

# Cost Modeling of Business Processes and Structure of Discrete Accounting Objects: Experience of Restaurant Business

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**Abstract.** Nowadays, the interest to integrate the concept of business process management with the accounting system and to form accounting and analytical procurement of customer-oriented management is increasing. Customer-oriented management is the priority direction to increase the competitiveness of a restaurant. Its main indicators are maximum customer satisfaction with the menu items, the suitable balance of quality-price ratio, and cutting time of waiting for the order. An innovative discrete approach to the structure of cost accounting objects and business processes is defined. Costing formation by the example of the organism's discrete development in the natural sciences is presented. The concept of customer-oriented management is implemented based on the innovative discrete approach taking into account specifics of the restaurant business. The model of cost accounting of discrete object of a meal "Salad" and the business process of its preparation within time/level of readiness parameters are developed based on system and process approaches. It shows the relationship between time and costs and demonstrates the process of direct costs accumulation of cooking at every stage of the business process. This model will allow us to make well-considered management decisions to improve the restaurant's activity in the future.

**Keywords.** Costs, Business Processes, Accounting, Restaurant Business.

## 1 Introduction

The restaurant business in Ukraine has shown rapid growth in recent years. The high level of competition does not allow the use of the price factor to increase revenue. At the same time, customers' requirements for product quality and cutting time of waiting for the order are constantly increasing.

Production costs and time are the main relevant factors of competitive advantage for restaurant businesses in the modern market. However, the real costs of meals and operations in many restaurants are often unclear or give the wrong idea, as the cooking and service processes go beyond the functional boundaries. There are some constraints connected with traditional production cost accounting systems as well.

To gain a competitive advantage, restaurants have to implement innovative

modeling and interdisciplinary methods of structuring discrete accounting objects and transforming business processes. This will transform the cost accounting system and cost calculation.

The purpose of this paper is to describe the experience of a restaurant in a resort town in terms of costs, based on business processes modeling and the structure of discrete accounting objects.

Design / methodology / approach - a case study was performed in the restaurant. Interviews have been conducted and a database of costs and activities have been analyzed.

The scientific hypothesis of the study means that time-based cost modeling of the structure of discrete accounting objects and business processes contributes to the performance improvement of restaurant businesses by identifying and eliminating non-value-added areas.

## **2 Related works**

The social evolution has been influenced by certain factors and phenomena, which have great importance on economic system establishing. The authors presented their views on the civilization process development and created various theories and concepts with the most famous A. Toffler's theory [1]. Accounting, as an integral part of economic affairs, is directly influenced by civilizational transformations. Evolutionary development of accounting took place according to the challenges and requirements of historical periods that followed each other. To describe them, A. Toffler introduced a concept of "waves": agricultural, industrial, post-industrial (information, post-information, digital, knowledge economy).

At the same time, each country and nation have its specifics of civilizational development that influence economic system formation and accounting system transformation. J. Archambault and M. Archambault paid attention to this fact and stated that cultural, social, economic, and political factors can influence the disclosure of financial information [2].

The paper of A. Abeygunasekera, et al. provides a detailed synthesis of the existing literature on the nexus between accounting and BPM. The paper confirms the dearth of work that ties the two disciplines; despite the synergetic multidisciplinary results that can be attained [3].

A comprehensive review of the scientific literature led to the following conclusions. Research that ties BPM and financial accounting was not identified at all. Lack of conceptual work that explores the potential nexus between accounting and BPM, and lack of literature reviews that synthesize prior studies related to aspects of the two areas. Authors encourage accounting researchers to see how they can contribute to another discipline like BPM and encourage BPM researchers to see how well-developed Accounting principles can be applied to address some of the long-standing gaps in the BPM field [3].

They also approved the emergence of publications in the late 1980s and the increase of interest to integrate the concept of business process management with the accounting system since 2007 [3].

Studies of foreign scientists promoted the process approach to management and accounting in Ukraine [4-10]. Business processes in [11-13] are analyzed as accounting and management objects.

### **3. Cost Accounting System and Business Processes in Restaurants**

#### **3.1. Traditional model of cost accounting system**

Kherson region has the largest seafront of the Black and Azov Seas in Ukraine. A large number of resort towns and cities set their budgets by tourist infrastructure. Hotels, cafes, and restaurants are densely spaced so they have equal access to the markets for raw materials and labor, delivery channels, and production equipment. The similarity of available food products and a relatively equal level of staff qualifications make it impossible to differentiate the range of restaurant products and individual pricing systems. The competition between restaurants for the most favorable conditions of production and distribution of their products and services is increased by the climate conditions, allowing to work on average four months per calendar year, and the limited number of customers, determined by the places for tourists.

We studied the characteristics of cost accounting and calculation based on the example of the restaurant business of the Kherson region. The analyzed restaurant has the following divisions: (1) Bar, (2) Kitchen, (3) Service, (1) Warehouse.

Let us consider the features of accounting in the kitchen. For accounting in the kitchen is a responsible chef. His duties are not only accounting of raw materials and products, but also controlling the shelf life of products to write it off timely. An important aspect of the restaurant is the minimum price and maximum quality of raw materials for cooking meals and products. Therefore, firstly restaurant considers several suppliers, chooses better terms of supply, and prefers a particular company according to the quality-price ratio of raw materials and regularity/volume of supply. The high competitive level and customer requirements for the quality of products sold by the restaurant require to cook meals from the freshest products.

An important aspect of the restaurant's activity is the menu, which significantly determines its uniqueness and attractiveness to invite more visitors. Menu development is the chef's responsible. The analysis of the menu of several restaurants in Kherson region shows a certain similarity of the assortment, which is usually divided into two parts:

- kitchen menu: breakfasts, cold dishes, appetizers, salads, kinds of pasta, side dishes, pizza, sushi, desserts;
- bar menu: hot drinks, wine menu, cocktail menu.

The next stage of the research is the cost accounting system. In accounting, the costs of food, semi-finished goods, and other products used for cooking ready meals are accumulated on the account "Production". Other costs connected with cooking (salaries of kitchen workers, depreciation of equipment, energy costs) are accumulated on charges account. Each meal or product has its calculation for items of raw materials according to the recipe.

Job order cost card is drawn up for each meal or product which forms costing per a calculation unit based on costs of the raw material and its norms according to a recipe. The restaurant also produces signature dishes sold exclusively in this restaurant with a non-traditional recipe and/or chef's technology. The next step is to specify the value of ingredients per serving, taking into account the output of a particular type of meal or product.

In cost accounting, special attention is paid to the norms of raw materials costs and monitoring their compliance. To meet this goal, the restaurant develops a technological description for each meal (product), which contains the following information: (1) product name and use area of the technological map; (2) list of raw materials to produce the meal; (3) requirements for the quality of raw materials; (4) norms of gross and net weight of raw materials, norms of the output of semi-finished product and finished product; (5) description of cooking technological process.

The percentage of premiums over the purchase price reflects the complexity of the meal and the cost of service. The organization of production is focused on cooking meals based on a certain set of ingredients. The traditional model of the cost accounting system involves the accumulation of direct costs (the cost of ingredients) and price-setting by a fixed trade margin (%).

Consequently, the activity of the restaurant business is connected with different heterogeneous costs neither in composition nor in purpose within cost accounting. In the "as-is" model the first stage is the development of meals from the menu, the second includes calculation and costing, the last stage determines its price. The usage of a fixed trade margin can lead that the price will be much higher than competitors have. As a result, there is a high risk that a particular meal will not be in demand because of the high price and time for order processing. In other words, the traditional model takes into account one of the indicators of customer-oriented management - quality, others - the customer-friendly price and waiting time are not taken into account in the model.

### 3.2. Modeling of the structure of discrete production cost accounting objects and optimizing business processes

In the previous paragraph, we have analyzed the existing production cost accounting model and identified its drawbacks. Only costs and time can be considered as relevant factors for a highly competitive restaurant business. The price of restaurant products is determined by the market and competitive environment. Therefore, the current economic and industry situation requires using a target price, which will focus on the restaurant. As a result, the pricing formula is changed (Fig. 1).



Fig. 1. Pricing formula with a focus on a target price (author's development)

Thus, the retail price for a meal becomes fixed, costing will consist of the market price of the ingredients, while the trade margin becomes a variable component calculated by dividing the target price and costing. Since cooking technology cannot

be dramatically changed and savings of the products will consequently lead to loss of quality, the problem solving belongs to innovative methods such as business process modeling and the structure of discrete accounting objects.

Business process modeling is prospective, but a relatively new area of accounting compared to other disciplines. It is an interdisciplinary approach to identifying, designing, executing, documenting, measuring, controlling automated, and non-automated business processes to achieve target results according to desired goals.

Cost accounting is a part of management accounting and focuses on the use of financial and non-financial information to plan and control activity and information support of the managerial decision-making process. It refers to identification and accumulation of costs connected with a product, process, or service. Business process modeling is used to improve, redesign, or re-engineer existing business operations to improve overall performance or effectiveness. Accounting and business process management work for the same purpose – to increase business efficiency by identifying productive activities and eliminating unproductive ones.

Let's focus on the kitchen menu. The menu has the "favorite" or "outsider" categories. Favorites include well-known meals with the classic recipe, designed to clients who are not risky enough and have traditional preferences. Meals of "outsider" categories are designed to customers group who prefer to experiment and visit restaurants in search of new exotic flavors, and what is the most important, they are willing to pay a higher price for it. Based on the results of the restaurant visitors interviewing we made the following conclusions: (1) factors such as price, variety, creativity in the recipe and serving meals influence the client's choice; (2) the number of consumers who prefer exotic meals and want to taste something unusual is significantly less than traditional visitors. Based on the presented meals classification, the chef creates a menu of meals that have a classic recipe and signature dishes of a restaurant. Food freshness and the shortest term of cooking are necessary for standard and signature dishes, therefore, it is necessary to form the largest number of dishes with the same raw material base and to optimize the term of cooking. So, the choice of meals and the creation of the menu has a radically different design: the maximum number of meals with a minimum set of products.

Therefore, to design a menu of a restaurant it is necessary to take into consideration that it should contain a various range of meals and ingredients available in the region. Since foods usually have a short shelf life, especially in the summer, the chef should offer a maximum range of different meals with a minimum set of identical ingredients. Another direction is to optimize the process of cooking a meal/product and identify items that will shorten the cooking time. Accordingly, a discrete structure of finished goods (meal, product, etc.) and a business process reflecting the flow of cost formation in stages become the objects of the cost accounting system.

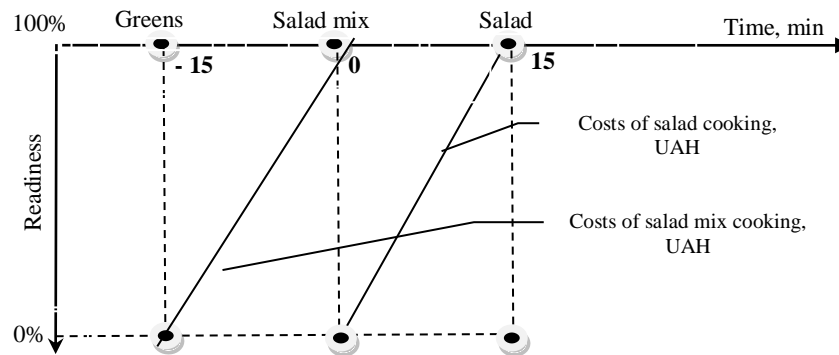
### **3.3. The architecture of an innovative cost accounting model and results of the implementation**

Gotze and Mikus [14] identify three directions of management to improve performance efficiency: to improve product quality, to reduce service time, and reduce product unit cost. Each theory becomes more clear and available if it can be

applied to solve practical problems. We will present the analysis and synthesis of discrete accounting objects (a meal and its cooking process) in restaurants. We will use elements of combinatorics and build a model of cost accounting of production and costing of a meal within customer-oriented management on the example of Caesar salad by classic recipe.

A meal “Caesar salad” according to the classic recipe consists of a certain set of ingredients. Firstly, we combine certain ingredients into components such as salad mix, dressing, and other ingredients. The salad mix contains a set of standard greens. In this approach, the salad mix (basil, dill, parsley, green onion, another salading, etc.) should become the first component of a subgroup of salad groups.

The second component will be dressing. Each salad has its dressing, but the set of ingredients is almost identical except for the single spices that determine the individual taste. The third component is a set of standard salad products (eggs, cheese, etc.). The allotted time for cooking any salad from the restaurant menu is 30 minutes. The pace of life of modern people is very fast, so the time of salad cooking should be reduced. Another reason is to free up time for a customer to order an extra meal, even if he has not planned it. Let’s consider the model of cost accounting and costing in time/availability parameters (Fig. 2).



**Fig. 2.** Model of the discrete cost accounting object of a “Salad” and business process of its cooking in time/level of readiness parameters

It should be noted that the perception of the model will be different from the observer’s status. The observer in the internal system (restaurant) will see two separate processes of cooking, and therefore the costing formation. The first stage is the cooking of a salad mix from a set of standard greens. If it is ready, in the accounting system the salad mix will be entered in records as an own produced semi-good. During the salad cooking process “Salad mix” is displayed as one of the components of the meal. Whereas, the salad, as an object of accounting for production, begins to accumulate costs from scratch.

Time as a category is equal to pronounced 30 minutes with a gap in the middle of the timeline, which allows preparing the mix in advance before the order is received from the restaurant hall. For the observer from the external system, in our case, the client, salad is perceived as the one object with the cooking time in 15 minutes.

Let’s introduce the implementation of the proposed model in the software environment (Fig. 3). To reflect the costs of cooking in the model, it is necessary to

create a base of ingredients in the program to form the costing of the modifiers and the meals. In an item master data a group of "Semi-finished goods" is formed, which will include components of future meals. All other ingredients for cooking are included in the group "Raw materials for the kitchen".

Caesar salad

| Гр                    | Код | Наименование    | Единица | Точ.вес | Замена | Закупка | Розница | Закупка, за 1 кг | %Нац | Розница, за 1 кг | Брутто | Нетто | Выход | Закупка | Розница | Итого сумма,грн |
|-----------------------|-----|-----------------|---------|---------|--------|---------|---------|------------------|------|------------------|--------|-------|-------|---------|---------|-----------------|
| 30                    | 910 | Заправка цезарь | порц    | 1       |        | 12,24   | 22,03   | 12,24            | 80   | 22,03            | 1      | 1     | 1     | 12,24   | 22,03   |                 |
| 30                    | 912 | САЛАТНЫЙ МИКС   | порц    | 1       |        | 4,98    | 8,96    | 4,98             | 80   | 8,96             | 1      | 1     | 1     | 4,98    | 8,96    |                 |
| 02                    | 149 | Сыр Пармезан    | кг      | 1       |        | 330     | 594     | 330              | 80   | 594              | 0,02   | 0,02  | 0,02  | 6,6     | 11,88   |                 |
| 02                    | 116 | Помидор в асс   | кг      | 1       |        | 10      | 18      | 10               | 80   | 18               | 0,07   | 0,07  | 0,07  | 0,7     | 1,26    |                 |
| 02                    | 164 | Хлеб            | шт      | 1       |        | 10,4    | 18,72   | 10,4             | 80   | 18,72            | 0,02   | 0,02  | 0,02  | 0,21    | 0,37    |                 |
| Итого по калькуляции: |     |                 |         |         |        |         |         |                  |      |                  | 2,110  | 2,110 | 2,110 | 24,730  | 44,508  |                 |

Dressing Caesar      Salad mix

Fig. 3. The job order cost card "Caesar salad with chicken"

The item master data will record as well the name of finished goods: meals, drinks and others, so it is intended to form a full list of products used in the restaurant in the database. The use of the item master data allows accruing a trading margin on the purchase price of raw materials.

The costing writing off the process of a sold meal is done in an algorithm. The first step is to receive an order from a customer. The waiter accepts the order from the guest, puts it in the monobloc, then the order goes to the kitchen through the printer. The program already contains information about the structure of the meal in the job order cost card. The costing of the meal is written off the costs simultaneously with the revenue reflecting from sales at the time of recording the order. If information is recorded timely and correct, data on the value of sold products and residue stock in the kitchen will be the most accurate and available online.

#### 4 Conclusions and Suggestions

The traditional cost accounting system and costing of meals of the restaurant are based on the direct costs of production while costing of self-made meals/products is determined by the prices of raw materials and purchased semi-finished goods and retail margin. Other costs are considered indirect. The retail price of a meal is based on costing and a fixed margin expressed as a percentage. As our restaurant is not a VAT taxpayer, it is not included in the calculation. The traditional model of cost accounting means the accumulation of direct costs (product costs), which determine the cost of a meal, and the formation of prices by a fixed trade margin (%). However, the methodology does not take into account indicators of customer-oriented management.

The obtained results confirm the scientific hypothesis and allow us to formulate the following conclusions: to gain competitive advantages aimed at maintaining a

positive image of the restaurant, we proposed innovative transformations for the maximum customer satisfaction within the shortest possible period of time. To implement the innovation, an innovative structured approach for the cost accounting model was developed: (1) modeling the structure of discrete accounting objects, the business process optimization, and establishing the interrelation of the structural elements of the accounting objects and stages of the business process with the time factor; (2) the architecture of an automated cost accounting system based on financial accounting data to implement innovation and automated software development.

The proposed innovative approach was implemented in the restaurant and has created specific economic benefits. A new understanding of accounting (discretion) and technological process (business process) is the result of research that qualitatively differs from its previous comparables, creates new consumer values, and promotes a positive image of the restaurant and economic impact. The use of a target price for a meal/product radically changes the pricing method, namely, the retail price becomes fixed and is set according to the market situation and the price of competitors. The trade margin becomes a variable indicator calculated by dividing the target price and costing, which allows managing the relevant factors.

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