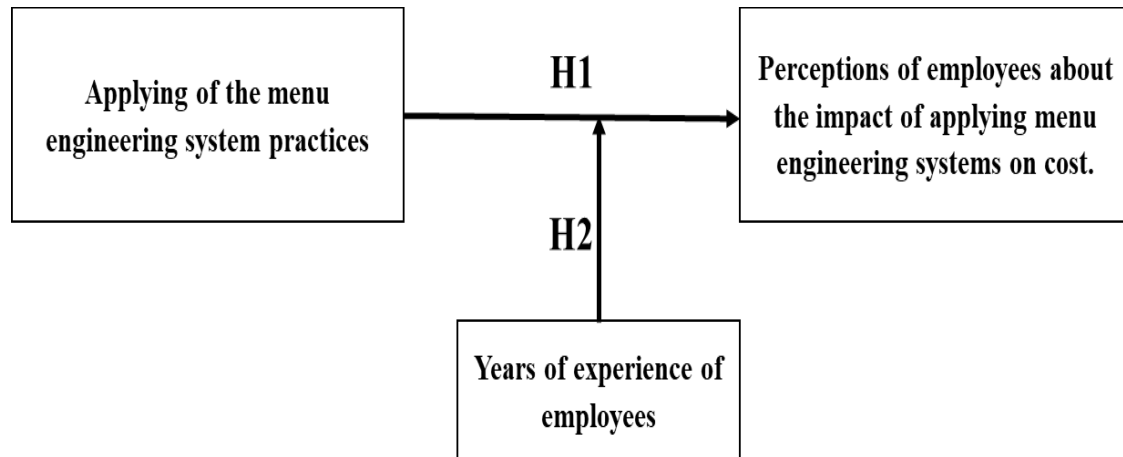
3. Methodology

The study relied on a quantitative approach in order to achieve its objectives. The methodology includes the stages of surveying the theoretical literature and shedding light on the studies that dealt with the subject of the study, then the stage of collecting, classifying and presenting data in order to shed light on the study concepts, then the stage of data analysis and verification of the validity of the hypotheses and then explaining the findings related to the objectives of the study.

Regarding the current research, secondary data was collected from scientific journals, books, scientific articles and websites related to the title and objectives of the research.

The study population includes all five hotels in Cairo, which number are 28 hotels, according to (the hotel association statistic 2020; The hotel Association, 2020).

The employees of some departments concerned with the adoption of menu engineering system were targeted, and these employees are (Food and Beverages manager - Executive chef- Cost controller), because they are the employees concerned with the adoption of this technology

As a result of the small size of the population, the comprehensive survey method was used to obtain data from the population. Accordingly, the total number of respondents was 84 respondents. Where 84 questionnaire forms were distributed, but the return from them and valid for analysis is only 71 forms, with a response rate of 85%.

The questionnaire was used in this research to investigate the current status of the adoption of menu engineering system in five-star hotels in Cairo, to identify the extent to which the standards and practices of menu engineering are applied, to see how this practices effects on the reduction of food and beverage department costs according to respondent's perception.

The questionnaire questions were formulated based on the theoretical framework of the research. The final questionnaire form contains 29 five-point Likert scale statements, ranging from 1 (strongly disagree) to 5 (strongly agree).The questionnaire consists of three parts:

- The first part: consisting of 11 phrases (demographic data)

- The second part: consisting of 7 phrases related to the technology of applying menu engineering system. The questions were extracted from the following sources: (de Souza Vianna et al., 2020), (Attwood et al., 2020) and (Raab & Zemke, 2016)

- The third part: consisting of 10 phrases are related to the perceptions of employees about the impact of applying menu engineering systems on controlling of food and beverage cost. The questions were extracted from the following sources: (Badiuzzaman & Rafiquzzaman, 2016), (Dalci et al., 2010; Vaughn et al., 2010; Lueg & Morratz, 2017) and (Shobaki et al., 2018)

The data were analyzed by using the statistics of the SPSS program (Statistical Package for Social Science) version 26.00 .In orders to identify the general tendency of the respondents' opinions about the study variables and to measure the extent of data dispersion by calculating the mean and the standard deviation. In addition to using regression

analysis and analysis of variance (ANOVA) to test the study hypotheses.

4. Finding and Discussion

The researchers used Cronbach's Alpha to measure the correlation and reliability of the sentences used in the questionnaire in order to verify the accuracy of the measurement. Table No. (1) Shows the reliability.

Table 1

Reliability analysis for data collecting.

Measurement	No. of phrases	Cronbach's Alpha
1. The menu engineering system practices	9	0.945
2. Perceptions of employees about the impact of applying menu engineering systems on cost	8	0.965
Total	**17**	**0.95**

The results show that all statements are significantly higher than the value of 0.7. Accordingly, the research measurement is valid and reliable.

4.1 Demographic Data

Table (2):

Demographic Data Analysis

Variables	Categories	Frequencies	Percentages
Gender	Male	63	88.5%
	female	8	11.5%
Number of years of experience	less than 5 years	11	15.4%
	from 5 to less than 10	19	26.6%
	from 10 to less than 15	20	28.1%
	more than 15 years	21	29.9%
Educational level	Middle	6	8.5%
	B.S.c	51	71.8%
	Postgraduate	14	19.7%
Position	F&B manager	24	33.5%
	Executive chef	24	33.5%
	Cost control manager	23	33%

The previous table (2) Showed that 10 (11.5%) of the respondents are female, while 63 (88.5%) are male, which explains that the majority of respondents in the hotels under study are males.

With regard to years of work experience, the same table shows that most of the respondents (29.9%) are over 15 years old, (28.1%) are between 10 and 15 years old, and (26.6%) of the total respondents are between 5 and 10 years old , and just only (15.4%) are less than 5 years. It is clear from these percentages that most respondents are more than 15 years of years' experience.

As for the educational level, (71.8%) of the respondents hold a bachelor's degree, (19.7%) of the respondents have postgraduate studies, and (8.5%) of the respondents have an average education, and this indicates that the hotels under study are interested in hiring staff those with higher education level.

With regard to the quality of employees, the percentage of food and beverage managers was (33.5%) of the respondents, while the percentage of executive chefs was (33.5%) and the percentage of cost control employees was (33.0%).

4.2 Descriptive analysis

4.2.1 The adoption of menu engineering as an electronic management system

Table (3):

Adoption of menu engineering as an electronic management system

Assessing the applying of the menu engineering system	Mean	Std. Deviation	Rank
1. The menu engineering system facilitate determines the exact cost of food items.	4.40	0.711	1
2. The Food and Beverage department analyzing food menus	4.00	0.931	4
3. The Food and Beverage department arranging items on the menu continuously.	4.03	0.720	3
4. The Food and Beverage department is constantly evaluating the popularity of each menu item with guests.	3.95	0.967	5
5. The Food and Beverage department uses reports that compare profitability with the most popular dishes	4.11	0.743	2
6. The main mission of using the menu engineering system is to facilitate the re-design of the menu.	3.85	0.914	7
7. After the new menu has been completed, the Food and Beverage management monitors metrics (such as the number of orders you sell for each dish) to see if menu adjustments are working.	3.91	0.721	6
Average mean	**4.03**	**.815**	**4**

The previous table indicates that the averages of the respondents in relation to these the menu engineering system practices ranged from (4.40) to (3.85), and the total average of the degree of re-engineering the menu practices in the food and beverage department is (4.03) and its total standard deviation is (.815). By comparing the total average value with Likert scale, it was found that the total average value lies between the two values {strongly agree (5)} and {agree (4)}, but it was found that the total value is closer to {agree (4)} which indicates that the degree of adoption of the menu engineering system practices in the food and beverage department in the hotels under study in Cairo is reasonable to some extent. But such applications should preferably be applied all without applying some practices and leaving the others. This is agreed with what was affirmed by Yiğitoğlu, (2020) who stated that The menu engineering system facilitate determines the exact cost of food items.

Accordingly, it is clear that the adoption of the menu engineering system practices in the food and

beverage department in the targeted hotels in Cairo has reached great levels, and that the degree of adoption of techniques and practices of re-engineering electronic menus is at better rates (Ardiansyah, 2020)

From table (3), it is noted that the average value (4.40) is the largest among the values shown in the previous table. This value is relevant to statement number one. This value indicates that the food and beverage department determines the exact cost of food item automatically (Raab & Zemke, 2016)

It is also noted that the average value (3.85) is the smallest among the values shown in the previous table. This value is relevant to statement number six. The results agreed with what was mentioned by Putra et al., (2018), who confirmed that, this value indicates that the food and beverage department uses the electronic system to re-design the menu.

4.2.2. Perceptions of employees about the impact of applying menu engineering systems on Food and beverage cost control

Table 4

Perceptions of employees about the impact of applying menu engineering systems on Food and beverage cost control

Perceptions of employees about the impact of applying menu engineering systems on Food and beverage cost control	Mean	Std. Deviation	Rank
1. Reducing food and beverage operations follow-up costs	4.31	0.758	1
2. Reducing the inefficient use of raw material	4.23	0.755	9
3. Reducing the procedures that waste time	4.22	0.776	10
4. Saving purchases costs	4.29	0.831	4
5. Achieving maximum outcome engineering system with little expenditures	4.21	0.791	5
6. Reducing the cost of communication	4.26	0.744	6

7.	Helping managers to make more precise decisions	4.24	0.810	8
8.	Providing insight to calculate the food and beverage resource consumption with economic ways	4.23	0.782	7
9.	Facilitating control operational costs	4.21	0.733	2
10.	Reducing labor costs by automation work.	4.32	0.867	3
	Total mean	**4.25**	**0.784**	**5**

The data in table (4) shown that the total mean of adoption of menu engineering as an electronic management system on cost is (4.29) while its standard deviation is (0.784). This indicates the majority of respondents agree on that applying the menu engineering systems impact on cost control.

According to Table (4), it is also clear that the value of the largest arithmetic mean is (4.32) with a standard deviation of (.789), and this value is related to the phrase "that reducing labor costs by automation work ".

The results agreed with what was mentioned by Safari et al., (2018) , who confirmed that the menu engineering system facilitates the control of all communications with other departments through practices and techniques that provide flexibility to respond to internal and external changes, thus reducing the size and number of employees in the organization.

Shobaki et al., (2018), and Qader et al., (2017) also confirmed that applying of the menu engineering system provides an internal network to connect the server to all computers within the enterprise

departments, as the cost of this technology is relatively inexpensive compared to its benefits, as the system achieves great performance, speed, reliability and security. , and reduces labor costs, and the extracted reports help decision makers to take the appropriate decisions that would control costs.

Table (4) also shows the smallest mean value of (4.22) with a standard deviation of (.858). This value is specific to the phrase "Facilitating control operational costs". These results above agree with what was mentioned (Dalci et al., 2010; Vaughn et al., 2010; Lueg & Morratz, 2017) where they stated that the implementation of the menu engineering system helps in quick access to new customers, focus on improving the sales ratio and thus reduce the operating costs of food and beverages.

4.3. Testing the hypotheses.

The hypothesis which states "The adoption of menu engineering as an electronic management system on cost"

Table (5)

Model Summary (regression analysis)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.609[a]	0.371	0.364	5.98827
a. Predictors: (Constant), menu				

By using regression analysis, it was found that the change in applying menu engineering systems explains 36%, as the value of $R^2 = 0.36$ of the

change of employees Perceptions of F%B cost control with a significant level of less than 0.05

Table 6

Coefficients[a].

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.805	3.630		5.731	0.000
	menu	0.714	0.097	0.609	7.330	0.000
a. Dependent Variable: cost						

The study confirmed the existence of a positive relationship between applying menu engineering systems on employees' perception of the role of menu engineering systems in controlling food and beverage costs, where the results showed that the

value of (β=0.609 and p<0.05), which proves to us the acceptance of the first hypothesis, and this is consistent with (Kaddoumi, 2012) which indicates that the adoption of menu engineering system practices influences employee perceptions to

control food and beverage costs positively. Accordingly, alternative hypothesis was accepting the null and the hypothesis was rejected, therefore the first hypothesis is accepted.

5. Recommendation

Reducing the use of the paper system to know the costs of food and beverages and relying on electronic systems.
Updating the quality and type of application software versions and trying to replace old systems with advanced ones.
Following the rapid development in the area of electronic systems to ensure the efficient performance of the food and beverage department.
Secondly: recommendations addressed to F&B departments at five-star hotels who should:
Reconfigure and arrange menu food items based on the reports of menu engineering systems.
Implementing menu rotation by activating the menu engineering system, this helps to know the most profitable dishe.

6. Limitation and Future Research

The current study gathered data from Egyptian The current study was limited to five-star hotels, and researchers in the future should apply the study subject to other types of hotels.
The electronic management systems and its influence on F&B cost can be applied to other sectors of hospitality, such as restaurants, catering establishments, and hospitals.
The automated minibars have not received much attention from researchers, whereas most of the researchers discussed the traditional minibars without their automated shape.
Deep researches are required on the recipe-costing systems due to their importance in (forecasting - calculating and updating sales - pricing) fields.

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