Preface

ABOUT THE SUBJECT

The enhancement of current globalisation represents the fundamental feature of the world economy at the beginning of the 21st century and is characterised by emphasising the trend to reduce and remove the barriers between the national economies and enhancing the connections between these economies. Although it is one of the most used terms in specialised literature, there is not a generally accepted definition. One of the best known is the definition of the World Bank, which states that globalisation refers to the actual fact that over the last years, an increasingly larger part of the global economic activity takes place between people and companies from different countries.

Globalisation derives from the fact that, by starting from the technological and economical development, a significant number of human activities are situated on such a large scale and scope that they exceed the national borders within the limits of which the sovereign states exercise their right to govern. The new actors have to cope with the challenge caused by the monopoly-type governance. Multinational corporations, global financial markets, non-governmental organisations, as well as criminal organisations and international terrorist networks have appeared. Their activity is not covered by international laws, which are based on formal agreements between the nation-states, for they have not been able so far to find a common ground for agreements on the issue of globalisation.

The international production, including the production of transnational companies, branches, and other companies linked to multinational companies by agreements and alliances without capital participation has shown strong development. The old scheme of manufacturing in a country and selling in another country has given room to international manufacturing operations. The technologic progress allows the decomposition and desegregation of production processes. Companies choose the place that meets the most favourable production factors for each of the stages of the production process. Consequently, the export does not often represent the sale of a national product to a foreign buyer, but it results from the different national localisations of those companies that participate in creating the same product. The multinational companies can contribute to stimulating the economic development in countries, in strengthening their technological abilities, in creating their human resources, and in facilitating the access to new markets.

In the globalisation era, the production environment of all countries comes to the stage of realizing real prosperity. With the growth of markets towards globalisation, all firms need to deal with the challenges facing it. This has resulted in the materialization of automated industries with high performance of manufacturing systems. Traditional manufacturing systems are not able to satisfy these requirements. In the global market there is an increasing trend toward achieving a higher level of integration between designed and manufacturing functions in industries to make the operations more efficient and productive.
Manufacturing systems traditionally fall into three categories of layouts: job shop production, batch production, and mass production. Obviously, a batch production presents the topical problem for layout designers and manufacturing managers. Since, in batch production the parts move in batches from one process to another process, each part in a batch must wait for the remaining parts in its batch to complete processing before it moves to the next stage. This will lead to increased production time, a high level of in-process inventory, high production cost, and low production rate.

Operations management needs to reflect on these challenges. “Cellular Manufacturing Systems” (CMS) is one among the emerging trends, which can be implemented without losing much production run time, with low set-up time, low Work-In-Process inventory (WIP), short manufacturing lead time, high machine utilization, and high quality of products.

Taking this into account, this book provides further understanding on the subject with more fruitful ideas to academic researchers and managers of organizations in the pipeline.

ORGANIZATION OF THE BOOK

This book deals with the issue over the 17 chapters that form the content of the 3 distinct sections, being developed by university professors—specialists in the field—who perform their activity within prestigious universities in Europe. The three parts of the book are “Elements of Industrial Operational Management,” “Industrial Production Programming Systems,” and “Industrial Production Multiserve.”

Over 9 chapters, the first section deals with the fundamentals of industrial production operational management, taking into account both the company where production is achieved, and the type of the activities performed inside the company in order to achieve the industrial production, including the provision of the budget necessary to achieve production and support the logistics of performing the industrial activity.

Chapter 1, “Structural Organisation of Industrial Companies,” deals with the industrial company, which is the place where the industrial production is achieved. The industrial company is dealt with in a systemic approach with its inputs and outputs into and from the environment where it performs its activity, including the company’s existence form. Issues linked to the production process are presented under the aspect of its design and analysis within the industrial company’s design and production structure. A special importance is given to designing and arranging the production areas, including their modernisation.

Chapter 2, “Capacity of Production,” highlights the differences between the company’s production capacity, its size, and the production achieved in the company. The production capacity is statically and dynamically viewed and dealt with separately for the basic, auxiliary, and service departments, including for the areas of the company’s productive and unproductive departments. The role of the operative management in balancing the company’s production capacity and in reducing the capacity deficit is distinctly presented.

Chapter 3, “The Constructive and Technological Preparation of Production,” deals with the complexity of the constructive and technological preparation of industrial production, which has as a starting point the codification and classification of products, and continues with the production scheduling. Issues related to production integration, production concentration, and its modernisation are dealt with in this context. Aspects related to the technological preparation of production are also dealt with, highlighting the role of appropriate technologies and of simulation in achieving the production.
Chapter 4, “The Management of Basic Production,” deals with an essential issue of industrial operational management, namely the management of production achieved in the industrial company’s basic departments. For this, the production types, their characteristics, and requirements that must be met are presented. The fundamental elements of the basic production management are also emphasised, and the flow production and orders production management is dealt with analytically, including the costs which these productions incur. Particular emphasis is placed on using the electronic computing technique in the basic production management.

Chapter 5, “Auxiliary Production Management,” deals with the other important activity of the company, namely the auxiliary activity, in terms of management. The structure of the auxiliary activities within the company is presented, and their management is analysed. In order to achieve the basic production, the maintenance, repair, restructure, and modernisation of working machines, equipment, and plants play an important role. The production of SDVs and how they are used are also dealt with in the book. The management of the power sector is also analysed, which a sector that should provide electric and thermal power, compressed air, water supply, etc. necessary both for productive and unproductive purposes.

Chapter 6, “Management of Serving Activity,” deals with providing the basic and auxiliary production with raw matters, materials, spare parts, etc., as well as with how the transport is performed inside and outside the company. The issues of storing the materials and raw matters are analytically dealt with, including the system of indicators regarding the efficiency of storage management, as well as aspects concerning the various forms of transportation within the company, including the optimisation and rationalisation of the transport system.

Chapter 7, “Operative Management of Industrial Production,” is the chapter that deals with specific elements of the industrial operational management. Complex issues concerning planning, launching, tracking, and re-updating the production schedules are dealt with, putting a particular emphasis on the computerisation of the operative management of industrial production. The dispatcher is presented as a method of the industrial operative management that leads to rendering it more efficient, and the role of the balanced dashboard in the industrial operative management is presented separately.

Chapter 8, “The Use of Budgets in Forecasting the Activity of the Company,” deals with using the budgets in the industrial operational management, having basic elements of budget and budgeting presented. The company’s system of budgets is thoroughly dealt with, starting with the production budget and ending with the company’s financial budget. The role of budget and budgeting in the management of the industrial production achieved in the company is distinctly highlighted.

Chapter 9, “Elements of Logistics Used in Industrial Operational Management,” refers mainly to the logistical provision of both production and company. Starting from the systemic approach of the concept of logistics, the position of the logistic activity within the company is presented, as well as the content of a new function of the company, meaning the function of logistics. The costs incurred by implementing the logistics in the company and performing the logistics activity in the company are emphasized. Depending on how the activity of logistics is implemented in the company, a company’s “logidram” may or may not be achieved.

The second section deals with the issue of planning the industrial production and its related management systems over three chapters.

Chapter 10, “Scheduling the Production Obtained by Means of Production Processes Organised in Variable Flow,” deals with the issue of planning the production achieved on the flow production lines when they do not have an imposed pace, meaning that they are variable. Matters of the flow production lines are dealt with, and the production schedule related to such production lines is emphasised based
on them, where both the level of loading such flow production lines and the level of occupancy of those performers working on such lines are stated. A special situation is the case where products resulted after processing several raw matters are obtained, but through a single technological processing operation.

Chapter 11, “Scheduling the Production Obtained by Production Processes Where Several Operations Are Performed and Repeated at Time Intervals Previously Set Forth for Various Products,” tackles the issue of programming the serial production obtained by production processes that include several operations repeated at time intervals previously set forth. In this situation, it is necessary to go through several steps: to establish the series size, to determine the size of the manufacturing and transportation batch, to establish the duration and structure of the manufacturing cycle, to state the potential calendar advances if applicable, to establish the cyclic stocks in the warehouses, and to correlate the scheduled production with the company’s production capacity.

Chapter 12, “Managerial Systems, Methods, and Techniques Used in Scheduling the Industrial Production,” deals with the systems of operational management of the industrial production based on costs, including the use of artificial intelligence in the industrial production operative management. The cost-objective management system is dealt with separately, exemplifying some practical situations, but also the management system through costs inside of which an important place is given to the centres of costs that represent the essential element of this management system. The target-cost management system is dealt with separately in the same trend, highlighting the differences between these and the other two management systems based on costs. Special importance is given to using the artificial intelligence to develop an expert system applied in the operative management of steel production.

Over five chapters, the third section tackles aspects concerning certain modern trends in the operative management of industrial production, namely the multiservice of workplaces.

Chapter 13, “Considerations on Multi-Service on Workstations,” deals with theoretical aspects of the multiservice of workplaces. To start with, aspects concerning the processing cycle on the machine tools and their characteristics are dealt with. The indicators are distinctly dealt with, and afterwards, it is proceeded to grouping the processing operations depending on their technological structure. The multiservice of machine tools is characterised by a series of parameters established among others through the technique of combining the operations to be performed according to the type of technological process. Establishing the practical ways of serving the machine-tools takes into account both the theory of “waiting strings” and the theory of “Markov chain,” and the optimisation of multiservicing several machine tools can be done by using “Takacs” and “Runnenburg” models or the method of the “mechanisation coefficient.”

Chapter 14, “Operational Production Structures Used in the Multi-Serving System,” deals with the spatial elements where the system of multi-serving the machine tools can be organised, meaning the organisational structures existing in the company and specifically the operational structures where the multi-service is actually applied. In this respect, organisational links are dealt with, such as production workshops and departments, flow manufacturing lines, and organisational links equipped with numerical and automatic control machine-tools. The production departments consisting of aggregate machine tools and processing centres are also dealt with separately. Special attention is given to how the production is organised in flexible manufacturing systems and flexible manufacturing cells in the robotised production departments.

Chapter 15, “Using the Graphical-Analytical Principle to Use Multi-Serving in Operational Management,” tackles elements of graph theory and namely a principle of this, the “analytical graph” used in multi-serving several machine tools. Their multi-service is influenced by a heterogeneous complex of factors, which leads to the existence of several forms of multiservice, such as: multi-service in case
of operations that are identical with the same duration and structure; multi-service in the case of differ-
ent operations with the same cycle duration; multi-service in the case of multiple operations with the
same duration and the same manufacturing cycle; multi-service in the case of different operations; and
multi-service in the case of certain operations that are performed on several machine-tools a few times
within the same cycle. Regardless of the actual way by which multi-service is achieved, it is assessed
through an actual system of indicators that characterise the level of multi-servicing several workplaces.

Chapter 16, “Using the Multi-Serving System in the Textile Industry,” is an applicative study of
multi-servicing in a business branch that is suitable for this system of operative management, namely
the textile industry. Taking into account the particularities of the textile industry, multi-servicing several
workplaces was distinctly applied both for the knitting machines, as well as for the weaving machines.
A special situation for the textile industry is that of servicing several weaving or knitting machines at
random time intervals. In this case, the theory of waiting strings is used for organising the multiservice
of several workplaces.

Chapter 17, “Control of Industrial Production Management,” deals with one of the basic functions
of industrial production management. The control of operative management of industrial production
and its content is thus highlighted. Particular emphasis is placed on how the managerial control can be
achieved and also on the types of control. The managerial control is dealt with systemically by stating
its components. Regardless of its forms and means by which it can be achieved, control must lead to
rendering the operative management of industrial production more efficient.

TARGET AUDIENCE

This book is addressed to both theoreticians and practitioners in the field of operative management of
industrial production. This equally concerns those who study—students, graduates, doctoral students—
those who have experience in this field—researchers, professors—as well as those who actually work in
production—engineers, technicians, economists, developers, logisticians, company managers, presidents
of the administrative boards, etc. The intention of this book is to create a challenge regarding the debate
of the theoretical and practical problems the operative management of industrial production is facing.

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