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OPTIMIZATION OF A MULTI-NOMENCLATURE SMALL-SCALE PRODUCTION OF AN INDUSTRIAL ENTERPRISE

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In the modern industrial environment enterprises face a number of difficulties, such as limited financial, labor and production resources, high dependence on market conditions and the need for quick adaptation to changing environmental conditions.

Multi-nomenclature small-scale production is one of the most complex forms of organization of industrial production, which requires flexibility, precision planning and efficient use of resources. Under conditions of limited capacity, high nomenclature saturation and variable output, enterprises face a challenge of improving the efficiency of production processes.

Multi-nomenclature production involves production of different products, each of them having its own construction and technology. This creates difficulties in output volumes planning, resource allocation, equipment and personnel utilization management. In addition, frequent changes in product specifications or customer orders can lead to disruption of work rhythm, inefficient use of machines and delays in product shipment.

These problems are especially relevant for small enterprises that do not have an ability to organize mass production or take advantage of economies of scale. Unlike large plants, small industrial enterprises, as a rule, operate with tight budget constraints and minimum stocks of materials, as well as with a limited number of workers and production equipment, which makes it especially important to rationally plan production processes in order to maximize profits, minimize costs and timely fulfill orders. As a result, even minor errors in production planning can have a significantly negative impact on the profitability and competitiveness of a business.

To solve the problems of optimal planning and production management in such conditions, quantitative methods of analysis and optimization are increasingly used, among which linear programming occupies a special place due to its efficiency, versatility and computational speed. Mathematical optimization methods of linear programming provide a powerful toolkit for solving such problems. By formulating the problem of production planning as a linear programming problem, it becomes possible to determine the optimal output for each nomenclature unit taking into account constraints on available resources and external factors. Such models help minimize subjective factors and make informed managerial decisions that take into account trade-offs between different objectives: cost reduction, profit maximization and efficient use of resources. Moreover, they open up the possibility of sensitivity analysis, allowing us to assess how changes in input parameters affect the overall production plan, as well as to develop strategies to respond to potential failures and external risks.