

COST ESTIMATION USING ECONOMETRIC MODEL FOR RESTAURANT BUSINESS

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Abstract: Study is aimed to develop an econometric model to estimate the cost of the restaurant business in Erbil city of Kurdistan. Restaurant food is costly in Erbil city as a common opinion of consumers. Restaurants are also struggling to make the business sustainable. A basic assumption considered to evaluate all cost factors and to establish an equation to get the clarity of cost estimation and check it with sales of the business. So the research questions formulated as what are different cost factors involve with the restaurant business, which cost is the most important to consider having the significant impact on the business, and what can be the standard econometric model to incorporate cost factors? A sample of 215 restaurants has been taken as the representative of industry. Variables and data get feed in the SPSS software for the analysis. Five dimensions of cost structure from cost namely Prime Cost, Works Cost, Cost of Production, Cost of Sales and Sales has been taken in study. Conclusion of the research based on the data analysis shoes that Prime Cost is the least important, Works Cost has the negative trend shows that there is increase in Sales will have the huge fall in Works Cost, increasing Sales has the small increase in Cost of Production, Cost of Sales is under question. Finally an econometric equation model is presented assuming the standardized equation for this specific case.

Keywords: restaurant, food, econometric, cost, sales

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INTRODUCTION

Cost is one of the most important factor for establishing a sustainable business. During the entire life cycle of the business, it must get cared in terms of

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cost to keep it financially viable. The current research is the exploration of different cost variables involved with the restaurant business and the cost estimation is getting performed in this industry by the mid-range of players stated by the research of Singh and Azad [2019]. Food is among the most important basic needs of human being. When we consider Kurdistan, people are influenced with different culture all around the world and mostly from Turkish a very rich food culture. Though it is not limited only to Turkey, having all Asian food from India, Pakistan and China. Arabic and Kurdish people are very fond of eating in restaurants and they are very frequent visitor to different restaurants in the city as well out of the city [Singh 2018]. During the exploration of literature on the successful restaurant business models many concepts came to the picture, which created the inquest to analyze and understand the need for the development of model for the cost estimation. Restaurant is a very cost intensive business and needs to care for hygiene and quality in a very particular manner to keep the food healthy and consumers satisfied [Singh 2017]. Food or the menu of offerings is not only the criteria decides the success of a restaurant rather it is composed of many factors leading to satisfaction of the consumer and makes the feel to visit again and again to that specific restaurant.

All the satisfaction factors must meet the consumer desires in satisfying expectations, if it does not reach the level then will turn as a failure where the customer will visit once then will never take a look on turn and will have a negative word of mouth by Singh and Hamadamin [2019]. Restaurant business sustainability is depends on many factors like attitude of employees and service providers, communities they belong and lifestyles they carry. Though the food is the core of the business and a major responsibility goes to the chef responsible for kitchen. A small change in process or effort will lead to a big difference. Production plays another critical role in the whole process of the cost and profitability to keep the business viable [Singh, Sahin 2017]. Production sheets must get used as to keep the record of quantity of food produced and quantity of raw materials consumed. The specific way cooks prepare the food and following up the specifications also effects the cost of food and operation. Following the specifications and being aligned with the guidelines can take it to the higher level of success. Management involvement is also very important to make the business successful, it is important to know the back of the office execution that incurs huge cost. Another important issue is the control on staff, wastage and right distribution of all resources. Staffs are assets in the restaurant business but it can turn to a higher cost if not tackled properly and systematically, an organized, transparent and visible management has a better control over cost in the business.

For a successful restaurant business managers should keep themselves keen to cost issues lead by food quality, cleanliness and sanitation. A promised service is depending upon the capacity of the service provider and the commitment towards services that makes any service reliable. Restaurants characterizes themselves as the reliable, fair prices, timely food delivery and maintain the quality [Sahin, Singh

2017]. Another a better way for managers to keep the eye on operations by checking the costs on a routine basis, mostly the food and beverages which leads to wastage, and the labor costs that is one of the performance indicators of the industry. There are different approaches to calculate the food cost which can be daily or hourly basis but should have a careful monitoring mechanism. Food and beverages cost generally is calculated as the cost of food sold divided by food sales within specific time frame. Highest cost in this industry is the labor cost which gets calculated by dividing the total labor cost by the total of food and beverages ales.

LITERATURE REVIEW

The study on Morocco cereal consumption has shown the price elasticity and expenditure elasticity as the base of consumption [Essaten, Mekki & Serghini 2018]. Though the study gives the deeper insight on the expenditure which is the strongest determinant of viability of the project said by Mohinta, Singh and Mishra [2017]. The outcome of the study has the discussion on the theory advocating that the food goods are having inelastic demand. The study by Essaten, Mekki & Serghini [2018] says that the market is highly price sensitive and may be a reason for this is the consumer understanding and changing regulatory issues on consumables. Another study in Nigeria having the concentration on the development of long term relationship between the agricultural credit support and food security [Osabohien, Godwin 2018]. The cost in agriculture sector is very high, being much of the hidden cost and not being visible in the picture, understanding gets much critical by Sahin and Singh [2018]. There are only two types of credits available here commercial banks credit to farmers and the agricultural guarantee scheme, which are not enough to have the complete understanding and the elaboration for the cost structure. Study by Osabohien and Godwin [2018] shows very clearly that there is a huge cost of being failed in the lack of skills and understanding of the right process [Singh, Sahin 2019].

Many research existing have the cost variable exclusive strategic variable responsible for the viability of the firm. The economic models development can have fruitful outcome capturing the fact of the need of cost calculations [Dube et al. 2002]. Such models will have more realistic picture and can provide the competitive edge for a firm. Economic models benefit organizations in expanding and establishing new dimensions for business expansion. Econometric modeling can document the effects and causes of variables especially in the area of market predictions. A study by Erdem and Keane [1996] has developed a model for the consumer choice effecting pricing strategy which can lead to the cost of the firm. Research taken by Dube et al. [2002] says a forward looking approach is developed for the establishment of competitive price considering the cost actor get kept under control. Structural modelling has its contribution in a vast scope of the study for establishing the market in the dynamic business environment. One of the research as the case study in restaurant business suggests that though the profit can be more

in the restaurant business but it is not returning a high profit because of the higher cost. A huge money goes as the cost in the industry, it is the case with most of the restaurants. A high cost involved because of competitiveness and to enhance the credibility. A restaurant can have the business and can have the high profit only having these two ways are cost management and efficiency improvement [Singh, Sahin 2017]. But mostly success of the business depends upon the cost base and a sound cost structure. Many food businesses have worked on the cost reduction at the time of economy downturn to keep the business viable [Singh, Mishra and Mishra 2014].

Research conducted by Singh [2017] contributes to the econometric model development based on the consistence of economic theory. The empirically tested model is consistent with variables of the economy aggregating with changing micro and macro parameters. The application of empirical data and model is estimating the demand in the economy. Study says that the data economic model must fitting with established theory justifying effects. Additionally the research says that the many variables are eliminated from the equation as the error term (Sahin and Singh 2017). There are many research examined on the food demand [Dhehibi, Gil 2003; Sheng et al. 2008; York, Gossard 2004] representing traditional theoretical models shows the Almost Ideal Demand System (AIDS) model and its variations, Rotterdam, Working's models and Linear Expenditure System (LES) model. Simultaneous equation model (SEM) is not applicable when the price and quality is jointly evaluated. The most important cost in the restaurant business is the cost of quality, as defined by the quality management literature is the nonconformance of stated standard which is the failure cost [Schiffauerova & Thomson 2006]. Cost of quality explained in other words as total resources used by the organization under the quality standards having the consistency of performance [Bamford, Land 2006]. The cost of quality model is a preventive model represents the cost factors in different industry where it is very effective in hospitality industry [Weisinger et al. 2006]. Operations management principles advocates the restaurant business needs to have a very high quality of service that creates the customer value on a long run and business get the cost reduced and profitability increased [Bohan, Horney 1991]. The needful quality of the service can get improved vice-versa with the consideration of cost of quality with the continuous practice of improvements in required customer satisfaction standards [Kandampully et al. 2001].

Another research throws light on the short run costs importance for an organization to be profitable on a long run. For this the regulation and technical strength will be the most important issue [Sahin, Singh 2017]. A model named translog model indicating the features of incremental production costs which are more important for any firm facing challenges with standards and regulations. The change in economy effects the change in cost for a firm due to varying conditions. It is always suggested to companies to avoid to entering higher cost markets and more consideration should go to expenses. Innovation is the tool for the success

today for all the business to grow wherever it applied [Singh, Sahin 2019]. Though it is behind the curtain but needs to get a higher consideration for the establishment of a balanced cost system [Hjalager 2010]. The process innovation includes many activities like food and service technologies speeding up the cooking process, saving in the energy and labor, reduced waste production and better sanitation all together improving the cost performance [Rodgers 2007]. The innovation is contributing in maintaining the satisfaction level of customers with changing and diverse socio economic structure with strengthening the competition discussed by Cura, Singh, and Talaat [2017]. Marketing innovation is the area where the business should focus more diversifying the business orientation towards the market orientation. It can have the higher cost for the time being but will be the investment and will benefit the business on the long run.

RESEARCH PROBLEM

Though the business models are always presented considering the specific objective. Mostly the business models presented considering the profit and expenses. Many business models have been presenting with the derivation of cost factor stated by Singh and Mishra [2013]. Restaurant business is a very high cost intensive business where the fixed cost can be comparative lesser than the variable cost but the variable cost is generally much higher that leads to the many challenges for the business to be sustainable [Singh 2017]. During the literature study it is observed that there is not very sound study done which can be the base for the cost factor understanding and evaluation for a common person willing to understand the cost structure equation for the restaurant business. So extensive literature review showed the research gap as the need to develop an econometric model that can evaluate and justify the cost variables in the restaurant business mostly responsible for making the business viable.

Research Questions

- What are different cost factors involve with the restaurant business?
- Which cost is the most important to consider having the significant impact on the business?
- What can be the standard econometric model to incorporate cost factors?

Research Objectives

- To explore different cost variables in restaurant business.
- To find the importance of different cost factors with restaurant business.
- To develop an econometric model for standardizing the cost factor in restaurant business.

Research Methodology

Research presented here is quantitative study and based on deductive approach of variables. Financial concept has been considered as the variable where the cost structure of the restaurant has got the most important consideration, the study has worked to establish the equation for generic cost structure equation presentation [Singh 2017]. The cost structure variables are main indicators for establishing the relationship. A standard questionnaire is prepared for this specific study considering the agreement of restaurants on different variables. Conceptual clarity and understanding has been established based on extensive literature review from secondary sources. Questionnaire became the tool to collect primary data for the analysis. Descriptive research is presenting descriptive data analysis for the basic understanding of study by Singh and Mishra [2015]. A sample of 215 restaurants has been taken as the representative of industry. Variables and data get feed in the SPSS software for the analysis. Conceptualization itself has given the clarification for statistical testing, the data analysis has established the econometric model showing the cost variables relationship with the sales of the restaurant. Conceptually the cost sheet of accounting carries five dimensions namely Prime Cost, Works Cost, Cost of Production, Cost of Sales and Sales to calculate the complete cost structure. Here in this study an instrument is used to get the data and compressed it in a scale format considering the process for standardizing the absolute values.

ANALYSIS AND FINDINGS

Analysis is performed taking all variables in consideration, where the Cost and sales relationship is assessed with all cost dimensions [Singh, Mishra 2014]. Each test has different outcomes which has been formulated as equation for better understanding of the concept by Singh [2017]. Altogether thirteen regression analysis has been performed each factor has three sets of test, so four factors are forming twelve tests and the last test is performed as the outcome of the independent (Prime Cost, Works Cost, Cost of Production and Cost of Sales) variable to the dependent (Sales) variable final outcome.

The first test performed for assessing the Prime cost with its constituents where constituents are five in number considered for this specific case where all are showing very low value of contribution as shown as *Equation 1.1* below.

Equation 1.1 - Prime Cost with Constituents

$$\text{Prime Cost} = 2.331 + 0.2*PoRM + 0.2*PE + 0.2*RMC + 0.2*DWL + 0.2*DC,$$

where:

PoRM - Purchase of raw materials,

PE - Purchase expenses,

RMC - Raw materials consumed,

DWL - Direct wages labor,

DC - Direct charges.

Further Prime Cost Constituent items are checked its contribution and effect on Sales which has some positive and negative contributions as shown below in *Equation 1.2*.

Equation 1.2 - Sales with Prime Cost Constituents

$$\text{Sales} = 3.901 + 1.116 * \text{PoRM} - 0.079 * \text{PE} + 0.575 * \text{RMC} - 1.077 * \text{DWL} \\ - 0.605 * \text{DC}.$$

Finally a test performed taking all Prime Cost Constituents together as Prime Cost which shows a negative value means the Prime Cost is reversely effecting Sales as *Equation 1.3* presented below.

Equation 1.3 - Sales with Prime Cost

$$\text{Sales} = 5.085 - 0.941 * \text{Prime Cost}.$$

Above three equations *Equation 1.1*, *Equation 1.2* and *Equation 1.3* are the representation of Prime Cost and its constituent effecting Sales. Observing these three equations the basic understanding can get formed on the importance of Prime Cost involved in the total cost structure commonly for restaurants in Erbil city.

The second set of analysis performed taking Works Cost and the same way executed as earlier testing the contribution of Works Cost. Below *Equation 2.1* is presented having the contribution of constituent items where it's much lower than earlier as well having the value of 0.125 shows all constituents are equally effecting in the formation of Works Cost.

Equation 2.1 - Works Cost with Constituents

$$\text{Works Cost} = 1.471 + 0.125 * \text{FR} + 0.125 * \text{FP} + 0.125 * \text{IW} + 0.125 * \text{SS} \\ + 0.125 * \text{OS} + 0.125 * \text{FI} + 0.125 * \text{FAD} + 0.125 * \text{WCI},$$

where:

FR - Factory rent,

FP - Factory power,

IW - Indirect wages,

SS - Supervisor salary,

OS - Office salary,

FI - Factory insurance,

FAD - Factory asset depreciation,

WCI - Works cost incurred.

Below shown *Equation 2.2*, presenting the effect of Works Cost Constituents on Sales to get an idea about the importance and contribution of items with the Sales

value, where some constituents are positive contributor though some are negative contributors to this specific equation.

Equation 2.2 - Sales with Works Cost Constituents

$$\begin{aligned} \text{Sales} = & 1.309 + 0.292*FR - 0.283*FP + 0.382*IW + 0.411*SS - 0.797*OS \\ & + 0.876*FI - 0.526*FAD + 0.301*WCI. \end{aligned}$$

The final equation of this set is formed as *Equation 2.3*, where the consideration is given to the final Works Cost dimension and its effect individually to the Sales value. The equation shows that Works Cost is a higher contributor to the cost and having positive impact on sales.

Equation 2.3 - Sales with Works Cost

$$\text{Sales} = 0.667 + 0.796*\text{Works Cost}.$$

Above presented three equations as *Equation 2.1*, *Equation 2.2* and *Equation 2.3* are representing the Works Cost effect on Sales and moreover the constituent items contribution to Works Cost as well to the Sales. It is giving a very straight assumption about the contribution of different cost constituents to Sales and its importance for this specific case.

The third set of equations framed taking Cost of Production, where the first equation framed as *Equation 3.1*, representing the constituent items contribution to the Cost of Production showing all items are equally contributing though the contribution is very weak and much weaker in overall consideration.

Equation 3.1 - Cost of Production with Constituents

$$\begin{aligned} \text{Cost of Production} = & - 2.276 + 0.143*OR + 0.143*AD + 0.143*GC \\ & + 0.143*AF + 0.143*BC + 0.143*HS + 0.143*OE, \end{aligned}$$

where:

OR - Office rent,
AD - Asset depreciation,
GC - General charges,
AF - Audit fees,
BC - Bank charges,
HS - House salary,
OE - Office expenses.

Below shown *Equation 3.2*, showing the representation of Sales with Cost of Production constituent items measuring its effect on Sales. The specific case here is showing a mixed result some items are negatively though the positive value is very high positive contributor.

Equation 3.2 - Sales with Cost of Production Constituents

$$\text{Sales} = 1.093 + 1.244*OR - 0.720*AD + 1.123*GC - 0.560*AF \\ - 0.625*BC + 0.709*HS - 0.464*OE.$$

The third equation of this set is showing the effect of Cost of Production on Sales which is presented as *Equation 3.3*, where it is clearly visible that the Cost of Production is contributing a sound positive way to the Sales.

Equation 3.3 - Sales with Cost of Production

$$\text{Sales} = 1.225 + 0.671*\text{Cost of Production}.$$

Above presented three equations as *Equation 3.1*, *Equation 3.2* and *Equation 3.3* are presenting the contribution of Cost of Production to the Sales where three different equations presented showing the individual contribution, the constituent formation and the overall effect as a factor for the restaurant business in Erbil.

Fourth set of equations are formed considering Cost of Sales with its constituent items, where the *Equation 4.1*, showing its minimal contribution as the constituent items though the constant value is negative but the presentation is clear understanding of constituent items contribution in the formation of Cost of Sales.

Equation 4.1 - Cost of Sales with Constituents

$$\text{Cost of Sales} = - 1.804 + 0.143*SMC + 0.143*SMS + 0.143*TE + 0.143*A \\ + 0.143*DME + 0.143*ST + 0.143*BD,$$

where:

SMC - Sales man commission,

SMS - Sales man salary,

TE - Traveling expenses,

A - Advertisement,

DME - Delivery man expenses,

ST - Sales tax,

BD - Bad debts.

Below presented *Equation 4.2*, is providing the understanding of the Cost of Sales items effect on Sales factor, where it is very clearly visible that some items are positively effecting the Sales though a few are negatively effecting Sales.

Equation 4.2 - Sales with Cost of Sales Constituents

$$\text{Sales} = 1.059 + 0.144*SMC + 0.287*SMS + 0.059*TE + 1.669*A - 0.462*DME \\ - 1.136*ST + 0.192*BD.$$

The third *Equation 4.3*, of this set is showing the contribution of the Cost of Sales overall on Sales, where the equation shows that Cost of Sales is positive

contributor to the Sales. Specific to the contribution of Cost of Sales is 0.763 times of the Cost of Sales.

Equation 4.3 - Sales with Cost of Sales

$$\text{Sales} = 1.012 + 0.763 * \text{Cost of Sales.}$$

Above shown three equations *Equation 4.1*, *Equation 4.2* and *Equation 4.3* are representing altogether the Cost of Sales factor and its relationship with Sales dimension. Three equations have clearly depicted constituent's formation part, the effect of factor items and individual effect on the Sales dimension.

The final outcome equation is *Equation 5*, has the complete calculation and presentation of Cost Factors namely Prime Cost, Works Cost, Cost of Production and Cost of Sales with its contribution to the Sales in this specific case of restaurant business.

Equation 5 - Sales with Cost Factors

$$\begin{aligned} \text{Sales} = & 0.795 + 0.219 * \text{Prime Cost} - 0.669 * \text{Works Cost} \\ & + 0.170 * \text{Cost of Production} + 1.193 * \text{Cost of Sales.} \end{aligned}$$

Altogether thirteen equations presented above where three equations are in four different sets presenting four factors of cost. The last equation presented as *Equation 5* is the outcome and the final calculation of contribution where Works Cost is negative contributor but other three cost factors are positive contributors in this specific case of study on restaurants in Erbil city.

CONCLUSION

Based on the analysis and findings the research can conclude on assumptions made prior to the research based on the research problem. The research problem formulated was to evaluate the cost viability of the restaurant business considering cost factors involved for making the business sustainable. Moreover to develop an econometric model for the understanding of elaborative cost structure of a restaurant business. This research has reached to the solution of this research problem by answering the research questions and full filling the research objectives. Different cost factors involved was the asked first research question, four cost factors namely Prime Cost, Works Cost, Cost of Production and Cost of Sales are most important for the restaurant business. Cost of Sales is the most important cost factor involved as per the Equation 5, it is a high increase of 1.193 units on 1 unit of increase in Sales. A significant difference with the Cost of Sales can have a significant positive impact on Sales and profitability has been the answer to second research question. A standard econometric model is developed as Equation 5 - Sales with Cost Factors, is the answer for third research question.

$$\begin{aligned} \text{Sales} = & 0.795 + 0.219*\text{PrimeCost} - 0.669*\text{Works Cost} \\ & + 0.170*\text{Cost of Production} + 1.193*\text{Cost of Sales}. \end{aligned}$$

Research objectives full filled as set for the research after exploration four cost factors identified and have been answered as the first research question in the above paragraph. Second and third objectives as well reached the goal answering the second and third research questions consecutively. Finally the research concludes that the restaurants are cost intensive business where much of care is required for making it sustainable. Based on this research the Prime Cost is the least important and not impacting much to the business means the increase in Sales has a very small increase in Prime Cost. Works Cost has the negative trend shows that there is increase in Sales will have the huge fall in Works Cost, which can be good for the health of the business. Increasing Sales has the small increase in Cost of Production, which is beneficial for the business. Cost of Sales is under question as it is much higher which shows the increase in Sales will increase is drastically ([Bradosti and Singh 2015]), here it needs much awareness and exposure to the market. One of the reason can be the higher advertising and marketing cost in the city as it is not exposed with the well-established facilities.

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