

## NECESSITY AND CONTENT OF THE HOSPITALS FOOD DEPARTMENT PRODUCTION PERSONNEL PLANNING

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### Abstract

The dietary food departments' personnel planning problem is relevant to both public and private hospitals as these production activities affect the cost and quality of service in general. In the absence of an adequate methodology for determining the needs of a personnel amount, these activities are caused by a variety of subjective and objective factors. The purpose of this publication is to substantiate the need for production personnel planning in the hospitals' food departments and to provide a reasonable methodology for determining the number of staff required.

The proposed methodology is prepared taking into account the complexity of the prepared dietary dishes, the number of these dishes required for the manufacture and the length of the working day and the working week.

The result of numerous studies is the proposed formula (1), the application of which allows precisely calculating the required amount of production personnel: (1), where - the number of employees required, without yet having been evaluated by workers' work and rest regimes; n - number of the same dietary dishes required to produce during a day; K - coefficient indicating the complexity of dishes preparation; - a constant coefficient of labor productivity growth, it is equal to 1,14; T - duration of personnel working day. The determination of the coefficient K expressions was the main objective of the study. The final number of employees is determined as follows: (2), where N - final number of

production personnel required; K - coefficient, which having been evaluated in accordance with employees' work and rest regimes.

Use of suggested methodology will help for the dietary meals producing institutions better organize production processes and optimize staff costs.

**Key words:** Food department, Personnel planning, Quantitative model, Amount of necessary personnel.

### 1. Introduction

Personnel planning problems have attracted research interests for a long time ago. These problems have been considerably changed over time, accommodating a variety of constraints related to: legal and organizational requirements, part-time staff, flexible hours of staff, staff preferences, etc. [1]. There is an increasing awareness of the cost in the process of public service provision in the last two decades much effort has been devoted to developing more cost-effective forms of such provision. So, new styles and patterns of public service management and service provision were applied, which has affected significantly the cost of health care food service also [2]. The use of more industrial technologies reduced the cost, but as far as food quality has worsened. It is shown in the recent survey of patients. But it is obvious that in the area of food making, the cost of food production has a direct

impact on dishes quality [3]. Even the proper quality of dishes is especially important for the production of dietetic foods in hospitals.

Increased focus on nutritional status of patients has been observed from ward personnel with no connection to the kitchen. So, how many personnel are necessary for preparing a certain amount of dietary dishes? The dietary food departments' personnel planning problem is relevant to both public and private hospitals and for other health care institutions as these production activities affect the cost and quality of service in general. In the absence of an adequate methodology for determining the needs of a personnel amount, these activities are caused by a variety of subjective and objective factors.

The goal of this publication is to substantiate the need for production personnel planning in the dietary food departments of the hospitals and other health care institutions and to provide a reasonable quantitative model for determining the number of staff required.

## 2. Materials and Methods

Analysis of management literature was made in order to find out the need for personnel planning. Then possibilities analysis to adapt some general formulas, which are submitted by the authors of management literature, was made for determining personnel number of dietary foods production. Also, photography of working time was made in the dietary food production departments in order to determine possible complexity of dishes preparation.

In the same order numerous calculations were carried out: the number of the dietary dishes components, the weight of the components, components processing time, and so on. The influence of employees' qualification on processing time and quality of production was also determined through experts' assessment, other necessary information has been found by staff surveys and interviews. However, the staff survey information was not used in this article. During the study, the staff felt tight, tensed, so an expert interview for getting some information was preferred. Survey of patients was organized in order to get information about production quality, while experts' assessment was used to determine the coefficients of work susceptibility.

## 3. Results and Discussion

Personnel planning for producing of dishes starts even in the house kitchens, long ago. Every housewife, while preparing for a home party, always thinks can she prepare a table with dishes by herself, i.e. without hired assistants. Hence she has to plan about her possibilities to prepare dishes with some help or without it. The

most researchers describe personnel planning as a staff need for future activities of the modern company (forecasting), assessing the emergence of some future work places, problems of changes in employee turnover, and changes in possible future production volumes. Dietary food producing is a more complicated process than the preparation of regular food due to more sophisticated processing, therefore the number of staff identification procedure must be different [4]. The appropriate number of staff is one of the parts of the system.

Petrovic, [1], stated that every work will be done purposefully only by incorporating appropriate amount of personnel required for some work. Therefore, personnel's planning is the current and future labor force demand that is needed to meet the company's objectives. The need for personnel is determined by both objective and subjective factors. In particular, by the principle of saving money, public institutions of health care often seek possibilities to reduce the amount of production personnel. This is typical of Lithuanian hospitals' food departments and for other health care institutions. Worst of all, this is done with the quality degradation, though food quality strongly depends on food production system [5], and the appropriate number of staff is one of the parts of the system. Improper planning of dietary food department personnel even faces a challenge to abuse by personnel time and some finances. This is typical for the public institutions of the post-Soviet countries (also and for Lithuania). Common cases of dietetic food quality suffer due to insufficient number of personnel and, at the same time, due to insufficient technological and organizational control of work. It is therefore purposeful to approve Jorne Van den Bergh *et al.*, [6], view that a personnel planning is suitable people working in the required posts in order to achieve the best results for the company purpose. By naming the suitable people, they meant the most qualified staff, which would be able to overcome the required tasks.

Different masters of dietary food preparing and different researches prefer and use different methods for determining number of required personnel in dietary food departments. Some of them decisions are based on flair, feelings, and experience. According to Vanderstoep and Johnston, [7], such decisions can be appropriate, but always quantitative decisions, which are made in accordance with right methods, have more objective results. In this case quantitative calculations of required number of production personnel in dietary food departments of the hospitals and other health care institutions would be more appropriate because of their better objectivity also. Therefore, it is necessary to look for possibilities to approve classical staff planning methods for the planning of personnel of preparing dietary food.

Summing up these thoughts, it can be argued that a personnel planning is necessary in order to achieve better results of dietary food preparing activity and moreover to prefer a quantitative methods of accounting.

### 3.1 Requirements for the model of determining number of dietary food production personnel

The need for personnel can also depend on the peculiarities of organizing the technological process of food production. For example, dietary food preparing institutions can operate with only semi-finished products or with raw food resources. The proportion between such processed foods may also be different. When working with semi-finished products, it is obvious that personnel will require less than the use primary processing of food (Edwards and Hartwell, [8], Drejeriené and Drejeris, [9], and many others).

Nutrition systems have changed as well with a higher use of buffets and satellite kitchens and less use of central plating in the world during last decade. The educational background of employees has also changed resulting in an increase in number of skilled employees (cooks, catering assistants) in the kitchens and decrease unskilled employees. Öker and Adigüzel, [10], offers different planning according to the needs of qualified employees and unskilled workers, because since the needs of both categories are in the manufacturing companies. The same situation is in the dietary health care departments also.

Creating more new food processing equipment facilitates the work of chefs, but also its management requires adequate cooks' qualification. So, qualification of personnel and equipment use influence also to the number of necessary employees. Better qualified staff can work faster and achieve the same quality results in less time [11]. So, staff qualification is important precondition for calculating number of required staffing. The use of cooking equipment also affects the number of personnel [12]. If modern mechanical and thermal food processing equipment is used, the need of personnel for primary product processing can be reduced. The use of modern technologies reduces the thermal processing time, accelerates and enhances the mechanical processing of products, and is therefore useful for the production of dietary foods. This means that the selection of the equipment needed can affect the number of personnel [13].

The amount of dishes, which necessary to produce, depends on the number of dietetic food people. It is easier to prepare for making dietary dishes, because usually known the required quantity of them. Because in the hospitals, nursing homes and other health care institutions the number of people, which need dietary

nutrition, is known in advance. So, it is obvious that more personnel is required to produce more dietary dishes. Therefore, the number of dishes also affects the needs of personal.

It is more difficult to produce some diet, when it consists of more components. It is obvious, that for producing the same quantity of complicated dishes (which consists of more components and require more complicated processing of resources) will need more personnel than production of more simple dishes. This means that the complexity of the dishes can affect the number of personnel required. But there is quite difficult to assess the complexity of the preparing some dishes for the purpose of comparison them [14]. The expression of the complexity of the dishes can be the number of processed components, the time of production dishes, and the exclusivity of the processed products. Exclusivity would be some aspects of quality, such as a lower quality product processing needs to be more creative input and time.

Bot the food technologies, organizational opportunities of work and the qualifications of personnel are constantly changing, evolving and improving in accordance with the achievements of science and technology and people's economic and social provisions in order to gain competitive advantage or better meet customer needs [15]. These circumstances must influence the need for stopping an unmanageable number of employees. Therefore, in accordance with Cetin and Icigen, [16], the number of employees should be optimal in the current state of technical progress. Hence, some kind of mechanism is necessary, which would allow optimization of personnel number according to mentioned circumstances.

Employees working time can also affect the need of personnel amount. Working hours are generally regulated by normative documents of the country. During a longer working day, personnel can make more dishes or more complicated, requiring more time for dishes production.

The amount of personnel in the dietary food department can be influenced not only by the employee's work duration, but also by the working regime of organization. The longer working time of dietary food organization is a result of more staffing. As a general rule, organizations find a link between the organization's working time and the work schedule of employees. The working time of dietetic food establishments is usually quite long, since the food is made for at least 3 nourishments: breakfast, lunch and dinner. Thus, the organization's working regime and the working schedule of employees affect the number of personnel.

### 3.2 Modelling process of determination number of personnel in the dietary food production institutions

Öker and Adigüzel, [10], suggest determination number of departments and formulas for determining number of employees in each department based on number of orders for unskilled and skilled labour. They suggest necessary qualification improvement for unskilled personnel and also according to a timing calculation for each job performed by both skilled and unskilled workers. The positive experience of these authors, which is expressed on appropriate formulas, can be adapted also in the need planning of the dietetic department personnel.

The simplest, classical and logical model for determining the number of employees [17] should look like this:

$$N = \frac{P_D}{I_D} \quad (1)$$

Where:  $N$  - the number of employees required,  $P_D$  - whole day working volume (or other duration),  $I_D$  - possible output per day (or other duration) of 1 employee.

We will continue to follow this mathematical dependence. The whole working volume can be expressed by the number of dietary dishes necessary to produce -  $n$  (per day or other duration). Multiplied by the number of dishes -  $n$  and 1 dish production time -  $t$ , we would get a number, representing the time required to produce all dishes per day (or other time).

If the time required to produce all dishes per day (or other time) would be divided by the total work time of all employees we would get an approximate number of personnel, which require to produce all these dishes. Still other conditions must also be foreseen. So, a mathematical model to determine the number of personnel is proposed in the following expression:

$$N_1 = \sum \frac{n \cdot t}{3600 \cdot T \cdot \alpha} \quad (2)$$

Where:  $N_1$  - the number of employees required, without yet having been evaluated by workers' work and rest regimes;  $n$  - number of the same dietary dishes required to produce during a day;  $t$  - 1 dish production time; 3600 - amount of seconds per hour,  $\alpha$  - a constant coefficient of labor productivity growth, it is equal to 1.14 (according to the work safety normative documents);  $T$  - duration of personnel working day.

The time to produce one dietary dish is very much dependent on the qualifications of the staff, the equipment used and other factors. Since the dishes are of varying complexity, it would be much easier to include some coefficient assessing the complexity of the dishes production, i.e. work susceptibility. This coefficient would express the time for producing 1 dish also. Let it be coefficient  $K$ . So, the time for 1 dish production may be expressed by formula:

$$t = 100 \cdot K \quad (3)$$

Where:  $K$  - coefficient of work susceptibility (it expresses complexity of dietary dish).

So, total formula for determination approximately number of personnel in dietary food institution would be expressed as:

$$N_I = \sum \frac{n \cdot K}{36 \cdot T \cdot \alpha} \quad (4)$$

The proposed methodology is prepared taking into account the complexity of the prepared dietary dishes, the number of these dishes required for the manufacture and the length of the working day and the working week. But the work and rest regime of personnel was not included into assessment. After all, the longer rest periods for the employee, more of them need to hire [18]. The result of numerous studies is the proposed formula (5), the application of which allows precisely calculating the required amount of production personnel in the institutions producing dietary food.

The final number of employees is determined as follows:

$$N = N_I \cdot P \quad (5)$$

Where:  $N$  - final number of production personnel required;  $P$  - coefficient, which having been evaluated in accordance with employees' work and rest regimes. Expressions of coefficient  $P$  are universal, determined according to the work safety normative documents.

The most popular work and rest regimes and their  $P$  coefficient expression suggested in the Table 1.

**Table 1. Expressions of the coefficient P according to weekly working regimes**

Weekly working mode	Coefficient P
5 working days a week (2 days for rest)	1.32
6 working days a week (1 day for rest)	1.39
3.4 working days a week (3.4 days for rest)	1.59

But how can be determined the values of coefficient  $K$  (the factor of dishes complexity)? In this case to ask opinion of some experts will be necessary.

The determination of the coefficient  $K$  expressions (coefficient of work susceptibility) was one of the main objectives of the study. First of all, different dishes with medium complexity of proceeding were selected (cold, soups, main, and desserts). All of them got a coefficient  $K$  equal 1. Examples are shown in the Table 2.

Based on the proposed (Table 1) medium complexity dishes coefficient  $K$  values experts (the leader of the hospital canteen, chefs, dieticians, dieters, best cooks) have to determine coefficient of work susceptibility  $K$  of the other dishes, which are produced in existing health care institution. The main criteria for assessment is duration of producing the dishes, amount of the cooks producing them, and amount of necessary processes, number of ingredients according to dishes recipe.



**Table 2. Examples of the dishes with determined producing medium complexity (coefficient of work susceptibility K=1)**

Cold dishes	Soups	Main dishes	Deserts
Fresh salad of 2 components with sauce Fried fish with one-component garnish	Vegetable soup with grits Creamy vegetable soup with potato broth-based	Shredded stew meat cooked meatballs or fish balls	Milk cocktail with jam small fried pancakes

**Table 3. Determination necessary number of production workers in the Vilnius Red Cross Hospital food department**

Dishes	Coefficient of work susceptibility	Number of dishes	Approximately number of personnel in dietary food institution
<b>Breakfast</b>			
Salad of the 3 components	1.4	350	0.99
Boiled eggs	0.3	125	0.08
Boiled fish	0.7	125	0.18
Fresh vegetable garnish	0.35	190	0.135
Tea with lemon and honey	0.25	390	0.20
Tea with honey	0.2	160	0.06
Juice	0.1	40	0.01
<b>Lunch</b>			
Vegetarian vegetable soup	0.8	250	0.41
Vegetable soup with grits	1.0	150	0.03
Creamy vegetable soup with potato broth-based	1.0	200	0.41
Juice	0.1	380	0.08
<b>Dinner</b>			
Pancakes from buckwheat flour	0.9	150	0.32
Cooked cheese dumplings	1.1	100	0.22
Milk Soup with Macaroni	0.65	85	0.11
<b>Evening dish</b>			
milk, kefir	0.1	125	0.03
Fruits	0.15	80	0.02
Pap	0.25	215	0.11
<b>Approximately number of the personnel</b>			<b>3.395</b>

Thus, according to example the departments' responsible persons can choose medium complexity dishes by themselves and evaluate (determine) the complexity of the remaining (other) dishes according to them.

### 3.2.1 Example of suggested methodology use

The Red Cross Hospital in Vilnius has 600 beds for patients; most of them almost always are occupied. The hospital has a main kitchen, which, according to diet, produces dietary dishes for all patients of all departments. Very long ago work regime for food department production staff is established as follows: 3.4 working days a week 4.3 days for rest. Duration of employees' working day is 12 hours. Such working regime is possible and legal, as provided for in the Civil Code. In addition, results of the survey showed that it meets needs and requirements both of the staff and of the top management of the food department. So, next step is to make calculation according to suggested formulas and by dishes menu for the patients. Patients cannot choose dishes in this hospital.

Menu for 12 April 2018 and others calculations according to proposed model are presenter in the T able 3.

After considering the work and rest regime, the final number of employees will be calculated according to suggested formula (5):

$$3.395 \times 1.59 = 5.398$$

The result of the calculation has shown that 6 workers are required to produce the indicated amount of dietary dishes. One of them may do not work full time or carry out other activities during the part of working day.

In the real circumstances, there are 6 production workers in the Red Cross Hospital, who work in 2 shifts. The information provided shows that one employee may be taken on a part-time. Such date allowed the hospital administration to save some money by redistributing work, adjusting work schedules, i.e. after, i.e. reducing wages fund.

The proposal was launched on May 2018. Working under new conditions did not reduce the quality of work, but forced the staff to concentrate more and more

focused on achieving the organization's goals in tackling the challenges of the everyday life. The survey of patients showed their satisfaction with the quality of the dietary dishes.

#### 4. Conclusions

- The article demonstrates the need for personnel planning in dietetic institutions based on the research of many scientists in various aspects. Obviously, properly selected personnel can do the necessary work more qualitatively and more appropriately to achieve the goals of the organization.

- Suggested mathematical model for determination necessary number of production personnel of health care institutions is based on the quantitative assessment.

- The necessary amount of personnel depend on the qualification, the quantity of the required dishes, the complexity of them as well as on the length of the working time of the personnel and on the working and rest regimes have been proved. The quantitative expression of all these circumstances is included in the proposed mathematical model.

- Use of suggested methodology will help for the dietary meals producing institutions better organize production processes and optimize staff costs. The proposed model was tested at the Vilnius Red Cross Hospital's Food Department. The results showed a possibility to reduce staffing rates and thus save some money.

- The objectivity and appropriateness of the application of the model proved to be true, since after the reduction of personality the quality of dietary production in the hospital was not adversely affected.

- Processing of the survey results is a further object of our scientific research.

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