KAUNAS UNIVERSITY OF TECHNOLOGY

FACULTY OF MECHANICAL ENGINEERING AND DESIGN

Salman Munavar

"Analysis of Operational Efficiency of Restaurants aimed to Improve Productivity"

Master's Degree Final Project

Supervisor

Assoc. prof. Antanas Čiuplys

KAUNAS, 2016

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INDUSTRIAL ENGINEERING AND MANAGEMENT (621H77003)

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(Title of study programme, code)

" Analysis of Operational Efficiency of Restaurants aimed to Improve Productivity "

Final project

DECLARATION OF ACADEMIC INTEGRITY

20 May 20 16

Kaunas

I confirm that the final project of mine, **Salman Munavar**, on the subject "Analysis of Operational efficiency of Restaurants aimed to Improve Productivity" is written completely by myself; all the provided data and research results are correct and have been obtained honestly. None of the parts of this thesis have been plagiarized from any printed, Internet-based or otherwise recorded sources; all direct and indirect quotations from external resources are indicated in the list of references. No monetary funds (unless required by law) have been paid to anyone for any contribution to this thesis.

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KAUNAS UNIVERSITY OF TECHNOLOGY

FACULTY OF MECHANICAL ENGINEERING AND DESIGN

Approved:

Head of

Production engineering Department

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MASTER STUDIES FINAL PROJECT TASK ASSIGNMENT
Study programme INDUSTRIAL ENGINEERING AND MANAGEMENT

The final project of Master studies to gain the master qualification degree, is research or applied type project, for completion and defence of which 30 credits are assigned. The final project of the student must demonstrate the deepened and enlarged knowledge acquired in the main studies, also gained skills to formulate and solve an actual problem having limited and (or) contradictory information, independently conduct scientific or applied analysis and properly interpret data. By completing and defending the final project Master studies student must demonstrate the creativity, ability to apply fundamental knowledge, understanding of social and commercial environment, Legal Acts and financial possibilities, show the information search skills, ability to carry out the qualified analysis, use numerical methods, applied software, common information technologies and correct language, ability to formulate proper conclusions.

1. Title of the Project

Analysis of Operational Efficiency of Restaurants aimed to Improve Productivity

Approved by the Dean Order No. V25-11-7, 3 May 2016

2. Aim of the project

To improve restaurant productivity by analyzing and increasing operational efficiency in all units of the restaurants.

3. Structure of the project

- Literature survey of restaurants trends, categories, facilities and operations
- Problems faced by restaurants such as Wrong Investment, Inventory problems, cost problems, training, quality, wastage and maintenance that hinder their operational efficiency
- Analysis on possible theoretical solutions for the problems faced the restaurants
- Analysis of various restaurant costs such as fixed cost, variable cost, food cost, labor cost
- Solutions to keep the restaurant costs at right levels to increase operational efficiency
- Establishing Labor productivity metrics and how they can be used as parameters to increase labor productivity
- Conclusions

4. Requirements and conditions

- A literature survey in an operating restaurant to know their operational trends
- The theoretical solutions for increasing operational efficiency should be feasible to implement in restaurants

5. This task assignment is an integral part of the final project

6. Project submission deadline: 2016 May 20th.

Given to the student Salman Munavar

Task Assignment received _____ _____

(*Name, Surname of the Student*) (*Signature, date*)

Supervisor _____ _____

(*Position, Name, Surname*) (*Signature, date*)

Salman Munavar. Analysis of Operational Efficiency of Restaurants aimed to Improve Productivity. Master's Final Project / supervisor assoc. prof. Antanas Čiuplys; Faculty of Mechanical Engineering and Design, Kaunas University of Technology.

Study area and field: Production and Manufacturing Engineering, Technological Sciences.

Keywords: *productivity, operational efficiency, cost analysis and labour productivity*

Kaunas, 2016. 59p.

SUMMARY

The master thesis deals with the topic "Analysis of operational efficiency of restaurants aimed to improve productivity". Restaurants face many problems with their regular operations that hinder their chances of increasing their operational efficiency. These problems are analysed and a set of theoretical solutions have been suggested to solve these problems in their operations. Analysis on various restaurant costs like fixed costs, variable costs, food costs, labour costs have been done to set these costs as a theoretical standard to increase operational efficiency. Labour productivity metrics have been established based on which realistic targets are given to check labour productivity. If all the metrics and analysed theoretical solutions regarding operational problems are implemented practically in a restaurant, its operational efficiency would increase significantly which would subsequently improve the overall restaurant productivity.

Salman Munavar. Restoranų veiklos efektyvumo analizė siekiant pagerinti darbo našumą. Magistro baigiamasis projektas / vadovas doc. dr. Antanas Čiuplys; Mechanikos inžinerijos ir dizaino fakultetas, Kauno technologijos universitetas.

Studijų kryptis ir sritis: Gamybos inžinerija, Technologijos mokslai.

Reikšminiai žodžiai: *produktyvumas, veiklos efektyvumas, darbo našumas, išlaidų analizė.*

Kaunas, 2016. 59 p.

SANTRAUKA

Baigiamajame magistro darbe nagrinėjama tema – "Restoranų veiklos efektyvumo analizė siekiant pagerinti darbo našumą". Restoranai susiduria su daugeliu problemų, susijusių su įprastomis operacijomis, kurios trukdo padidinti veiklos efektyvumą. Šios problemos yra analizuojamos šiame darbe bei pateikiami teoriniai sprendimai ir pasiūlymai kaip jas spręsti. Įvairių restorano išlaidų analizė, pavyzdžiui, pastovios išlaidos, kintamosios išlaidos, maitinimo išlaidos, darbo sąnaudos buvo nustatyta kaip teorinis standartas siekiant padidinti veiklos efektyvumą. Buvo nustatyta darbo našumo metrika, ir remiantis ja nustatyti realūs tikslai kaip patikrinti darbo našumą. Jei visi metrikos ir išanalizuoti teoriniai sprendimai dėl veiklos problemų sprendimo būtų praktiškai įgyvendinami restorane, veiklos efektyvumas gerokai padidėtų, kuris vėliau pagerintų bendrą restorano produktyvumą.

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INTRODUCTION

The restaurant industry is a part of hospitality and service industry which has grown significantly over the years. It is a multibillion-dollar industry which is fiercely competitive and constantly evolving with time. From Multiple chain restaurants to single restaurants, from small budget restaurants to luxury restaurants, it needs efficient management to stay competitive and act as profit yielding business enterprise. The concepts of attaining high productivity are often associated with successful restaurant chains that show high levels of profits and stay popular with the masses by establishing their brand names.

One efficient way of achieving high productivity in restaurants is by increasing the operational efficiency of restaurants. In order to achieve operational efficiency, the restaurants need to get the most out of its available resources, labor force, Technology and smart planning from the people in management. The restaurants should deliver service to its customers in the most cost effective way possible without compensating on its quality. This will in turn contribute to improving productivity.

Aim of the Project

This research project is done to analyze the operational efficiency of restaurants aimed to improve overall restaurant productivity.

Tasks

As part of the analysis, the most common problems and mistakes made by the restaurant management are analyzed. The theoretical solutions are suggested for these problems in such a way that, they are easy and feasible for the restaurants to implement practically. Cost analysis metrics and labor productivity metrics are established as parameters to measure operational efficiency and productivity.

1. LITERATURE SURVEY OF RESTAURANT TRENDS

The restaurants industry is broadly categorized based on a number of socio-economic and geographical factors. Most of the restaurants can be distinguished from another based on the type of food served. It could be ethnic, religious and other age related factors that categorize the restaurants based on their food service.

Italian restaurants are very common in Europe and United States even though these geographic locations have their own restaurant types. A cuisine is believed to be global, if it has capacity to attract customers from a local area despite not being a local cuisine of that country. Similarly, Mexican cuisine is preferred in United States over many other cuisines because of close proximity of United States with Mexico. Also, within United States, out of 50 states, the state of New Mexico has many Mexican restaurants. So much so that, they are more in number than native American restaurants.

Religious Cuisines are also global but they are part of a cultural heritage associated with specific religion and the people following that religion. Jewish cuisine is very famous with all the Jewish people living around the world. Similarly, Islamic cuisine and Buddhist cuisine are very popular with people practicing those religions. Many restaurants have these cuisines as their primary food serving and are themed based on religion. They provide Kosher (Meat obtained from religious sacrifice by Jews), Halal (Meat obtained from lawful sacrifice by Muslims) and vegetarian foods.

Global brands such as MC Donald's, Pizza Hut, Subway and KFC have started a trend where a relatively localized cuisine has been made to go global. People are very fond of these brands and irrespective of their local culture, tradition and religion, these brands and their food servings are accepted by people around the world. These brands set up their restaurant outlets in a similar fashion as in their native countries. The change in trends and food is minimal and they have a proven formula to be successful. They employ localized people as labor but the operational trend is same as in the native country of the brand.

Another restaurant categorization is based on the socio-economic factor. Luxury restaurants and budget restaurants are its types. Luxury restaurants attract people who are socially rich and have a preference to dine in a sophisticated atmosphere. These restaurants provide multi cuisine menus and usually have alcohol servings. They also have contract with boarding and lodging with the hotels of similar brand name. In short, they provide complete service to the customers but it comes at the cost of being expensive. Budget Restaurants attract people from all classes but mostly they are one

dimensional with respect to their cuisine. They serve traditional local food and in some other cases, a mixed cuisine.

Also based on the level of business operation, the restaurants can be further categorized as,

- Full Service Restaurants
- Limited service Restaurants
- Hotels and Lodging

Full service restaurants offer dining for families, individual customers, Business personnel and people from different spheres and operate round the clock in a working day. They also have facilities to serve alcohol, in most cases with a separate bar attachment or in-house bar. The theme of cuisine served is also very broad ranging from local to continental cuisine.

Limited service restaurants offer dining in a rather sparse manner with self-serving style system. They differ from fast food outlets because they provide seating for dining and serve menu with a large variety of cuisine. The potential customers for these restaurants are also not specific. The number of employees working in these restaurants are less in number compared to full service restaurants.

Hotels and lodging have the mix of both the former restaurants. Most hotels have multiple restaurants under the same or different brand name. In addition to that, a hotel is also expected to have a variety of other facilities like bar, lodging, reception area, waiting hall etc. The restaurants operating under hotels are not very different from autonomous restaurant outlets.

1.1 Restaurant Facilities

Back of the House

Back of the House or commonly referred as BOH is the actual area which involves kitchen, cleaning facility and Inventory Storage. Restaurant's main work area where the food is being prepared is their kitchen. Kitchen facilities differ depending upon the size of the restaurant and their customer count. A popular operating restaurant would have a sophisticated kitchen facility with latest equipment. A newly start up restaurant's kitchen facility is planned in such a way that it has room for improvement to their facility in future. Some of the restaurants have multiple kitchens, preparing different types of cuisine. These restaurants are very big enterprises serving large number of customers. Some of the kitchen facilities commonly installed in most of the regular restaurants are,

- Cooking range
- Cutting tables
- Operating tables
- Delivery tables
- Gas pipelines connected to Owens
- Chimneys
- Cooking range stoves
- Streamers
- Char broilers and fryers
- Gyro machines
- Griddles
- Ventilation Hoods
- Skillets
- Toasters
- Boilers

The main course dishes are prepared mostly in Owens and the restaurants use various different types of Owens.

- Convention Owens – used mostly for main course meal
- Conveyor Owens – Used for mass preparation of dishes at the same time
- Deck Owens – Used for mass production too.
- Owen Streamers – Used for warming food
- Microwave Owens – Used for small or single customer orders

In addition to this the kitchens also have a water facility capable of cleaning all the equipment, vessels and kitchen culinary items. The water facility is usually kept separate from the main operating area of the kitchen to avoid confusion. The used vessels and kitchen culinary items are kept separated in a washing trolley or huge plastic containers. Later these trolleys are taken to the washing area or cleaning area by the cleaning staff.

Just as in manufacturing facilities where tools are numbered and kept in separate shelves or in a storing place, restaurants also follow a similar pattern to operate. Kitchen equipment are numbered with a serial number and kept separately according to their need of usage in a common store. For example, the cutting or operating table would have knives and cutters of different size, placed or hanged adjacent to it. This makes it a lot easier for the kitchen staff to do their part of work.

After the work is completed, they are placed in the cleaning trolley which would replace these parts to their appropriate places.

The delivery table in the kitchen is where the food prepared is placed for garnishing and other alterations. Equipment required for this work are placed near the table. Once the food is arranged accordingly by the chefs, the serving staff take it to the customer serving table to serve it to the customer. Before this phase, “the order completed” note is left with the kitchen manager.

Front of the House

Front of the house is the area where the customers dine. It is commonly referred as FOH in restaurant circles. The main facilities in this area of the restaurant are,

- Dining room - customized as per management’s wish
- Serving tables
- Chairs
- Air- conditioning Units
- Heaters
- Washroom for customers
- Reception counter for customer care
- Menu cards

The employees working in this part of the restaurant are serving staff, Host, restaurant manager, ERP software operator, cashier, security personnel, Cleaning staff and in case of maintenance of Front of the House, Maintenance staff. The role of host is to find serving tables for the incoming customers and welcome them. The serving staff are responsible of all the customer service. From, taking their order, the serving staff should take charge of all the customer related queries with that serving table. They are released from their role, only when the customers leave the restaurant. The role of the manager is to see whether all the front of house activities is coordinated efficiently and in a planned manner.

1.2 Restaurant Employee Job designations

Table 1.1 Various job designations

Employee designation	Responsibility
Restaurant Manager	• Leads the restaurant outlet. • Responsible for making Investment decisions, hiring labor etc. • All other Units report to him on a daily basis • Responsible for cash flow and Accounting.
Inventory Manager	• Supervises the Inventory • Sometimes responsible for Inventory purchase decisions.
Kitchen Manager	• Head of chefs. • To supervise kitchen operations
Sous Chefs	• Employees responsible for preparing food. • Usually operate in teams.
Kitchen Help staff	• Acts as sub-ordinates to kitchen manager • Responsible for cleaning the mess left over after food preparation. • Staff are usually mobile, as they bring inventory items to kitchen.
Serving Staff	• Responsible for customer hospitality and service. • Taking food orders and collecting bill payments.
Host	• Responsible for welcoming the customers and help finding them a serving table
Management team	Responsible for making corporate decisions • Chief Executive officer • General Manager • Executive Chef • Banquet Manager • Food service Director

In order to know, how these restaurants operate, a survey was conducted in one of the popular restaurants in Kaunas. Pizza Jazz was selected as the restaurant and it falls under the budget restaurant category serving continental cuisine. A variety of questions were prepared beforehand to enquire the management about their operational efficiency. [Appendix]

2. ANALYSIS ON OPERATIONAL PROBLEMS IN RESTAURANTS

2.1 Wrong Investment Decisions

Investing in capital that is not really the need of the hour will lead to liability [1]. These investments could be inventory, Kitchen Equipment, Marketing and hiring labor personnel. Investing available capital in right areas is the basic behind any successful enterprise [1]. This concept applies the same with restaurants too. The decision starts right from the management room with the restaurant manager as the decision maker. Understanding the food menu of the restaurant, and a detailed brain storming session with the chefs will pave way for a clear need of capital. Also, spending liquid cash on marketing can also result in a liability sometimes. Marketing about the restaurant brand at a wrong place, in a wrong way is also a waste of capital. So investment can go wrong not just with food or kitchen needs but also with marketing.

Due to the stochastic market situation, most of the restaurant managers find it hard to take their calls on right investment. The market is constantly changing and the price of food raw materials also change with time. The aim here is to buy all the necessary raw materials at a cheapest price possible and store them. The challenge here is the rising global food raw material costs and these prices are constantly changing according to the market situation. All the leading restaurant chains are affected by it in some way or the other. The price of raw material also varies depending upon the geographic locations of the restaurants.

For Example, In Europe, Onion prices are usually low during summer and spring. They usually go up during rainy and winter seasons. This situation is different for any restaurant set up in some other tropical country. If the restaurant management, feel that they can ship in onions for a cheaper price from any tropical country it is a tiring task. They have to adjust with the price rise. Also, the customers wouldn't be too pleased with the change in prices on the food menu.

Gasoline and LPG (Liquefied Petroleum Gas) cylinders are also one of the primary things that are used by the restaurants. The prices of these things are usually fluctuating all around the world. The restaurant management has to overcome these fluctuations and invest in them wisely.

Capital invested on marketing is also not a guarantee that the sales will go up because of this marketing venture. Restaurants spend a significant capital on marketing only to find out later that it had no advert impact in their sales. These kind of losses are most common among restaurant owners.

2.2 Lack of Inventory Control

Inefficient inventory management can lead to decline in profit levels over the longer run. It may not show the immediate impact in the profit margins but will surely bring down productivity over the longer run. Insufficient inventory leads to low production and it means the loss of chance to make more profit. Low profit levels are directly proportional to low productivity. Also, having excess stock in the inventory than actually required is also a liability. Inventory levels have to be perfect all the time to calculate the organization's productivity.

Restaurant managers struggle to know the exact amount of inventory required per working day in places where the customer count is unpredictable. Usually they come short of inventory and close their business early than their actual working time. If only they had known the customer count for that specific working day, they would have prevented such a situation. That is the reason why restaurants need to have the estimation of customer count per working day. They can do exclusive market research and anticipate their numbers. Filling the Inventory would become a lot easier if they can estimate the customer count. Restaurant managers cannot keep track of all the inventory material and the inventory level. The advances in technology have made this tiring task easier for the restaurant managers. Most restaurants have a ERP (Enterprise Resource Planning) Software installed. These ERP systems keep track of all the inventory available, inventory used, inventory that is leftover. Traditional ERP systems have been on the decline due to the usage of outdated programming languages in them. Programmers who knew those languages are also hard to find, as new generation programmers don't show interest in learning these programming software. So restaurant managers need to invest in new ERP systems that are constantly evolving with time. The decision to invest capital on these latest ERP systems is also a bit of gamble because ERP systems are constantly evolving and the operators of these software need to be trained regularly too.

2.3 Lack of Training Programs for workforce

New recruits need to be enrolled in a certified training program so that they can be trained about the different traits of work in the restaurant. Most of the restaurants don't have a certified training program and take the risk of setting their new recruits on a trial and error methodology. The workforce cannot be functioning at full potential with this methodology. Kitchen staff need to have experience to handle various situations. Even if they are newly recruited, a training program for a prolonged period will make them adapt to the needs of the restaurant. Accidents due to untrained kitchen staff are very common in restaurants. It may create a risky working atmosphere and lead to loss of resources. This in turn affects productivity.

The serving staff need to be trained as well. Most restaurants employ serving staff on a temporary basis and pay them wages based on number of working hours. They are mostly part time employees and restaurant managers doesn't feel the need to train them before setting them up to do their work. This runs the danger of experiencing unsatisfactory customer service. If the customers are not happy with the service, they are most likely to avoid the restaurant and search for an alternative during their next outing. The technical staff also need to be enrolled in training programs. Staff who control electricity issues, ERP operators, Cashiers, Internet administrators etc. need to trained before they are assigned responsibilities. The training programs could be time consuming and costly. Most restaurants managements think that losing a potential staff to training programs is a loss of time and will lead to loss in profit levels and productivity. Actually, they fail to understand that it is a safety first approach which also ensures high productivity in their working time.

Restaurants fail to train their newly hired employees about safety regulation procedures. Even Most employees who have worked for two or more years are not free from accidental mistakes and are susceptible to injuries from burns and other hazards. The cost of covering the medical expenses for these employees is a burden on the restaurant management. Small restaurants cannot afford the budget allocation for training these employees and because of these both the employees and the management are bound to suffer simultaneously as a consequence.

2.4 Large Amount of Fixed Costs

Fixed costs are constant or unchanging costs that have to be covered by the enterprise regardless of the level of output or activity [2]. Many Restaurant owners and managers struggle to understand the difference between fixed and variable costs. Even if they do, they are not confident to segregate the different job designations that fall under fixed costs. Irrespective of the sales, the restaurant would have to pay the employee who has been hired under monthly salary permanently. This is a burden on the restaurant management. They should commit to fixed costs without estimating the total sales and performance that the employee would have to offer.

The electricity bills, rent, property tax, local real estate taxes, state real estate taxes, commercial tax, employee insurance, water tax are some of the expenses that are fixed costs. Internet bills may vary depending upon the usage. Gas prices also don't stay the same every month due to market fluctuation. Irrespective of the total sales, the restaurant would have to pay these bills every month. If the majority of labor also fall under this category, then it is a burden on the restaurant management. If the sales go up, they would be saved from this catastrophe but if they drop, then the restaurant is destined for hard times financially. Productivity levels are sure to come down significantly.

2.5 Lack of maintenance Programs

Running maintenance programs are as important as taking investment decisions. Restaurant managers neglect the need for a regular scheduled maintenance program. As a consequence, they end up paying more to the repairs and replacement of kitchen and restaurant equipment. Their approach towards maintenance is mostly reactive maintenance. Reactive maintenance or breakdown maintenance is a reaction to breakdown of working equipment where skilled personnel are called upon to restore the equipment to its usual working condition [3]. Its advantages are less than its disadvantages in the restaurant industry. It results in idle machine time, in restaurant's case, it is the wastage of valuable equipment usage time. Also, Managers come short of budgets to handle the situation. They would have to take external loans to afford a maintenance team. Some disadvantages of the reactive maintenance include,

- Budget Constraints
- Reduced Life time of assets
- Safety issues
- Wastage of valuable work time
- Equipment downtime
- Collateral damage
- Repetition of same technical issues
- Higher energy costs

2.6 Wastage of Resources

Wastage of raw materials in restaurants is a common problem that many restaurant managements face today. There is no constant data on how much wastage occurs per working day. It varies from time to time. Most of the wastage occurs during food preparation. Wastage due to negligence in food storage, Improper handling of raw materials, accidental spills and low maintenance of equipment is also high. Customers also tend to waste food that is being served. These are the number of wastage possibilities in a restaurant.

Wastage due to inefficient functioning of restaurant equipment also occur. Some of the examples are,

- Wastage due to refrigerator malfunctioning
- Wastage due to microwave Owen malfunctioning
- Wastage due to leakage in boilers
- Wastage due to leakage in vessels, pots and cups

A plenty of these wastages can be correlated with maintenance. Due to unscheduled maintenance procedures this equipment tends to show wear over a considered period of time. Therefore, a portion of these wastage can be directly attributed to negligence in maintenance.

Also, some of the customers are bound to waste their served food. This is unavoidable scenario where restaurants experience food wastage every day [4]. This waste food is thrown away as trash. Restaurant management fail to understand that this food wastage was once their raw material and they have actually spent a lot on acquiring that food cost.

2.7 Lack of quality

One of the important motives behind achieving operational efficiency also involves no compensation with quality [5]. Most of the restaurants want to cut their unwanted costs but they do that at the expense of compensation with their quality. Quality in terms of food and service, atmosphere, hospitality and management decisions. Quality deliverance covers aspects such as,

- Quality raw materials
- Quality equipment installation
- Quality atmosphere
- Quality in food preparation
- Quality in service

The main aim of achieving quality is to impress the customer [5]. The customer should feel that they are being served quality food, in a quality atmosphere and of very high standard compared to the money they pay the restaurant. Most restaurants neglect these quality index altogether. The restaurant industry is very competitive and the only parameter that sets a good restaurant from other average restaurants could be Quality. Quality in terms of service is also very much looked upon by the customers nowadays.

For Example, This Hypothetical restaurant situation where Service quality is below the expectation levels of the customer can be analyzed in detail.

Once the customers are welcomed and allotted a serving table, the service staff engages the customer with the restaurant menu card. The customer orders the food of his choice and its being noted down by the service staff. If the service staff designated for this customer has other alternative tasks to be covered at the same time, it paves way for confusion and other unexpected chaos. The

service staff cannot immediately notify the Kitchen manager about this order due to other commitments. So the customer sat for several minutes without any advances from the service staff, waiting for his food. This may annoy the customer.

In this case, the quality in terms of service is poor. The customer has a rough estimation of how much time it would take for his food to be prepared. If the time limit exceeds his expectations, he is bound to get annoyed with the service. This problem in terms of poor quality in service is due to inefficient time management. A specific service staff should have been appointed for that particular serving table without any other commitments. The time that would normally take to prepare that order would probably satisfy the customer. Any other delay caused can frustrate the customer and it highlights the problem in the restaurant work allotment and coordination.

3. THEORETICAL SOLUTIONS TO THE PROBLEMS

3.1 Smart Investment Decisions

Investments are made on a daily basis in restaurant industry. Decisions to invest in diverse field of operations can be seen in the restaurant Industry. Some of the fields where decisions are need to be made to invest regularly are,

- Purchase of Inventory stocks
- Equipment maintenance
- New Equipment purchase
- Outsourcing certain tasks
- Hiring new labor
- Marketing ventures
- Expansion of facility
- Tackle new regulations and Legislation

Investment on raw materials required for the restaurant is quite risky. The restaurant management need to plan accurately on how much inventory stock they can keep at a time. In order to know the required amount of food raw material that need to be purchased, combining and coordinating with the inventory management team is very important. The price of food products is not constant and keep fluctuating based on market situation. The best possible way to buy goods at a cheaper price is to have a standard contractor. The whole sale purchase of food raw materials like vegetables, fruits and garnishing foods will save significant amount of money rather than purchasing from a retail outlet. Also, getting a detailed report from the whole sale dealer on each purchased product will help the restaurant management predict the price of the product.

For example, Wholesale contractors know whether the price of a vegetable would increase or decrease with respect to forthcoming climatic change. Tomatoes are cheaper during rainy season because of high yield rates and are a lot costlier than standard price during summers due to low yield. There is middle course as well. Barring these two seasons, the price of tomato would generally be expected to be standard. The restaurant management need to consider this standard price whenever they take these raw material into their purchasing plans. In this way, they can maintain a budget for this particular raw material purchase even if the prices get lower or higher.

While allocating budget for raw material purchase, the standard price is taken as the parameter to allocate budget for purchasing that product. Any changes in prices of the product, need to be adjusted within the budget. Also stocking in excess will sometimes lead to decay or vegetables getting rotten. So the inventory levels need to be analyzed and subsequently the purchase levels have to be determined. If the restaurant buys exact amount that is required for its functioning than it means it is a good investment on raw material. If it purchases in excess or less than what is required, then it means two possibilities which are explained briefly in the table below.

Table 3.1 Raw material investment

Investment on raw material	Effect on business
Excess raw material purchase	Capital wasted on unwanted raw material which could be counterproductive. **Reason –** Issue of raw material getting decayed or rotten, if not used in time.
Inadequate raw material purchase	Opportunity wasted on increasing profit margins. **Reason** – Issue of running out of stock, even though the customer demand is there.

Another parameter that helps to measure productivity and profit margins in restaurants is the concept of ROI (Return On Investment) [6]. Return on investment is the ratio of the profit or loss made in a fiscal year in terms of an investment. It denotes the percentage of value in increase or decrease of the investment.

Most restaurants calculate these ROI ratios with lack of sophistication on investor's return. One classic example, from the news article published in The Business Insider gives a relatively better solution to calculate ROI ratios. The general Return on investment calculations doesn't take the time scale of establishment of the business, its peak years and its decline.

$$\text{Return on Investment} = \frac{\text{Gains from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}}$$

For Example, the restaurant management decides to make investment on a mini bar within their restaurant premises. Alcohol is so far not served at the restaurant. With this investment, on setting up

a new counter for customers who wish to have alcohol with their meal, the revenue is likely to go up. The issue here is to gain the returns on investment with this new set up.

If the cost of setting up a new bar facility along with capital investment on alcohol is 80000 €, then the sales of alcohol within that fiscal year will give a broad range about how much ROI the restaurant has generated. If the alcohol sales within that period is 1,00,000 €, then this figure is the new profit generation from that new investment. In order to calculate the ROI ratio, the formula for a fiscal year is considered.

$$\text{Return On investment} = \frac{1{,}00{,}000 - 80{,}000}{80{,}000}$$
$$= \quad 25\%$$

Therefore, within a year the restaurant managed to gain 25% on their initial investment for setting up a bar which also includes alcohol capital purchase cost. Here in this example, the restaurant is expected to get the returns in their forthcoming fiscal years if the sales remain the same. If the sales drop, then the time scale would be broadened, to achieve their initial investment cost. Another Return on Investment calculation that considers the performance of the business over a time period also into account is rather more accurate than our previous example. Restaurants cannot prolong for a longer period in the market with constant success. There are tend to be some ups and downs.

Here, the restaurant manager wants to open a new branch under the same brand name in a new location that is not much of an urban area. He initially predicts a good opportunity and sees an opportunity for good sales. The restaurant start up would cost him 400000 € as initial investment. He plans to return the investors the sum of money he owes them in installments. If the restaurant sales go up in the range of 1,00,000 €, then the right way to calculate his return on investment would be to take the performance index of the restaurant into the equation. The new facility might not yield the same amount of revenue every year and it changes with every year. It is possible to calculate the Internal Rate of return every fiscal year [10].

Table 3.2 Return on Investment Calculation

ROI Calculations								
Financial Fiscal Year	2010	2011	2012	2013	2014	2015	2016	Total
Cash In	-400,000€							-400,000€
Cash Out	100,000€	100,000€	100,000€	100,000€	75,000€	50,000€	0	525,000€
Net Cash Flow	-300,000€	100,000€	100,000€	100,000€	75,000€	50,000€	0	125,000€
Internal Rate of Return	14%							
Multiple	1.31							

Here, from the above table, the Investors put in 4,00,000 € initially and the restaurant gets 1,00,000 € every year for four fiscal years in a row. Then the restaurant experiences declines in sales and eventually it comes to its decline. Therefore, the annual rate of return is 14% of the initial investment. The multiple 1.31 shows the calculation to generate the total cash outcome when it is multiplied by initial investment amount. The net cash flow shows the total profit made from the investment during these seven years.

Just as in case of a new start up or facility, the return on investment with respect to marketing can also be calculated. Judging the effects of marketing could be complex than the above two examples because they are accurate if we assume that the only reason for higher sales is only because of the impact made by marketing. Level of marketing may differ depending on the necessity and the safe approach is to take the middle path between high investment on marketing and low investment on marketing [15].

For Example, a restaurant case study scenario where a manager decides to invest certain amount of money on marketing.

The restaurant manager hires a Jazz Band to perform on Saturdays and Sunday nights. The cost for hiring for a week (that has two performance days – Saturday and Sunday) is 1600 €, which extends to 6400 € per month and 76,800 € per fiscal year. The sales increase by only 1000 € on the days that the band performs. In fact, the manager finds out from customer survey that sales would probably remain constant even if the band doesn't perform.

Assuming that the ASP (Average Selling Price) or Revenue per customer is 40€ and the AVC (Average Variable Cost) per customer is approximately 24.80 €, Then the contribution per customer is 15.2 €.

Contribution per Unit = ASP – AVC

= 40€ - 24.80€

= 15.20 €

Taking this amount into account, we can find out the contribution margin.

Contribution Margin % = Contribution per unit / Selling price per unit

= 15.20 € / 40€

Contribution margin % = 38%

To find out whether the investment on the Jazz band is generating a good return, the restaurant needs to calculate the ROMI (Return On Marketing Investment) [15]. ROMI can be calculated using the following formula,

$$\text{ROMI \%} = \frac{[\{\text{Incremental Revenue Attributable to marketing X Contribution Margin \%}\} - \text{Marketing Cost}]}{\text{Marketing Cost}}$$

= [{1000 € X 38%} – 800 €] / 800 €

ROMI% = - 52%

Based on this huge negative ROMI result, it is not worthy to invest in this Jazz Band which is more of a liability. According to marketing strategy, Incremental sales of marketing is used as a parameter to judge the amount spend on marketing. Incremental sales are estimated to be 8000 € per month because of 8 performing days from the Jazz Band. In order to calculate the weekly sales, increase every weekend, baseline sales are necessary, which are same as the expected sales without marketing. The estimated sales of the restaurant are assumed to be 3,00,000 € per month.

- Lift (%) = Incremental Sales / Baseline sales

  = 8000 € / 3,00,000 €

  Lift (%) = 2.66 %

- Cost of Incremental sales (€) = Marketing Spending (€) / Incremental Sales (€)

  = 6400 € / 8000 €

  Cost of Incremental sales (€) = 0.80 €

The cost of Incremental sales determines the value the restaurant is spending per Incremental sale, and it experiences 2.66% sales increase because of hiring the Jazz Band to perform Eight times in a month. Due to low sales lift and extremely negative ROMI (Return On Marketing Investment), It can be concluded that the marketing investment would not yield any profit and should be rejected. In cases where the regular sales are also on the decline, even then this marketing venture should not be initiated as it would not have any significant impact on the profits. If this marketing investment is already done and new crisis situation arises for the restaurant, cancelling this contract should be the top priority.

Return On Marketing Investment should always be calculated, when a marketing venture is considered by the restaurant. These calculations will determine whether to make the investment or avoid these investments and continue with the regular business activity.

Decisions on investments in new equipment or replacing the worn out equipment need to made in advance. The operating cash flows cannot afford these purchases and therefore a separate safety budget need to allocated for such instances. The budget could be added periodically from each month's profit rather than investing all the amount in the budget. Maintenance of restaurant facility, maintenance of kitchen facility and kitchen equipment need to allotted a separate budget as well. Initially during the startup of a restaurant these decisions need to be made. The decisions made during this time are to stay forever as long as the restaurant is in operation [14]. Therefore, a careful approach needs to be taken on these decisions and a feasible budget amount needs to fixed for these operations. As the business grows, the budget for these operations also need to grow simultaneously in accordance with the ratio of business growth.

3.2 Inventory Management

Taking care of the Inventory is a least popular task with the restaurant managers yet it is crucial in determining the food costs and profit margins. If there is a lack of proper planning and irregular structure in Inventory management, the business has very little chances to grow. Due to its importance, most restaurants employ a separate personnel, preferably an Inventory manager to overlook these operations.

Restaurants install ERP (Enterprise Resource Planning) Software that can monitor Inventory purchase, Usage and dispatch of raw materials. With each customer order, the necessary ingredients required to complete a certain dish are highlighted in the ERP software. A systematic process flow chart shows the how the inventory is notified about the customer order.

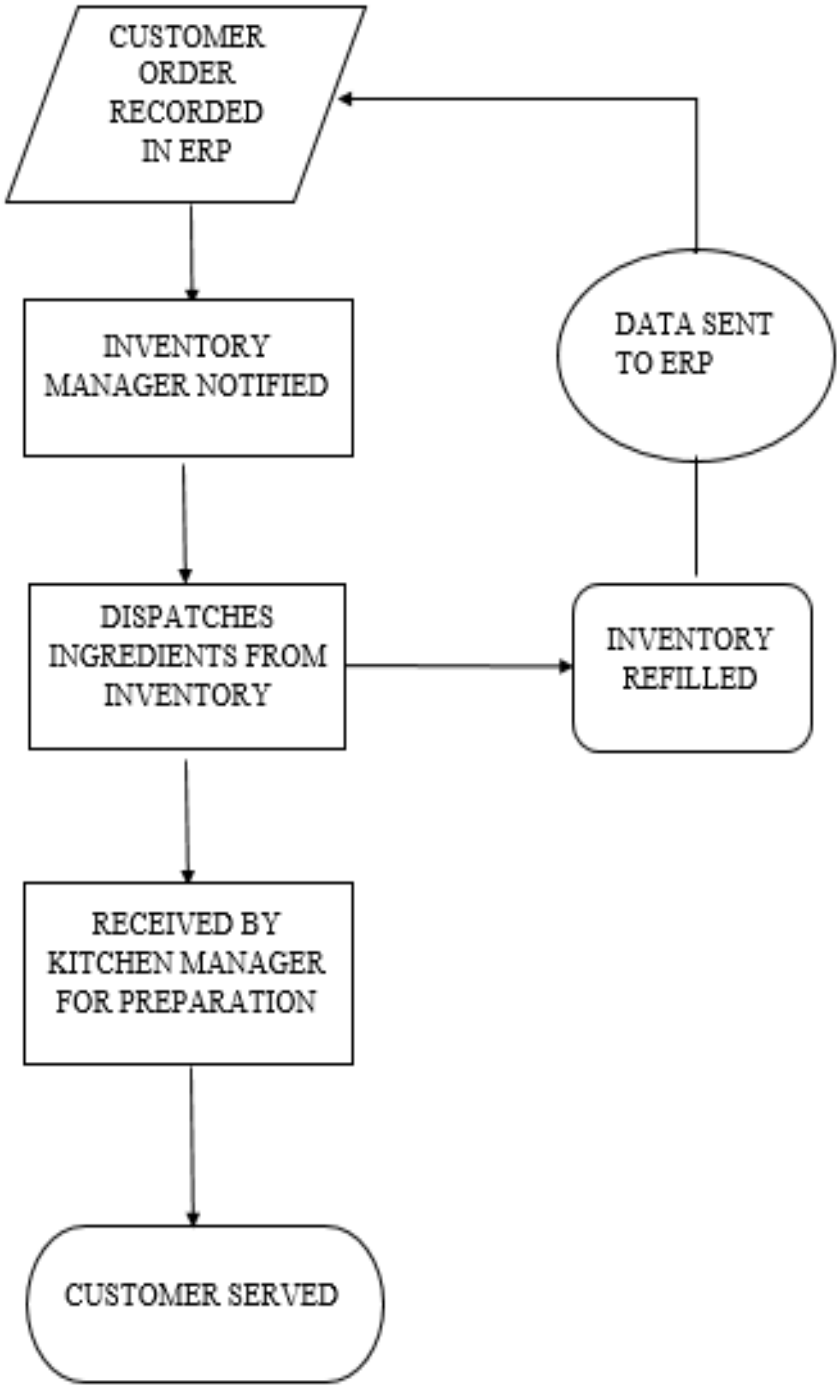

Fig 3.1 Role of Inventory and ERP System

Once the customer order is taken, the serving staff informs the ERP software operator about the order. The ERP software operator enters the customer order and the software sorts out the ingredients required from the inventory for this order preparation. The ingredients required for a specific dish in the restaurant menu should be pre-programmed in the ERP software. Only then the software can list the necessary items that need to be taken from the inventory. After the Software lists the ingredients, the note is sent to the Inventory manager. In most cases, the ERP software handled

by the operator is synchronized with the one handled by the Inventory manager. As soon as the list of ingredients is overseen by the order entry operator, the Inventory manager can able to see the same in his ERP software. The Inventory manager hands over the ingredients or food raw materials to the kitchen manager. Thus how the inventory count is constantly updated and kept track of [22].

After this order is completed and served to the customer, the Inventory needs to be refilled. This refilling process is alternative and usually takes place after the working hours or closing time of the restaurant. If the restaurant closes late at night, then the refilling process is completed the next working day. This is a method of Perpetual Inventory management where the Inventory Goods and cost of sales are updated continuously after each sale. It is a constant updating process which will give better insight of what is required to fulfill the Inventory. Also in accounting terms, it makes the task a lot easier as it constantly records the cost of goods sold. In many ways, perpetual inventory management is more beneficial to the management than periodic inventory management [11].

The pre-determined level of inventory required to prepare each of the food items on the restaurant menu is important parameter [23]. Only if the restaurant sorts these levels, the management would predict the inventory stock required for each working day. A sample calculation in a restaurant scenario where the restaurant needs to have pre-determined inventory levels for each food item or main course meal on their menu is shown.

Assume a restaurant scenario where 27 customers come on Tuesday afternoon. They have chosen for their main dish “Beef Stew”. Each guest need to get 120 g. of beef stew as it is written on the restaurant menu. How much beef should be purchased for the inventory, if the restaurant management knows from the chef feedback that the loss of processing is 8% and 34% for stewing. How much wastage is anticipated?

27 people X 120 grams = 3.240 Kg (Actual target)

Stewing Process = Loss of 34% of Initial stock

Processing of meal = Loss of 8% of Stewed meal

Stewing and processing are likely to take away 34% and 8% respectively from the purchased beef. Therefore, the stock to be taken from the inventory needs to be greater than 3.240 kilograms.

Loss of beef = 42%.

Prior to the preparation and processing,

necessary raw meat = 3240 + (42% of 3240) = 4.6 kilograms

For this group of 27 customers, the restaurant management would need to obtain 4.6 kg of beef to serve for each one of them, 120 g of prepared meal. Therefore, the stock to be taken from the inventory in this case is 4.6 kilograms. The same calculation procedure is essential for each of the other items on the restaurant menu. These calculations need to be done by programming in the ERP

software for every item on the menu. After serving the customer, the inventory level would be reinstated by the market purchase of 4.6 kilogram of beef.

3.3 Training Programs for Labor

The Occupational Safety and Health Administration states that untrained workers are more susceptible to injuries [8]. Even though the labors working in the restaurant are offered an insurance because of the new regulations, the medical insurances could be a hindrance for the restaurant manager if the employees working in their restaurant are often susceptible to injuries. Restaurant working conditions are prone to various kind of accidents especially because of the day to day usage of Liquefied Petroleum Gas (LPG).

Some of the accidents that could happen in the restaurant working condition are as follows.

- Burns from handling Hot Equipment
- Slips and falls due to food or oil on the kitchen floor
- Cuts and bruises from Kitchen equipment
- Injuries from Ergonomic hazards
- Burns from fire breakout

Therefore, the safety regulations are need to be established to prevent injuries from these accidents. Spending capital on insurance claims and medical care expenses often could be hindrance to the management. Instead the restaurant management can spend the capital on training their employees about safety regulations and subsequent training modules. Mostly young Workers, especially kitchen staff are prone to accidents and injuries, according to the report by National Institute for Occupational Safety and Health (NIOSH), an institute that promotes training modules for young employees in the restaurant industry. So the newly hired employees could be sent to the training institutes that provide various safety regulation courses like hazard Identification training tool. This is an online simulation based training that trains the employees on how to avoid creating scenarios that could lead to potential accidents and injuries. Employees that learn the hazard identification procedures are less prone to accidents in restaurants according to this institute's report. Similarly, there are training modules for all possible employee designations in the restaurant. Ranging from,

- Server
- Dishwasher
- Line Cook
- Prep cook
- Bartender
- Host
- Cleaning staff

Safety regulation training programs not only prevent employees from injuries due to accidents but also avoids employees taking medical leave due to illnesses. These training programs also emphasize on kitchen environment should be maintained.

Restaurant managers need to establish the dress code policies that could help prevent unwanted accidents in the restaurants. Some of the policies they can be imposed on the employees include,

- Banning Porous fabric
- Banning Loose clothes
- Footwear regulations to avoid slips
- Banning electronic instruments within kitchen premises
- Banning Hazardous materials like fire lighter, inflammable belongings of employees
- Banning alcohol and drugs

Other training programs that can be established at the restaurants other than the intent of safety regulations include training employees to different work scenarios. These training programs emphasize on getting the most from the available labor force. It trains the employees in order for them to be productive and efficient. The method of training methods for the newly hired employees in the restaurants of all category are expressed by the ***Graph 3.1*** below [9].

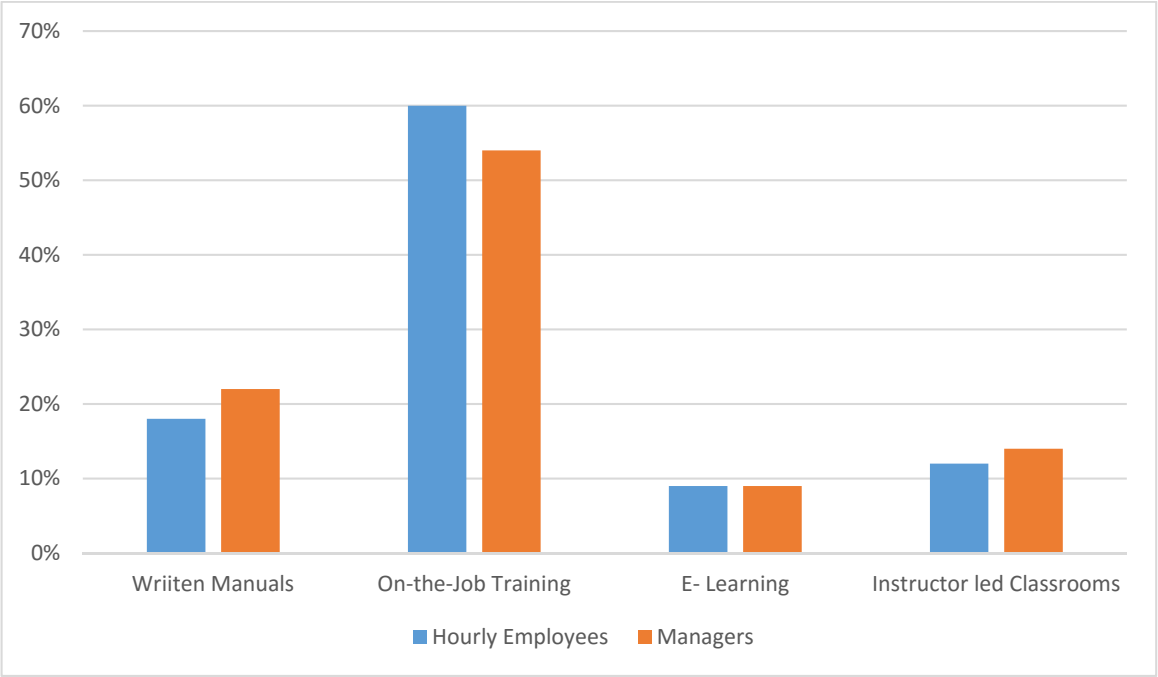

Fig. 3.2 Determining methods used for training employees

Hourly employees are laborers who are employed either on a permanent basis or temporary basis. Here in the above graph, hourly employees denote the serving staff, chefs, cleaning personnel, cashiers and security staff. Managers category denotes the kitchen manager, inventory manager, head chef, labor manager and the restaurant manager itself.

Summarizing the above graph, we can conclude that 18% newly hired employees undergo training by just written manuals. Most common method of training new employees is by on-job-training where a supervisor trains them in convenient way possible according to their job descriptions. Only 9% undergo E- learning training method while 12% of new employees are trained by a instructor.

Newly hired managers also undergo training and their training variations are as follows. 22% undergo training by reading manual or books, 60% undergo trial and error method of training, only 9% undergo E-learning training program while 14% are asked to attend classes undertaken by an Instructor.

Roleplay modules for newly hired employees could train them to handle restaurant scenarios where their maximum potential is absolute necessary. These kind of training programs focus solemnly on increasing productivity by being making the labor force efficient. Labor productivity results would be lot better if the employees are enrolled in these modules.

Some of the restaurant scenarios that could be roleplayed and trained for the employees are,

- How to perform when the restaurant is at maximum capacity
- How to handle customers waiting in the lobby
- How to handle customers making a complaint about service
- How to handle any external disturbance
- How to avoid spills
- How to protect raw material from being wasted

Many more scenarios are created to train the employees accustom to the situations. These training modules increase the labor performance, thereby contributing significantly to labor productivity.

Labor training expenses for franchises that operate under the same or different brand name have to monitored by the parent company. The degree to which they share the responsibility varies depending upon the type of restaurant.

Full service Restaurants – Family Dining, Casual Dining and Sophisticated and posh dining facilities.
Limited service restaurants – Fast Food outlet usually with casual dining.
Hotels with Lodging – Business dining arrangement, Family dining.
The degree to which the parent company share the training expenses of its franchise is depicted in a comparative graph [9].

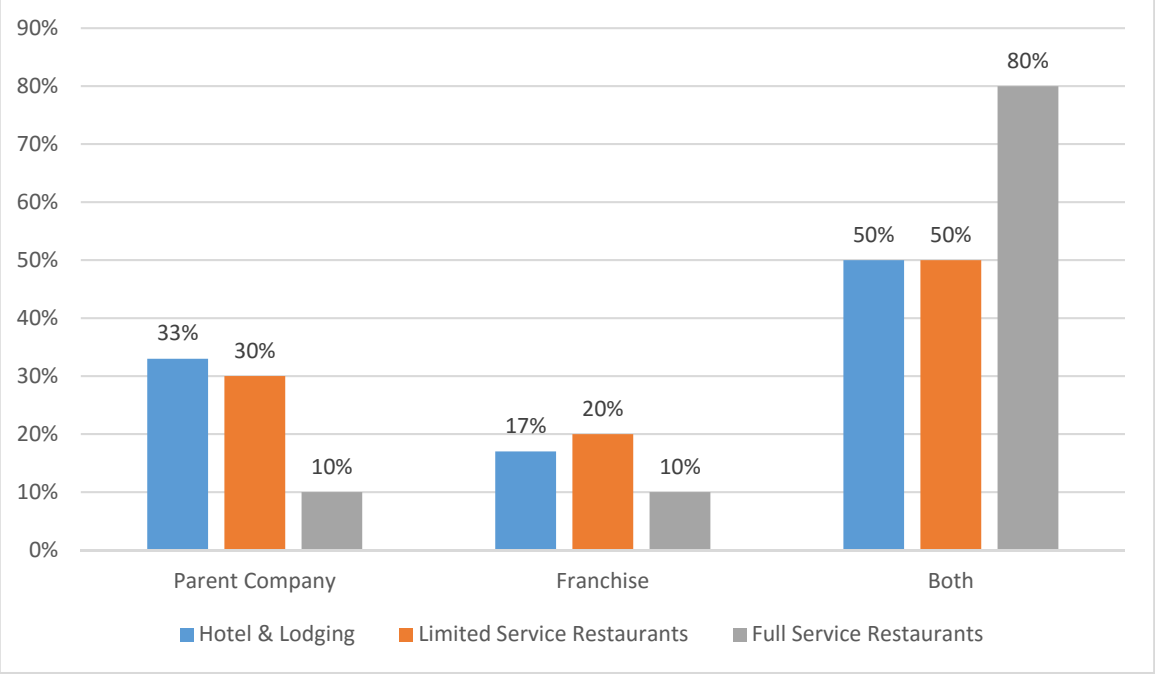

Fig. 3.3 Determining share of training responsibility [9]

The parent company shares 33% of training expenses individually in Hotel and lodging restaurant facility while the franchise shares 17% individually. Both the parent company and franchise combined, share 50% of training expenses as joint venture.

In Limited service restaurants, the parent company spends 30% of training expenses individually. The franchise spends 20% of training expenses individually and both the parent company and franchise combined, share 50% of training expenses as joint venture.

In full service restaurants, the parent company individually takes only responsibility for 10% of training expenses while the franchise also takes 10% responsibility. Both combined, spend 80% of the training expenses.

Apart from these training modules, the restaurant manager could train their labors to perform efficiently by organizing programs within their restaurant. These kind of training methods are suited to restaurants where the workforce is minimal and the restaurant size itself is small. In large luxury restaurants, enrolling employees in a training modules organized by specialized institutions is a must. For budget restaurants, employee interaction and motivation is rather possible. For such scenarios the management can introduce following training programs.

1. Demonstration – For the newly hired kitchen staff, on how to handle kitchen equipment and regular kitchen procedures. Usually demonstrated by a senior employee who has good interaction and teaching skills. The newly hired staff would benefit from seeing all the regular procedures done at the restaurant.
2. Shadowing – Newly hired employees, especially service staff, host/hostess are asked to observe the regular functioning of the restaurant activities. At the end of the training, the new employees would be asked to explain what they observed during their shadowing training.
3. Instructing – In this training, written notes or a set of instructions are given to newly hired employees to complete the tasks by following the written instructions. In case of a doubt regarding instructions, a mentor is appointed to oversee clarifications. This is most effective training since there is opportunity for employees to learn on their own by a trial and error method.
4. Supervision – This is one of the oldest passive training done in the restaurants. Serving staff are instructed by a supervisor about their duties and while they perform them, the supervisor grades their performance and submits it to the restaurant manager. Employee ratings are awarded and the employees are assembled to give them feedback about their work. Any mistakes in their work are specified by the supervisor and he asks the employees to correct them.

These training procedures done within the restaurant save training costs and save a significant capital. The only disadvantage is that, employees might take time to perfect their performance and get a regular workload. Also, the fact that another working employee dedicating his time to train rather than performing his own work could be less productive. That is the reason why restaurants practicing such training programs hire all the new employees at one go. So that the instructor's actual worktime could be productive, focusing on his primary duties.

The training program commands a budget allocation which can vary for different job designations. Budget for training itself is segmented into many portions depending upon the number of labor working in each sections. The gross average from most restaurants survey data considers the following sections.

Front of House (FOH): The employees working in the dining area of the restaurant. Service staff, cashiers, receptionist, cleaning staff, Host/hostess.

Back of House (BOH): The employees working in the kitchen and inventory. Chefs, cleaning personnel, Inventory labors, kitchen helping staff.

Corporate: Restaurant manager, inventory manager, kitchen manager, finance analyst, Delivery manager, marketing manager.

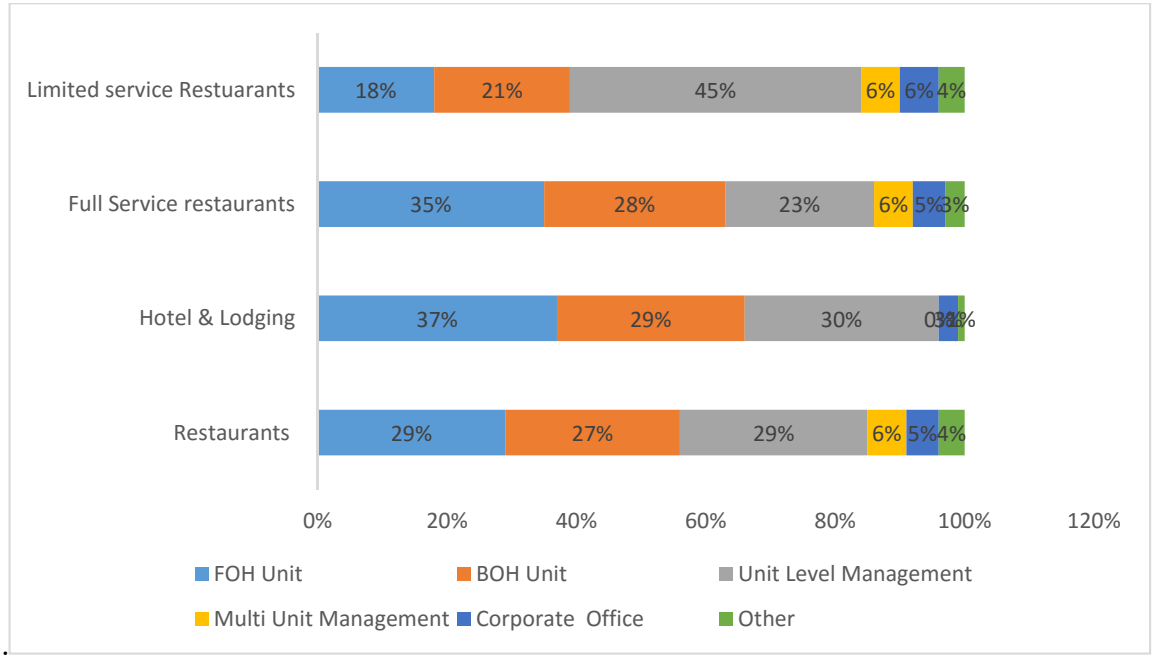

Fig. 3.4 Training budget distribution for various units [9]

In the graph, the data interprets budget allocation for different segments in different types of restaurants. In limited service restaurants, a vast majority of training budget is used for training unit level management managers. Full service restaurants and Hotel and lodging type of restaurants

allocate most of their training budget to Hourly employees in the front of the house. From this data, it is clear that training all restaurants spend a fortune when it comes to training their employees. The budget for training is influenced by profit from cost of goods sold. Usually it is very minimal, yet this training can increase labor productivity on the longer run and avoids unwanted expenses.

In Full service restaurants, the cost of training the front of house staff is much higher since the management has set a higher priority for service in the front of house. In limited restaurants, in order to concentrate more on their operational strengths, the unit management which has kitchen and inventory staff, cleaning staff etc. are allotted higher training budgets than the rest of the units. The data clearly shows that according to their level of operation and their business enterprise type, the restaurants allocate high or low training budgets to their preferred units. The restaurant managers need to identify their own restaurant's range and operational capacity and allocate the training budget for their units. In this way, the management would train right employees and gain maximum performance from them. It helps in the overall development of the restaurant to take them to the next level in their enterprise or brand growth.

3.4 Establishing a Maintenance Program

The practice of reactive maintenance in restaurants should be stopped. A systematic maintenance approach is needed to save money on unnecessary expenses on the longer run [18]. The restaurant management need to categorize restaurant equipment according to their facility units. The front of the house and the equipment in the front of the house should be given an independent approach when it comes to maintenance. Similarly, the equipment in the back of the house needs to be maintained with a different approach. Even though these two units' function under the same restaurant, their maintenance needs are different. For example, the air conditioning unit in the restaurant needs to have a different maintenance approach than the gas pipelines in the kitchen unit. The restaurant management needs to understand the necessity of maintenance for each restaurant facility and equipment and establish a maintenance program. Maintenance is very important in large scale and full service restaurants as they operate on a larger scale and the chances of losses due to improper maintenance are very high in these restaurants.

Outsourcing Maintenance

The tools required for maintenance are costly and expensive. Apart from common maintenance tools the restaurant need not invest in such expenses. Also, the fact that they have to hire some permanent maintenance personnel as their employee is very tiring. Insurances, fixed salary, support staff would have to be provided to let the maintenance team have a platform to perform maintenance. Also, the restaurant manager is more likely to be ignorant of maintenance related activities. Therefore, he cannot supervise these activities too. In that case, a separate maintenance manager would also have to be appointed. So, the burdens on the restaurant management would increase one by one.

In order to save time and capital, the best solution for the management is to hire specialized maintenance companies. Many maintenance companies who are specialized in restaurant and hotel related maintenance activities are there. The restaurant management can sign contracts for a certain time period to cover all the maintenance activities. This is the best solution because even in case of complex problems, the maintenance firm can send different specialized personnel to the regular personnel who do maintenance.

The restaurant manager needs to explain the maintenance company about various facilities in their restaurants and their maintenance needs. He would also need to explain the working conditions, working hours, machine operating time, equipment usage types etc. to the maintenance company. The budget for maintenance will come from total sales. It might not be significant in number, but with that limited budget allotted, maintenance is possible. Usually restaurants allot 1% to 3% of their sales revenue to maintenance activities. The scheduling for maintenance can be done for each equipment as per the advice of the maintenance firm. The best suited scheduling pattern is as follows.

- Daily maintenance
- Weekly maintenance
- Monthly Maintenance
- Quarterly maintenance

Reactive maintenance ideas should be avoided altogether and an established preventive maintenance should be adopted to reduce machine and equipment downtime [19]. Preventive maintenance checks for any necessary maintenance needs periodically. So as a consequence the possibility of experiencing an equipment downtime is very low. Also preventive maintenance costs less than repair and replacement of machines and equipment. A separate budget should be allotted for periodic maintenance depending upon the overall sales.

3.5 Waste management

Resources wasted in restaurants can be avoided by training employees but the wastage of food served to the customers, needs a different approach. Restaurants do not have an estimation of how much food they throw away because of wastage by customers. Even if they have a rough estimation of food wastage by customers, they do not know the methods to reduce food wastage. One of the ways to reduce food wastage by customers is to serve them appropriate amount of food. If the restaurants do this, then they can prevent loss of money through food wastage. One in ten customer wastes his food servings. A lot could be gained if these food wastage is utilized in the correct way. Cost of food preparation is the second largest expense for restaurants after labor costs. A part of this food is wastage on a regular basis and if there is no plan in place to prevent this loss then the restaurant management is missing out on an opportunity to increase its operating efficiency. Therefore, a waste management system is absolute necessary to gain an upper hand on our profit levels in comparison to the restaurant's competitors. Conducting waste audits periodically by hiring experts in the field can be a solution to sort out the common waste types. Some of the common food waste collected for recycling could be,

- Fruits and vegetables
- Meat
- Paper
- Plastic
- Dairy products
- Glass

In order to utilize the waste food materials in the most efficient way possible, the restaurant management needs to adopt certain principles and change its view towards food wastage. Instead of throwing away the leftover food, it could be used efficiently by initiating the following steps.

- Analyze the common leftover food by the customers.
- Arranging a suitable waste management for different food types. For example, raw vegetable waste from salads could be segregated from meat and non-vegetarian food items.
- Creating a separate waste management team which has insights about how to handle wastage of different food types.

Restaurant wastage collection could yield significant profit for the restaurant management if it has contracts with local wastage management plant. Either a contract with general recycling unit or government waste recycling plant, it would yield profit for the restaurant. Especially the food types that cost the restaurant too much capital. The used paper wastes, plastics and glass materials would also yield profit. Some of the food types that are wasted could be turned into fertilizers and soil amendments. They could also be used as energy sources. Therefore, segmentation of wastes is necessary and a storage facility needs to be allotted for keeping these wastes.

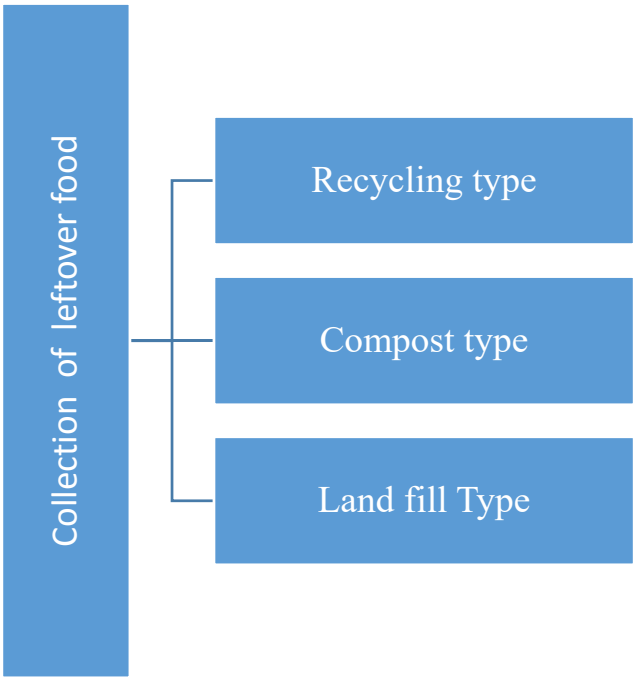

Fig. 3.5 Segmenting food wastes for different purposes

The recycling wastes can be turned into organic fertilizers. This is the most common food waste collected in the restaurant. Landfills waste is barren and not used for any type of recycling. Yet when it is added as a separate container along with the recycling waste, the waste management companies are most likely to take them as well. The restaurant could save transportation cost with this approach. Waste for compost is mostly degradable stuff that needs to be used as fertilizers immediately. Cattle owners and farm owners are most likely to collect these wastes.

The revenue generated from this waste management program is a bonus for the restaurant management. This revenue is not constant and may be depend upon food sales and how efficiently the waste is collected and stored. This is a secondary process for the restaurant compared to their primary responsibility and the parameters of customer satisfaction and quality are not really needed in this venture.

3.6 Quality Assurance

Restaurants need to be careful that their quality standards are not dropped with their obsession with increasing productivity and reducing operating costs. Productivity at the expense of quality is not actual productivity [13]. Temporarily it might yield profit but on the longer run it will come back to damage the restaurant's reputation. Creating a brand name is the most difficult trait in the restaurant industry. So restaurants managers should always ensure their quality standards are not dropped. Ensuring quality first and then secondary preference to productivity and cost reduction should be the policy [13]. Quality assurance will ensure that the restaurant remains popular among the customers and it paves way for a long and successful business venture. Some of the areas where restaurant need to give paramount importance to quality are,

- Food Quality
- Food raw material storage and safety
- Front of the House cleanliness
- Back of the House cleanliness
- Service to guests
- Employee training

Hiring a permanent quality assurance manager is an ideal solution to maintain quality for a prolonged period. The duty of the quality assurance manager is to set the standards for every operation. In case of decline in quality with any particular operation, the quality manager might cancel the operation itself and reassess ways to improve quality. If the initial efforts to improve quality fails, then the quality manager can establish a strategic quality planning which takes step by step approach towards achieving quality in all operations. The capital spent on ensuring quality is not considered as a loss since this will not consolidate the existing brand name of the restaurant. So quality in all the operations not just ensures efficient operation but also promotes brand name in the market. Once the standards are set, the restaurant management should ensure that it meets those quality standards in all their operations every time.

4. COST ANALYSIS OF RESTAURANTS

4.1 Fixed Costs

Fixed costs are vital in determining the restaurant's cost accounting. Irrespective of the sales and production, the restaurant has to cover these expenses every month. In short, fixed costs are those expenses, the restaurant management pays when the doors are closed to the customers. Some of the examples of fixed costs in restaurants are,

- Rent
- Property and real estate tax
- Water Tax (Might vary but nevertheless the restaurant has to pay every month)
- Electricity Bill
- Insurances
- Bank Interest (In case of loan taken)
- Leasing of equipment
- Marketing costs
- Franchise fee
- Restaurant Operator license
- Computer and Internet bills
- Cleaning contracts

These costs might vary in their denomination but regardless of that, the restaurant has to pay for these expenses every month. If it operates all days in a month or few days, these costs have to covered. Committing a large amount to these fixed costs could be a burden on the restaurant management. If the customer count is less and the business doesn't take pace, then it would be drastic for the restaurant to cover these expenses. The rate of failure of the business increases significantly.

4.2 Variable Costs

Variable costs vary depending upon the requirements and performance. The restaurant has control over these costs and they change every month with respect to the business performance. Food and labor are some of the examples of variable costs in a regular restaurant. Food purchase vary

depending upon the inventory goods sold. In other words, the cost of goods sold determine the food variable costs. The more the restaurant sells, the more it spends on purchase of new food products. As a result, this variable cost index is directly proportional with the cost of goods sold.

Cost of goods sold (COGS) = Beginning Inventory + Purchased Inventory – Final Inventory

For example, the restaurant has 12000 € worth of Beginning Inventory on a Month beginning. Then after another few days, the restaurant management makes a purchase of 3000 € worth of inventory. This is purchased inventory. After a few weeks, when calculating the Inventory stock worth, there is 4000 € worth of inventory. This gives the restaurant the figures of cost of goods sold, which is 11000 €. Also, at the close of the month, there is still 4000 € worth of inventory left. This is Final Inventory.

COGS = 12000 € + 3000 € - 4000€

COGS = 11,000 €

In some cases, this equation can be altered by taking Transfers into the equation. Transfers are of two types. 'Transfer IN' and 'Transfer OUT'. The transfer in type describes the inventory taken into the restaurant from either one or our own franchises that operate independently or within our management. If a transfer of goods between two restaurants happen then, when calculating the Cost of goods sold, the transfer index is taken into the equation. The same applies for transfer out where a restaurant transfers its inventory to its franchise.

In the earlier example, we estimated our inventory stock worth. During the same period the restaurant has borrowed 1000 € worth of inventory from one of its other franchises. Then these inventory borrowed fall under the category of 'Transfer IN'. Now, we take this borrowed inventory into our Cost of Goods Sold equation.

COGS = Beginning Inventory + Purchase Inventory (- Transfer Out) (+ Transfer in) - EI

Where EI = Ending Inventory

COGS = 12000 € + 3000 € +1000 € - 4000 €

Cost of Goods Sold = 12000 €

4.3 Determining Food Cost

The Cost of Goods Sold gives us the idea about how much inventory stock is used and how much we have sold of our purchases. Food cost determines the exact costs it required for the restaurant to spend on purchasing Food and Beverages. This is represented in Percentage as it would give us a clear cut understanding of how much profit we have made from our sales venture. We have to take the total monthly sales into the equation. In the previous case study, the Cost of goods sold was 12000 € and Let's take the total sales for that month as 30000€.

Food cost = Cost of Goods Sold / Food Sales

= 12000 € / 30000€

Food Cost = 40% (overall value for all the food items)

From this calculation, the restaurant manager would come to know that 40% of sales was spent on the purchase of food and beverages.

In order to analyze further into which category of food is costing the restaurant most, segmenting this food cost as per the different food items would give a broad perspective. Let's take for example, the food cost covered the purchase of following food items.

Table 4.1 Food cost percentage of various foods

Food items	**Food cost percentage**
Wheat flour	8%
Milk	7%
Cheese	12%
Vegetables	4%
Meat	7%

The reason for segmenting the food costs like this is to know where the restaurant spends more. In case of high food cost percentage and the restaurant manager wants to bring them down, he can segment his food cost and know what food type is costing the restaurant the highest.

4.4 Food Cost Percentage

The difference between the cost covered by the restaurant to make a specific dish and the selling price of that dish is Food cost percentage. The difference would help the restaurant manager understand how much food cost it takes to prepare a specific dish. When this is calculated for every food item in the restaurant menu, the restaurant manager would come to know how much profit a sale of specific food item would yield. The restaurant manager can design the restaurant menu accordingly to yield more profits.

The food cost percentage could be calculated from the formula,

Food cost percentage = Food Cost / Selling Price.

For example, if it costs the restaurant 2€ to prepare a Cheese pizza, and it sells the same cheese pizza with the price tag of 6€, the food cost percentage for this food item would be 33.33%.

Food cost percentage = 2 € / 6 €

Food cost percentage = 33.33%

This calculation gives the better understanding of our expenses to prepare this cheese pizza. If they take fixed costs and labor wages for preparation of this cheese pizza, then it would show the actual expense the restaurant goes through. The range for ideal food cost percentage for any food item should be between 25% to 35 %. Rather than comparing the food items that yield low food cost percentage, the restaurant need to keep the food cost percentage low for all the items on the menu and promote items that yield high Gross profit.

4.5 Gross Profit

Gross profit is the profit the restaurant makes after determining the cost of goods sold(COGS). The restaurant management can take a time limit like one month or even one week to calculate their gross profit during that time period. This gross profit percentage will determine the profit the restaurant has made during this time period. It is the profit generated excluding the labor wages, taxes, insurance expenses, facility maintenance and other expenses. Therefore, the gross profit generated should be as high as possible for every food item sold. The formula for calculating gross profit is [17],

Gross Profit = Total sales – Cost of Goods Sold

Let's take the food cost percentage of various food items in the restaurant menu and do a comparison. A variety of food items and their food cost percentage are listed below.

Table 4.2 Gross profit calculation

Food item	Food cost percentage	Selling price
Cheese pizza	33%	6 €
Salmon steak	15%	20 €
Beef stew	40%	10 €
Chicken pizza	30%	10 €
Banana milkshake	10%	2 €
Vegetable sandwich	32%	5 €

These food items and their selling price and food cost percentage are used to determine gross profit levels. The comparison of gross profit levels is depicted in a graph below.

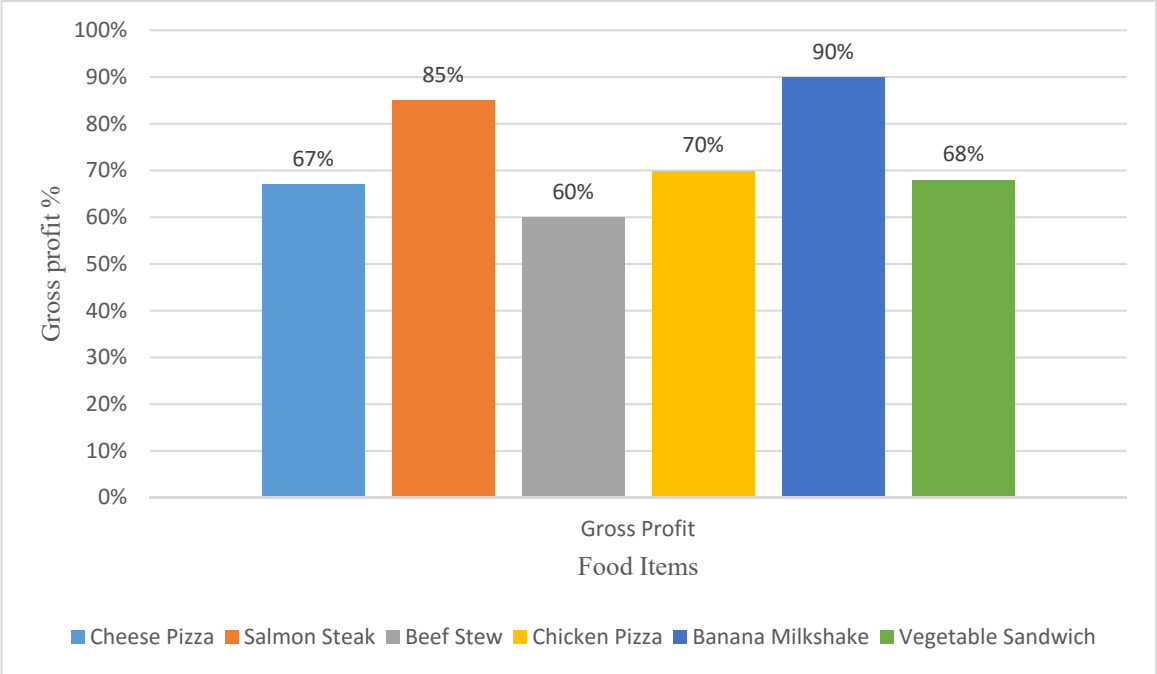

Fig. 4.1 Gross profit comparison for various food items

From the graph, it can be seen that Banana milkshake yields very high gross profit followed by salmon steak. The food item with least gross profit is Beef Stew followed by cheese pizza. Now, let's take a case study to analyze how these units like food cost percentage, gross profit and selling price of food items could be used for the restaurant's advantage with respect to a marketing campaign.

The restaurant manager thinks of giving a discount on the occasion of some special day or festival, For example, like Christmas. On the occasion of Christmas, the restaurant needs to discount certain food items on their menu to attract customers to their restaurant. The above mentioned items in the table are the items shortlisted for the discount. Within these items the restaurant manager has to choose any three food items and highlight them in the advertising campaign. It's part of a marketing for Christmas. Which items would the restaurant manager would choose without affecting the normal restaurant operations.

Logically, the items with highest gross profit are to be selected as they would contribute to a healthy discount rate. But the restaurant manager would also have to consider the selling price of the food items and compare them with gross profit percentage. The food item with highest selling price, in combination with high gross profit would be the ideal choice for giving discount. The reason behind this is, the high selling price means that particular item can afford a discount and attract customers to order that product. Also, the food item with high selling price would be marketed. This is a win-win situation for the restaurant. It can attract more customers and do easy marketing of their food item with high selling price.

Based on this concept, the restaurant manager would select Salmon steak and Chicken pizza for the discount campaign as these two items can afford a discount and yet give a good gross profit to the restaurant. Also these two food items are marketed and probability of customers buying this product after the discount period is high.

4.6 Pricing the Restaurant menu

Restaurants design their menu in such a way that the price tag of food items synchronize with the facilities the restaurants provide. A restaurant with sophisticated facility is more likely to design their menu with food items of high price. They take into consideration, the labor expenses, service quality, facilities, food quality etc. [16]. This is like an unwritten rule that restaurant managers understand. Also, a restaurant with ordinary facility providing decent service and quality would have average price tags for their food items in their menu. If they charge more than the market average, they are more likely to lose their customers to other competitors. So determining the price for every food item should do justice to their own restaurant range. Pricing a food item with the context of fixed and variable cost is ideal.

For example, a fast food restaurant gets ready to serve breakfast to the customers. It sells only sandwich for breakfast. All the necessary equipment required for making the sandwich are ready and are in operation. Sandwich maker is heated. The Sandwich is already prepared except for grilling and heating. A customer arrives and orders a sandwich. The cost of one sandwich is 5 €. The food cost for preparing the sandwich is 2€. This is variable cost. The equipment being used to prepare the sandwich are fixed cost. The electricity used for heating the sandwich maker is fixed cost. So is the packing box for that sandwich. These fixed cost are to be covered by selling many units of sandwich. A single sandwich cannot be used as a parameter to tell whether the restaurant would cover the fixed costs for that operating day. It depends on the total sales that day.

While pricing the product, the restaurant manager has to take into considerations the taxes, rent, insurance expenses, loan expenses and various other fixed costs and try to cover those costs in the pricing of the product [16]. Variable costs are the labor and food cost only. Therefore, based on how many labors are into the duty to prepare that product, their wages can be taken into calculation. While setting the gross profit margin for that product, the manager has to ensure that he is again considering all the possible fixed costs involved to prepare that food item. By this way, the restaurant could determine the ideal price of that product and compare it with its competitors.

5. LABOR PRODUCTIVITY

5.1 Labor Costs

Labor costs could either be fixed costs or variable costs. The labor costs that are to be covered by the restaurant irrespective of the total sales or the number of working hours fall under the fixed costs category. The labor costs that are paid to employees who work on an hourly basis or based on their performance are variable costs. It is influenced by the total sales and how much contribution a single labor has made. Based on these parameters, the labor costs are covered for employees under variable costs category.

The restaurant manager has to decide the number of permanent and temporary employees in the restaurant. The permanent employees would always prefer fixed salaries and wages. Also, the restaurant has to cover their insurances and pay incentives regularly [20]. The productive labor deserves fixed salaries and the restaurant manager has to decide upon the number of employees he wants to keep permanently. For the employees who fall under the variable costs category, their productivity could be increased by proper scheduling of their working time.

5.2 Extras per Man hour

This calculation is useful for determining the extra work hours that each employee works and how much should be their wages for these extra hours covered. In front of the house, the serving staff are hired in such a way that they are enough in numbers when the customer count is at full capacity. In other times, when the restaurant is not at full capacity, the manager needs to know the total man hours of the staff per day or per shift.

Total man hours of the front house staff per day/ shift is illustrated by this example.

Number of front house serving staff = 5

Number of working hours = 7 hours

Total server man hours per day = 5 serving staff X 7 hours

Total man hours per day = 35 hours per day

From the above example, the restaurant manager is guaranteed of 35 serving man hours for that day from his 5 serving staff. The wages for these 5 serving staff are variable costs, payed based on their total working hours. In case of any other extra work required to be done other than their regular hours per day, it is called as Extras per man hour. For all the extra man hours, the wages can

go up significantly. So when fixing the wages, the restaurant manager needs to consider the actual number of working hours required rather than fixed working hours like 7 hours in the above example. Similarly, these man hour calculation can be done for other working units as well. In kitchen, the total man hours of kitchen work per day/shift is given by,
Number of staff X Number of working hours = total man hours of kitchen staff per day/shift.

5.3 Average labor cost per cover

In order to calculate the average labor costs per cover, the cover metrics need to be calculated first. Cover metrics describe the serving tables served per man hour.
Total covers served per man hour is given by the formula,
Total covers served / total man hours = Total covers per man hour
Example, 210 covers / 35 man hours = 6 covers per man hour.

By this cover metrics, calculating average labor cost per cover can be determined. The average labor cost should be calculated for each of the food items in the restaurant menu. It helps in determining the price of the food item. When food cost is determined and food cost percentage is calculated, the remaining left is called gross profit. Average labor cost per cover can be subtracted from the gross profit for a particular food item. From this, we can determine the labor cost for each of the food item on the restaurant menu.
Example,
Assume that average wage for kitchen staff is 12 hours per hour.
Number of kitchen staff working = 5
Number of working hours per day = 7 hours
Labor cost for total man hours per week = 245 X 12 € = 2940 €
Total number of covers served per week = 1200 covers (assumed)
Labor cost / cover = 2490 € / 1200 covers
Average labor cost per cover = 2.45 € per cover.

This calculation of average labor cost per cover gives the necessary data about labor cost for each food item served. If this calculation is applied for all the food items on the menu, it would be helpful in determining the price of the product, whether it is profitable venture to continue selling that food item etc.

5.4 Labor Costs as a percentage

Just as the food cost as a percentage metric gives estimation of how much food cost it takes to prepare a particular food item on the menu, the labor cost as a percentage determines the labor cost for that food item to be prepared.

Labor cost percentage = Payroll / Total sales

For example, In an operating week, the total sales account to about 30,000 €. Labor payroll accounts to about 8,000 €. The total food costs are estimated to be 12000 €.

Labor cost as a percentage = 8000 / 30,000

Labor cost as a percentage = 26.66 %

When food cost as a percentage is also added with this labor cost percentage, it would yield the prime cost. From the overall sales, the prime cost can be subtracted to get the profit for that week.

5.5 Scheduling the labor

The most important parameter concerned with labor productivity is the work scheduling process for the restaurant labor. Labor productivity could increase significantly if the restaurant management schedules the right number of labor for each operation [21]. Over committing staff to an operation that requires less staff is a decline in productivity. Also, committing less staff for an operation that requires more staff would also reflect negatively on the productivity. Labor scheduling could be perfected if the restaurant takes the following measures.

1. The restaurant management need to know the peak hours of operation and the hours where the customer count is expected to be minimal [14]. Mitigate labor based on customer count and overlap shifts.
2. Categorizing the full time employees and part time employees and calculating their total labor hours per day would give the restaurant manager a clear idea about how to schedule his labor.
3. On occasions where restaurant customer count is predicted to decline, the part time labor could be cut short for those working days and the restaurant can manage with full time labor. The reason behind this is because part time labor is paid based on their working hours and they usually are not guaranteed exact working hours per day [20].
4. Employee relation building is also very beneficial when it comes to establishing long term contracts with employees. Accepting employee requests for leave or time off might boost the employee morale and they might be available for future scheduling programs or might agree to work overtime when required.

5. A visible check sheet where employees could always check their attendance and working hours could be helpful in sorting out time and avoids confusion among employees.

5.6 Employee Turnover Rate

Employee Turnover rate is the percentage of employees that get fired or leave the job during a specific time period. It is calculated to estimate the cost of firing or replacing an employee. In restaurant industry, the employee turnover rate is highest when compared to other businesses. Restaurants need to reduce the employee turnover rate as it might reduce the operational efficiency. The newly appointed employee might have to undergo a training program and by the time he joins actual work, the restaurant might experience significant decline in their operational efficiency. Especially, when restaurants sack high level employees under contract like managers, the compensation cost is more than the actual salary of the employee. Finding suitable replacement might take time and is always a tiring process. Also the restaurant loses an experienced employee which is a potential leadership loss at the workplace. Removing service staff and other low level employees could also reduce operational efficiency but not to the level like management employees. The employee turnover rate is calculated by considering a specific time period. Staring time of that time period and ending time of that time period should be noted with number of employees worked and currently working numbers.

(Starting number of employees + Ending Number of employees) / 2 = average employee count
Lost Employees / Average employee count = Employee Turnover rate

If an employee asks for incentives and other add-on payments, it would be wise on the restaurant management to accept these claims and keep the employee happy [7]. Also granting permission for leave, approving the employee request about a change in work shift of his choice and treating employees with dignity will make the employee feel that, he is part of a team rather than a waged laborer. These petty issues are important because it promotes working relationship between the management and its employees. As a result, an employee would want to work long in such a cultured working unit and establish himself. Employee turnover rate could be reduced because of such measures which in turn would contribute the restaurant management with increase in their labor productivity.

All the labor related metrics discussed are essential in checking the labor performance in all units. Each of the metrics ensures labor productivity in its own right. The overall labor productivity calculations will yield the right number of labor required for a specific restaurant operation. Depending upon this, the restaurant management can hire or discharge labor and maintain their productivity range. Since, the labor costs are the major expense in restaurant operation, achieving labor productivity is of paramount importance to the management. The wages paid to the laborers need to updated according to their performance and the amount changes with time because of the market demands. The restaurant management has to analyze these changes and set a wage budget for their labor force.

CONCLUSIONS

Analysis of operational efficiency of restaurants is carried out and the following solutions are recommended in order to achieve improvement in productivity.

1. A smart investment methodology would ensure that whatever the restaurant management invests on, it has a valuable return on investment. In this way, no new investment is a risk.
2. Inventory management and waste management provides proper utilization and systematic monitoring of all the resources purchased and collected respectively. This is a very important step in achieving productivity with respect to food preparation.
3. Maintenance programs carried out regularly would guarantee continuous process without any hindrance thereby keeping the restaurant operations in full flow.
4. Quality assurance policy states that productivity achieved at the expense of quality is not the real productivity and emphasizes to keep the quality standards in all operations.
5. The various costs involved with restaurants and establishing standards to tackle and control these costs suggest that committing to large amount of fixed costs is a risk. The labor force barring the corporates and the managers should be contracted based on variable costs.
6. Labor cost metrics and training programs for labor force yield the exact required number of labor for each unit operation and training these labor to improve labor productivity.

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APPENDIX

STUDENT: SALMAN MUNAVAR (salman.munavar@ktu.edu)

GUIDE: Assoc. prof. Antanas Čiuplys (antanas.ciuplys@ktu.lt)

Name PJAZZ Ligita Katauskienė Vyr. vadybininkė

Category - Popular public restaurant

Location - Kaunas, Lithuania.

The survey was primarily focused on operational trends in this restaurant. The main motive behind this survey was to gather knowledge about existing operational trends and how the workload is managed. The restaurant facilities and the work staff were in operation while this survey was done.

1. Which are the 3 most popular dishes ordered by the customers?

Pica ; Cezario salotos ; Sriuba

2. Which are the 3 least popular dishes in your menu, with respect to least number of times ordered by the customer?

Salotos su kiauliena; Napoleonas; Kalakutienos šaltibarščiai

3. Do you have pre-determined estimation of how much inventory stock is required to prepare your most popular dish on your menu?

- [x] Yes
- [ ] No

4. How many employees are working in your restaurant branch?

19

5. How do you pay your employees working in your restaurant branch?

- [ ] Fixed Wages per day/ week
- [x] Variable wages based on working hours
- [ ] Variable wages based on customer count

6. Do you have any estimation of customer count on a weekly basis?

- [x] Yes
- [ ] No

7. If Yes, kindly specify the customer count based on.

Most Popular day of the week - ~~šeštadienis~~ Penktadienis Friday

Least Popular day of the week - pietus lunch

Most Busy time of the day - vakaras night

Least Busy time of the day - 25

8. How many serving tables are there in your restaurant and how many customers can you take at full capacity?

Serving Tables - 25

Full capacity - Hundred

9. How many customers waste their food serving in a day?

- ☐ 1 out of 2 customers
- ☐ 2 out of 3 customers
- ☐ 1 out of 4 customers
- ☐ 1 out of 5 customers
- ☒ 1 out of 10 customers

10. How often do you experience food wastage due to accidental spills, mismanagement by servers or inevitable mistakes during food preparation?

- ☐ Happens every working day
- ☐ Happens every 3 working days
- ☒ Happens every week

11. How does your restaurant deal with food wastage?

- ☐ End up as waste garbage
- ☒ Contract with recycle plant
- ☐ Distribute to poor in the locality
- ☐ Others

12. How often do you run a maintenance program to ensure smooth working of your kitchen equipment?

- ☒ every month
- ☐ every quarter
- ☐ every year
- ☐ only when there is a defect