UDC 658.15
JEL L6; L8; C19; C29

FEATURES OF THE METHOD OF CALCULATION OF PRODUCTION CAPACITIES OF THE TEXTILE ENTERPRISES

ОСОБЕННОСТИ МЕТОДА РАСЧЕТА ПРОИЗВОДСТВЕННЫХ ПОТЕНЦИАЛОВ ТЕКСТИЛЬНЫХ ПРЕДПРИЯТИЙ

©Tursunov B.
Tashkent State Economic University
Tashkent, Uzbekistan, tursunov-bobir@mail.ru
©Турсунов Б. О.
Ташкентский государственный экономический университет
г. Ташкент, Узбекистан, tursunov-bobir@mail.ru

Abstract. Under the influence of technical progress, in development of technology, production technologies happen considerable changes, their qualitative part changes. They find the reflection, in the complication of the equipment, in its computerization, automaticity of management, increase in single power. Large systems of cars which increase the efficiency of equipment of the enterprises are created and take root and accelerate the process of production due to its threading, a continuity and flexibility. It results in qualitatively new opportunities of creation and growth of production capacities of operating companies and enterprises. The purpose of this article is a determination of essence of production capacity of the textile enterprises how to calculate production capacity, to define what factors influence the size of production capacity in the textile enterprises. To give the main aspects of planning of production capacity of the enterprise, to learn in what way domestic managers will be able to reach a full load of production capacities.In paper have been given formulas of calculation of production capacities of the textile enterprises, a number of factors of the textile enterprises influencing production capacity are studied. The results of the systematic analysis specified in this article can be used in writing of master theses, qualification and term papers and a method of calculation of production capacity in production, in economic departments of the textile enterprises.

Аннотация. Под влиянием технического прогресса, развития технологии, производственные технологии происходят значительные изменения, меняется их качественная часть. Они находят отражение, усложнение оборудования, его компьютеризацию, автоматизацию управления, увеличение мощности. Создаются большие системы автомобилей, которые повышают эффективность оборудования предприятий, укореняют и ускоряют процесс производства из-за его нарезки, непрерывности и гибкости. Это обусловлено качественно новыми возможностями создания и роста производственных мощностей действующих компаний и предприятий. Целью данной статьи является определение сущности производственных мощностей текстильных предприятий, как рассчитать производственные мощности, определить, какие факторы влияют на размер производственных мощностей на текстильных предприятиях. Чтобы дать основные аспекты планирования производственных мощностей предприятия, узнать, каким образом отечественные менеджеры смогут достичь полной загрузки производственных мощностей.

В статье даны формулы расчета производственных мощностей текстильных предприятий, изучен ряд факторов текстильных предприятий, влияющих на

производственные мощности. Результаты систематического анализа, указанные в этой статье, могут быть использованы при написании магистерских диссертаций, квалификационных и курсовых работ и метода расчета производственных мощностей в производстве, в экономических отделах текстильных предприятий.

Keywords: textile enterprises, production capacity, efficiency, resources, calculation of production capacity.

Ключевые слова: текстильные предприятия, производственные мощности, эффективность, ресурсы, расчет производственных мощностей.

Introduction

In modern conditions the problem of a reliable assessment of production capacity of the enterprise became particularly important and is very urgent. Having reliable information on the production capacity of the enterprise, it is possible not only to define adequately necessary (possible) production and level of loading of the equipment, but also to plan such actions as modernization available, acquisition (rent) of the missing equipment (areas) or their transfer to rent to other enterprises.

It is necessary to emphasize that the gained wide circulation and recognition both in domestic, and in foreign literature of a method of calculation of production capacity of the enterprise, shops, the site are founded or on the principle of the direct account, or on the principle of optimization of loading of the equipment with the help linearly — program model. Calculations on their basis are carried out for current (annual, quarter) production planning. Information used for this purpose is not only significantly aggregated, but also does not consider discretization of engineering procedure, its recurrence and the partionny nature of the movement of objects of the labor from one production operation to another. In other words, the difficult multioperating dynamic system which the production based on discrete technology is is reduced to significantly simplified, static, represented one (leader) or several groups of the equipment, system, information on which is provided only by the located and necessary funds of machine time. At such approach such major indicators of discrete production as cycle duration, the size of parties (start and transfer), the level of an interoperational reserve, a step of party of start (turn–around time for party) and others are not considered at all. Therefore results of calculation of production capacity are absolutely inapplicable in quick scheduling of deliveries, productions of a finished product and material support. Proceeding from it need of studying has been created technique of calculation of capacities of the textile enterprises.

Literature review

The main methodological views were formed in classical works of scientists of A. Smith, J. Art. Mile, K. Menchera, D. Nort and A. Marshall. Also, questions of business assets were discussed in scientific works of foreign scientific economists of E. Adam, R. Vilda, H. Dovenkorga, K. Menar, B. Rendega, V. J. Stephenson and R. Chase. In the field of a theoretical basis and feature of management of production capacities of the enterprises of light industry scientists from the CIS countries G. A. Alexandrov, P. G. Bunich, V. A. Vodyanov, N. L. Zaytsev, I. M. Petrovich, R. A. Fatkhutdinov, Ya. B. Kvasha, L. P. Bazilyevich and A. A. Balabins conducted researches. In their scientific works questions of management of production capacities of the industrial enterprises are considered. Organizational and economic aspects of problems of the textile enterprises are investigated in works of scientists V. N. Privalov, Yu.V. Zabaykin and N. B. Kaparov. In Uzbekistan the leading local scientists–economists M. Sharifkhodzhayev, S. S. Gulyamov, B. Yu.

Khodiyev, Yo. Abdullaev, Sh. Zaynutdinov, N. K. Yuldashev, B. Goyibnazarov and O. Aripov were engaged in theoretical questions of management of the industrial enterprises and organizational features. But the review of studying of these literatures indicates that features of calculation of production capacities of the textile enterprises are not studied rather deeply. Questions of calculation of industrial enterprises` production capacities was urgent in all models of economy. In above–stated researches and in scientific works the didn't pay attention to the problem of calculation management efficiency of production capacities at the textile enterprises [1–12].

Methodology

The considered problem requires the solution on the basis of the system approach demanding the accounting of essential signs of discrete production and indicators which are adequately characterizing its dynamics. In this regard we will note that one of possible approaches to its decision in relation to mass and business lot types of productions is offered by the Japanese experts. For small–scale and single types of productions by one of authors the principles of calculation of production capacity considering characteristics of the movement of objects of the labor were offered. However its practical application showed that the research has to be continued in the direction of improvement of calculations of duration of a manufacturing lead time. In the course of the solution of this task by authors it was established what received in results can be used not only for calculation of production capacity, but also for identification of reserves of time on various operations and, therefore, for more exact and effective planning of use of the equipment (jobs).

Analyze and results

Production capacity of the enterprise is characterized by the maximum quantity of production of the corresponding quality and the range which can be made by it in unit of time at full use of the fixed business assets in optimum conditions of their operation. Production capacity of the textile enterprise is characterized by the maximum quantity of production of the corresponding quality and the range which can be made by it in unit of time at full use of the fixed business assets in optimum conditions of their operation.

— output power. The last is calculated by a formula:

$$C_к = C_н + C_c + C_p + C_o + C_{pr} - C_в,$$

here

$C_к$ — power for the end of planning period;;

$C_н$ — production capacity for the beginning of planning period;

C_c — input of capacities as a result of construction new, expansions of the operating capacities;

C_p — a power gain owing to reconstruction;

C_o — increasing in power as a result of technical re-equipment and holding other organizational and technical actions;

C_{pr} — increasing (reduction) in capacities owing to change of the product range;

$C_в$ — reduction of power owing to its leaving.

Except entrance and output capacities, the size of average annual power is defined (C_{cp}):

$$C_{cp} = C_н + (C_c \times T_c + C_p \times T_p + C_o \times T_o + C_{pr} \times T_{pr} - C_в \times T_в) : 12,$$

here T_c, T_p, T_o, T_{pr}, $T_в$ — periods of validity of the corresponding capacities from the moment of their introduction and until the end of planned year.

The relation of the actual production to the planned size of production capacity is called efficiency of production capacity:

$$K_{нс} = O_{pl} / O_{act} ,$$

here O_{pl} / O_{act} — are the planned/actual output in physical units.

The simplest and exact measuring instruments of production capacity are physical units. Production capacities are measured, as a rule, in the same units in which production of this production in kind (in the textile enterprises is planned: tons, running meter, square meters, pieces and couples).

During each planned period production capacity can change. Than more the planned period, that the probability of such changes is higher. Are the main reasons for changes:

–installation of new units of equipment, instead of outdated or emergency;

–wear of the equipment;

–commissioning of new capacities;

–change of productivity of the equipment in connection with an intensification of the mode of its work or in connection with change of quality of raw materials, etc.

–modernization of the equipment (replacement of weaver's and spinning equipment, etc.);

–changes in structure of initial materials, composition of raw materials or semi–finished products;

–period of operation of the equipment during the planning period taking into account stops on repair, prevention, technological breaks;

–production specialization;

–operating mode of the equipment (cyclic, continuous);

–organization of repairs and routine operational maintenance.

Calculations of production capacities in the textile enterprises are carried out on the basis of information on a condition of an equipment in place. At the same time it is necessary to be guided by the following provisions:

–in calculations all cash equipment of the site (the shop, the enterprise), except for reserve is accepted;

–in calculations the effective greatest possible fund of operating time of the equipment at the set working in shifts mode is accepted;

–in calculations the advanced technical norms of productivity of the equipment, labor input of production, norms of an exit of production from raw materials are accepted;

–in calculations the most perfect ways of the organization of production and comparable measuring instruments of operation of the equipment and balance of capacities are accepted;

–when calculating production capacities for the planned period it is necessary to proceed from a possibility of ensuring their full load. But at the same time necessary reserves of capacities have to be provided that it is important in the conditions of market economy for quick response to changes of commodity market demand;

–when calculating size of power equipment downtimes which can be caused by shortcomings of labor, raw materials, fuel, the electric power or organizational malfunctions, and also the losses of time connected with elimination of marriage of production are not taken into account. Production capacity is determined by the power of the leading shops, units or sites. The leading shops, sites or units are understood as those from them where the main and most mass technological operations on production of finished (main) product are carried out and in which the prevailing part of the equipment is concentrated. In textile is a spinning and weaver's production.

For calculation of production capacity in the textile enterprises the following basic data are used:

–the list of the production equipment and its quantity by types;
–modes of use of the equipment and use of the areas;
–progressive norms of productivity of the equipment and labor input of products;
–qualification of workers;
–the planned nomenclature and the product range which are directly influencing labor input of production at this structure of the equipment.

If equipment productivity is known, then the production capacity of the textile enterprise is defined how the work of passport productivity of the equipment in unit of time and planned fund of time of its work (Tef):

$$M = Tef \times a \times H,$$

here Tef — effective fund of work of a unit of equipment, hour;
a — the number of the same devices, cars, the units installed in office (the site, the shop);
H — the hour norm of productivity of a unit of equipment on the passport of manufacturer expressed in the final product (t/hour, $м^3$/hour, $м^2$/hour et. c.).

If it is known what actually from the equipment is removed production more, than it is defined by the passport, then it is necessary to use in calculation of power technically reasonable norm of productivity determined by production workers.

It should be noted that in the textile enterprises a number of factors generally exert impact on the size of production capacity (Figure 1):

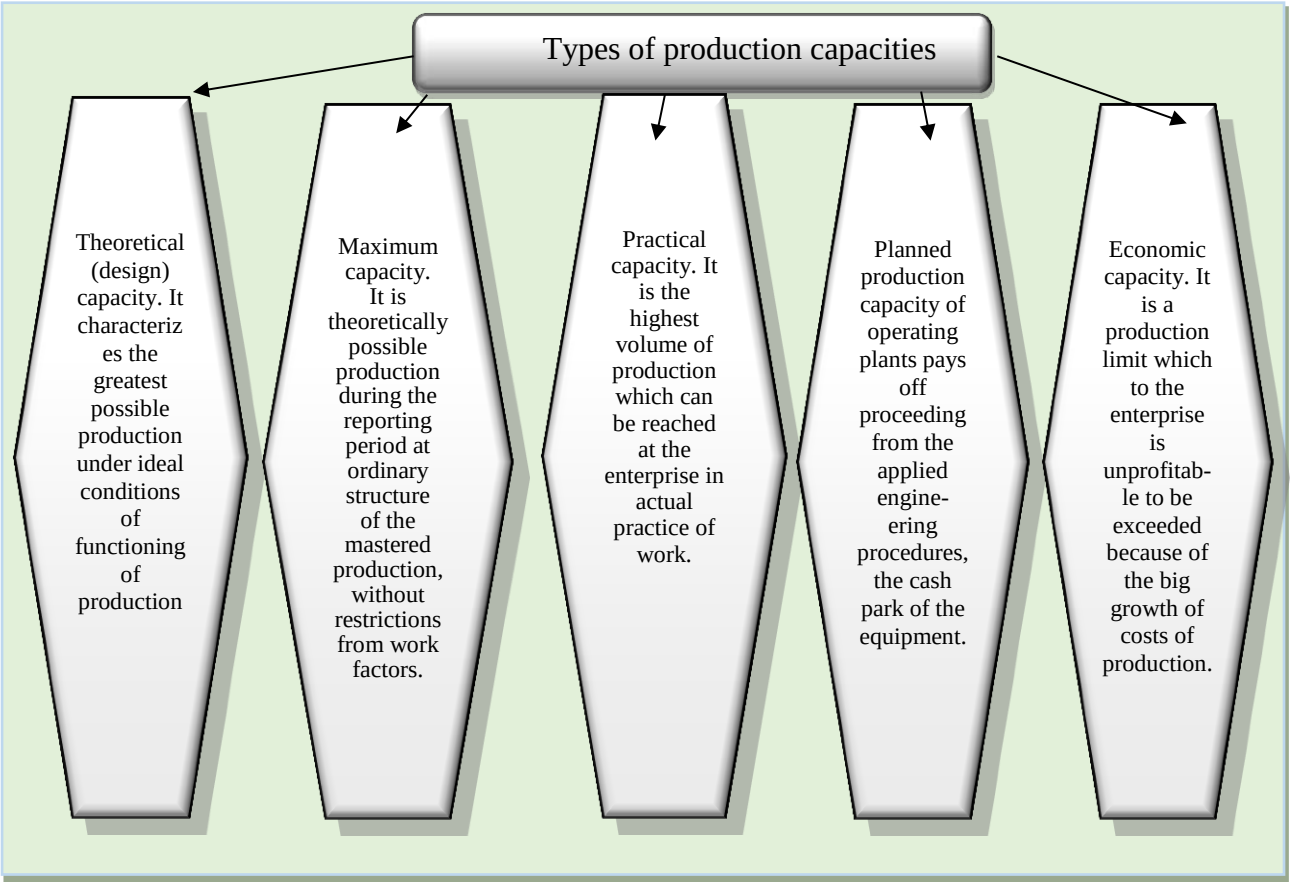

Figure 1. Types of production capacities

Production capacities can be considered from various positions, proceeding from it determine theoretical, maximum, economic and practical capacities. Production capacity —is size dynamic, changing under the influence of various factors. Therefore it pays off in relation to a certain period of time and even to calendar date. Power is defined on the beginning of planning period — input power and for the end of planning period.

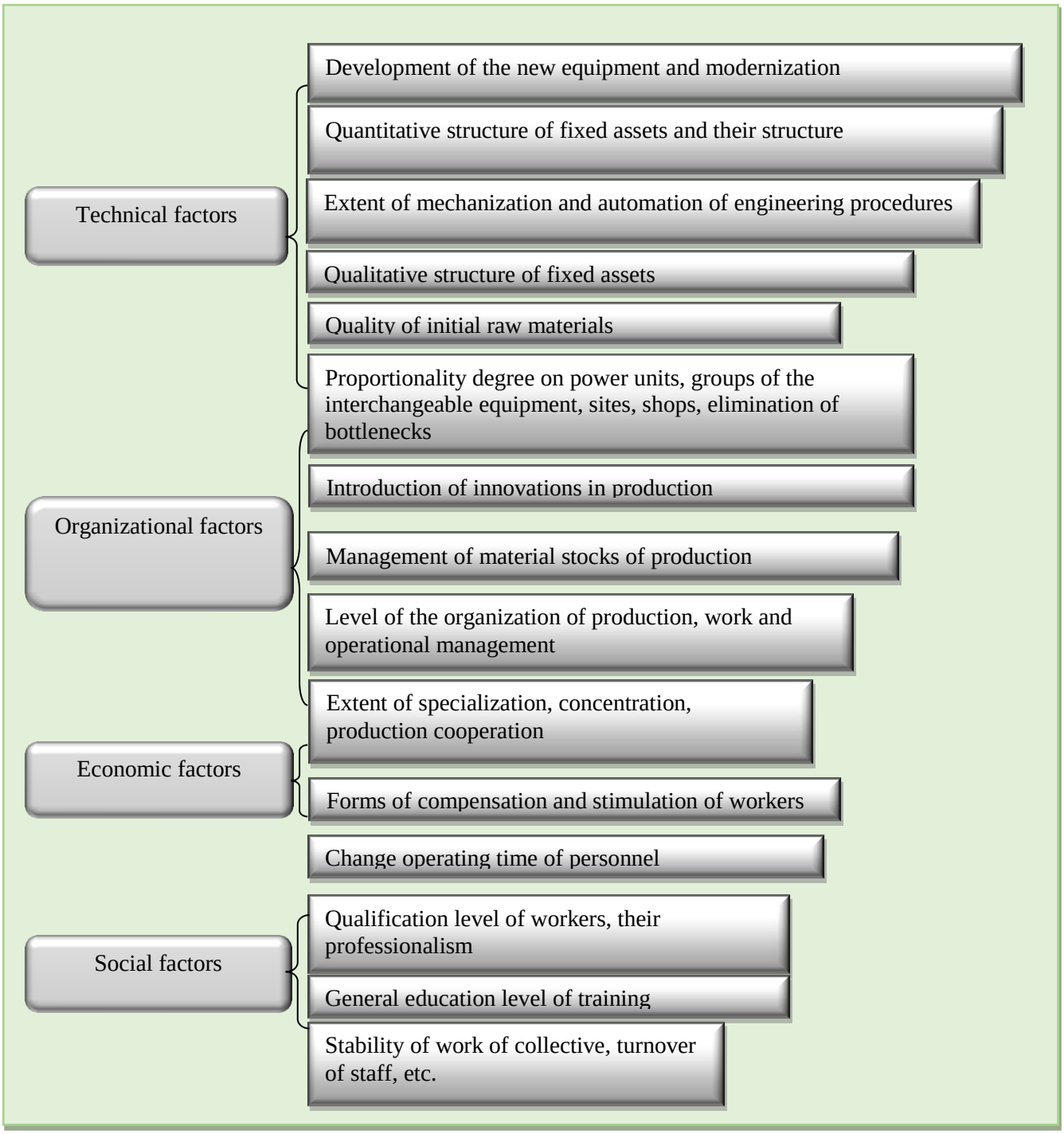

Figure 2. Factors exert impact on the size of production capacity of the textile enterprises

The effective fund of working hours of the equipment is defined depending on a site operating mode (office, the shop). If production works in the continuous mode (round the clock, without stops in festive and the days off), then the effective fund (Tnef) pays off as follows:

$$Tnef = Tcal \times TPPR - Ttech,$$

here Tcal — calendar fund (duration of year, 365 days or 8760 hours);
TPPR — time of idle times in scheduled preventive maintenance, in an hour;
Ttech — time of equipment downtimes for the technological reasons (loading, unloading, cleaning, washing, a purge, etc.) in an hour.

Definition of concrete values of production capacity is carried out on each production facility (the site, the shop, the enterprise, branch), taking into account the planned actions. On power of the leading group of the equipment the production capacity of the site, on the leading site — the production capacity of the shop, on the leading shop — the production capacity of the enterprise is installed. At installation of production capacity the administrative personnel develop actions for jointing of *bottlenecks* (*bottleneck* is understood as discrepancy of power of certain shops, sites, groups of the equipment of the minimum power of the relevant division, the site or group of the equipment. Emergence of a bottleneck is a consequence of not associativity between shops, sites or groups of the equipment) for the purpose of achievement of the best balance of production capacities of production structures of the enterprise, including policy tools of serial–parallel stages of processing and a variety of the product range.

In the conditions of continuous production the greatest possible fund of operating time of the equipment is equal to the work of calendar days and 24 h in days.

In interval production count the located fund of time of the equipment (in practice of it call nominal).

Calendar, or greatest possible, the fund is initial size in the accounting of operating time and inaction of the equipment. A certain operating mode (number of workers and the days off, number of changes and their duration) acts on each enterprise. Therefore not all calendar fund can be used for production. If from calendar fund of time to exclude a part of working hours between changes and time of the days off, then the regime fund of time turns out.

The located fund is received an exception of regime fund of expenses of time for planned repair and time for finding of the equipment in a reserve. In periodic productions and in process productions with periodically working equipment power is determined by a formula:

$$M = (Tef / Tc) \times Rm \times bgp \times a,$$

here Tc — time of a manufacturing lead time of operation of the equipment, hour;
Rm — the volume of loading of raw materials on one cycle;
bgp — an exit of a finished product from raw materials unit.
Extent of use of production capacities is characterized by the following coefficients:
1) general coefficient (Ko):

$$Ko = V / PCmid,$$

where V — the actual or planned volume of production.
2) intensive coefficient (Ki):

$$Ки = Vdays / APdays,$$

here Vdays — average daily production;
APdays — the average daily production capacity of the enterprise.
3) extensive coefficient (Ke):

$$Ke = Tf/p \,/\, Tp/h,$$

here Tf/p — the actual or planned fund of working hours;
Tp / h — the settlement fund of working hours accepted when determining production capacity.

Also, in addition of article we would like to note that planning of production capacities is very important in achievement of long–term success of the organization. Too big production capacities can be not less harmful, than too small. At the choice of strategy of production capacities, managers have to consider questions of the following type: “We have to have one big production capacity or several small?”, “We have to expand production capacities before there is an additional demand or to wait, so far it not to appear?”. To answer these and similar questions, systematic approach and development of strategy of production capacities is necessary, for the corresponding each concrete situation. Managers of the enterprise have to investigate three dimensions of strategy of the choice of production capacity before adoption of the relevant decisions: the choice of the size of a stock of production capacity, the choice of time and the amount of expansion and linking of decisions on production capacity with other made decisions.

Conclusion

Definition of concrete values of production capacity in the textile enterprises is carried out on each production facility taking into account the planned actions. On power of the leading group of the equipment the production capacity of the site, on the leading site — the production capacity of the shop, on the leading shop — the production capacity of the textile enterprise is installed. Production capacity depends on many factors, for example technical, social, economic, organizational. In science and in practice allocate the maximum, theoretical, economic, practical capacities. When calculating production capacity she is tied to a certain period of time or even to calendar date as production capacity — size dynamic. Definition of concrete values of production capacity is carried out on each production facility, whether it be the site, the shop, the enterprise or branch, taking into account the planned actions. On power of the leading group of the equipment the production capacity of the site, on the leading site — the production capacity of the shop, on the leading shop — the production capacity of the enterprise is installed. At installation of production capacity, the personnel develop actions on elimination of *bottlenecks*. Emergence of a bottleneck is a consequence of not associability between shops, sites or groups of the equipment.

For achievement of success in a long–term outlook, firms have to plan use of production capacities. Marketing use is obligatory, for knowledge of features of market segments and forecasting of demand, and the financial analysis because any expansion of production demands big capital investments. The analysis of human resources because improvement of use of production capacities, of course, will lead to hiring of new workers and their training is also necessary.

In our opinion, leads to improvement of use of production capacity, such actions as increase in quantity of an equipment in place, increase in working in shifts of operation of the equipment, improvement of repair and organizational actions, and also any modernization (a computerization, scheduling) of the equipment, fast installation of the new equipment, etc. Thus, any complex of actions for improvement of use of production capacities developed in all control links by the industry has to provide increase in production of production, first of all due to fuller and effective use of intra economic reserves and by fuller use of cars and the equipment, increase in coefficient of working in shifts, elimination of idle times, reduction of terms of development of again put into

operation capacities, a further intensification of productions. Together with increase in production also the need for development of new effective ways of use of production capacities grows. Thereby the set of design centers of effective use which use a set of the latest computer equipment which with high precision can develop this or that project develop. The set of a know–how is applied when planning production capacity.

References:

1. Aleksandrov, G. A., & Pavlov, A. S. (1984). Obnovlenie osnovnykh proizvodstvennykh fondov (Intensifikatsiya, effektivnost, stimulirovanie). Moscow, Ekonomika, 192
2. Bunich, P. G. (1963). Aktualnye voprosy effektivnogo ispolzovaniya proizvodstvennykh moshchnostei i osnovnykh fondov. Moscow, Ekonomiozdat, 69
3. Vodyanov, A., Gavrilova, O., & Marshova, T. (2006). Proizvodstvennye moshchnosti rossiiskoi promyshlennosti v kontekste problem ekonomicheskogo rosta. *Rossiiskii ekonomicheskii zhurnal,* (2), 15
4. Zaitsev, N. L. (2009). Ekonomika, organizatsiya i upravlenie predpriyatiem. Moscow, Infra-M, 536
5. Petrovich, I. M. (1990). Proizvodstvennaya moshchnost i ekonomika predpriyatiya. Moscow, Ekonomika.
6. Fatkhutdinov, R. A. (2001). Organizatsiya proizvodstva. Moscow, INFRA-M, 669
7. Kvasha, Ya. B. (1971). Rezervnye moshchnosti. Moscow, Nauka, 200
8. Bazilevich, L. P. (1985). Sovershenstvovanie metodov planirovaniya razvitiya proizvodstvennykh moshchnostei: avtoref. diss. … kand. ekon. nauk. Leningrad, 19
9. Balabin, A. A. (1991). Modelirovanie rezervov proizvodstvennykh moshchnostei (medotraslevoi aspekt): avtoreferat diss. … kand. ekon. nauk. Novosibirsk, 1991. 19
10. Privalov, V. N. (2005). Organizatsionno-ekonomicheskoe obespechenie povysheniya effektivnosti ispolzovaniya potentsiala proizvodstva tekstilnogo promyshlennogo oborudovaniya: avtoref. diss. … kand. ekon. nauk. Kostroma, 19
11. Zabaikin, Yu. V. (2006). Sovershenstvovanie organizatsii proizvodstva na tekstilnykh predpriyatiyakh: avtoref. diss. … kand. ekon. nauk. Moscow, 2006. 21
12. Kaparova, N. B. (2007). Mnogourovnevaya sistema povysheniya effektivnosti trikotazha: avtoref. disc. … kand. ekon. nauk. St. Petersburg, 2007. 19

Список литературы:

1. Александров Г. А., Павлов А. С. Обновление основных производственных фондов (Интенсификация, эффективность, стимулирование). М.: Экономика, 1984. 192 с.
2. Бунич П. Г. Актуальные вопросы эффективного использования производственных мощностей и основных фондов. М.: Экономиоздат, 1963. 69 с.
3. Водянов А., Гаврилова О., Маршова Т. Производственные мощности российской промышленности в контексте проблем экономического роста // Российский экономический журнал. 2006. №2. С. 15.
4. Зайцев Н. Л. Экономика, организация и управление предприятием. М.: Инфра-М, 2009. 536 с.
5. Петрович И. М. Производственная мощность и экономика предприятия. М.: Экономика, 1990.
6. Фатхутдинов Р. А. Организация производства. М.: ИНФРА-М, 2001. 669 с.
7. Кваша Я. Б. Резервные мощности. М.: Наука, 1971. 200 с.
8. Базилевич Л. П. Совершенствование методов планирования развития производственных мощностей: автореф. дисс. … канд. экон. наук. Л., 1985. 19 с.

9. Балабин А. А. Моделирование резервов производственных мощностей (медотраслевой аспект): автореферат дисс. … канд. экон. наук. Новосибирск, 1991. 19 с.

10. Привалов В. Н. Организационно-экономическое обеспечение повышения эффективности использования потенциала производства текстильного промышленного оборудования: автореф. дисс. … канд. экон. наук. Кострома, 2005. 19 с.

11. Забайкин Ю. В. Совершенствование организации производства на текстильных предприятиях: автореф. дисс. … канд. экон. наук. М., 2006. 21 с.

12. Капарова Н. Б. Многоуровневая система повышения эффективности трикотажа: автореф. дисс. … канд. экон. наук. СПб., 2007. 19 с.

Работа поступила в редакцию 18.09.2017 г.

Принята к публикации 21.09.2017 г.

Ссылка для цитирования:

Tursunov B. Features of the method of calculation of production capacities of the textile enterprises // Бюллетень науки и практики. Электрон. журн. 2017. №10 (23). С. 213-222. Режим доступа: http://www.bulletennauki.com/tursunov-b (дата обращения 15.10.2017).

Cite as (APA):

Tursunov, B. (2017). Features of the method of calculation of production capacities of the textile enterprises. *Bulletin of Science and Practice*, (10), 213-222