

Production-operation management. The chosen aspects

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Editor



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4.

TRADITIONAL METHODS USED IN OPERATIONAL ACTIVITIES



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Abstract: The purpose of this chapter is to present the traditional methods used in operational management. The methods described include benchmarking, outsourcing, Just-In-Time, *kaizen*, Total Quality Management, MRP I, MRP II, and core competencies developed in various periods of the 20th century to improve the planning process and efficient management of the flow of resources, goods and information. Benchmarking consists of comparing the processes and practices used by one's own enterprise with those used in enterprises considered to be the best in the analysed field. Outsourcing means separating from the organizational structure of the enterprise some functions performed by them independently and transferring them to other entities for execution. Just-In-Time is used to reduce work in progress and inventory levels in production and warehouse processes. *Kaizen* and TQM are based on the continuous diagnosis and improvement of all elements of the company. MRP methods are based on computer systems and clearly defined, inter alia, the volume of demand, order fulfilment time and provide other data relevant to the company's logistics system and its operations. Core competencies are company-specific skills that are difficult to copy or win over to competitors. The authors focused primarily on the presentation of the main goals, principles of operation, as well as the advantages and disadvantages of the selected methods in operational management.

Keywords: benchmarking, core competencies, Just-In-Time, *kaizen*, MRP, outsourcing, Total Quality Management.

4.1. Introduction

This chapter presents the main traditional methods used in operational activities. These methods are well known in practice and often used. When analysing various criteria for the classification of production methods, it is worth paying attention to an interesting division proposed by Halevi (2001, p. 36). The described methods can be divided into five groups:

- 1) focus on product design methods (benchmarking),
- 2) focus on commercial aspects (outsourcing, core competencies),
- 3) focus on processing manufacturing methods (Just-In-Time, *kaizen*),
- 4) focus on production planning and control (Material Requirements Planning, Manufacturing Resources Planning),
- 5) focus on organization (Total Quality Management).

In each of the indicated groups, Halevi describes several detailed methods, indicating their type which is characterized by:

- software solution—requires computers,
- management—methodical directions for organization and managing,
- philosophical—modern management methods.

A brief description of the selected methods is presented below.

4.2. Benchmarking

The benchmark is the levelling point, which is the reference point when determining the location or height of buildings and topographic objects above sea level (Bogan & English, 1994). In the 1970s, the word began to be used in the context of business and management. It was then used to define the process of analysis for comparative purposes. In 1979, the American concern Xerox Corporation used benchmarking as a way of comparing the company with competitors. The company then adopted benchmarking as the most important element of its recovery strategy. It is worth noting that the corporation made this decision when competitors began to offer products at a price lower than the costs incurred by Xerox for producing such products. Xerox was a pioneer in the application of benchmarking and thanks to this strategy it regained its previously lost position in the market.

Benchmarking is the search for the best industry practices which will lead to exceptional performance through the implementation of these best practices (Camp, 1989).

Currently, benchmarking is recognized as a method of comparing business processes and performance indicators with industry best and best practices from other companies. The elements that are measured are time, quality and cost. The use of

benchmarking is necessary in any serious process of organizational improvement, in which the current, ineffective state of functioning / operation of the enterprise will be partially or completely replaced by a more economic one, on the example of other enterprises. Thus, benchmarking contributes to the transformation and restructuring processes (Moriarty & Smallman, 2009, p. 484).

The main goal of implementing benchmarking is to obtain at least the average achieved by competitors from the same industry. In this case, learning from others is proposing one's own solutions based on the acquired knowledge, patterns, and not passive imitation. Benchmarking in production means the ability to meet customer requirements by adopting innovative practices regardless of their source. It is worth noting that access to statistical and production data of the enterprise plays a key role in this process. Over the years, manufacturing companies have developed various types of measures by which they can evaluate their performance. In most indicators, time is the basis of the measurement. In this way, enterprises can make calculations in various areas of operation. In a situation where enterprises are unable to obtain such data, they often obtain the necessary information from competing companies that have a common stage of the production process (Cupples, Macneil, Rimmer, & Testi, 1994).

The growing popularity of benchmarking in business practice results from the benefits it provides. These are among others (Kiziukiewicz, 2011, p. 393):

- better understanding of own individual and environment, identification of development opportunities,
- revealing the weaknesses of a given unit, defining the conditions for success,
- determining the necessary improvement actions (goals and tasks) and the necessary resources,
- improving operational efficiency,
- increasing competitiveness, strengthening the market position,
- better meeting customer expectations and improving relations with them,
- improvement of technologies and products,
- triggering the initiative and involvement of employees (promoting creative, innovative attitudes),
- attracting new investors.

The simplest division of outsourcing distinguishes between two types:

- 1) internal benchmarking: when the best (model) area is selected from among the areas of the enterprise with an extensive structure, where we have the adopted comparative variable (evaluation criterion). For example, this could be the area with the lowest costs and will be taken as a benchmark for comparisons and activities in other areas. By making such a statement, it is possible to identify the main factors determining the success of an individual in this respect and focus on their maximum use to obtain better results. The process of internal benchmarking is shown in Figure 4.1;

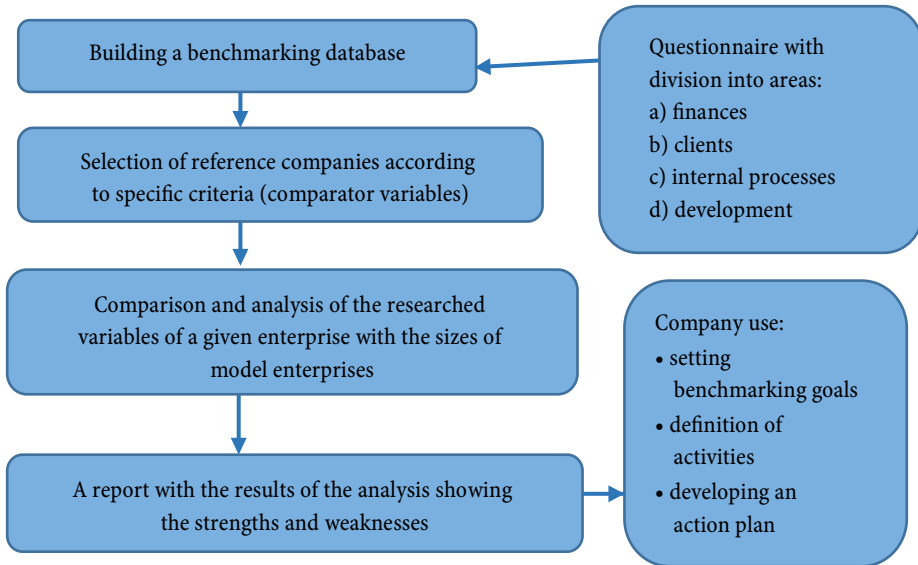


Figure 4.1. The process of internal benchmarking

Source: Own study based on (Kiziukiewicz, 2011, s. 396).

2) external benchmarking: when benchmarks are reference units from the environment. Taking into account the scope (scale) of its implementation, it is possible to distinguish international, cross-sector and inter-enterprise benchmarking (selection of the best enterprises, leading in terms of specific methods or processes—"best-in-class"). The functioning of external benchmarking is most often carried out according to the principle presented in Figure 4.2.

An important criterion for the division of benchmarking is also the subject of comparisons, and within such a classification one can distinguish benchmarking of processes, results and strategies (Balcerek-Wieszala, 2010, p. 245).

Process benchmarking concerns individual operational processes and work procedures, which are then compared with those already used by, for example, an industry leader. In this type of benchmarking dam, sales, R&D, products, marketing or production capacity can be compared.

Benchmarking of results focuses on benchmarking in terms of operational or economic efficiency. Analysing economic indicators or elements such as price or quality are also very helpful in determining a competitive position.

Strategic benchmarking is based on comparing the company with the leader, but not necessarily from the same industry. The basic goal is to recognize the leader's path of conduct not only in terms of the strategy he chose, but also the levels and type of investments. The effect of using this type of benchmarking is to create a long-term scheme of competitiveness.

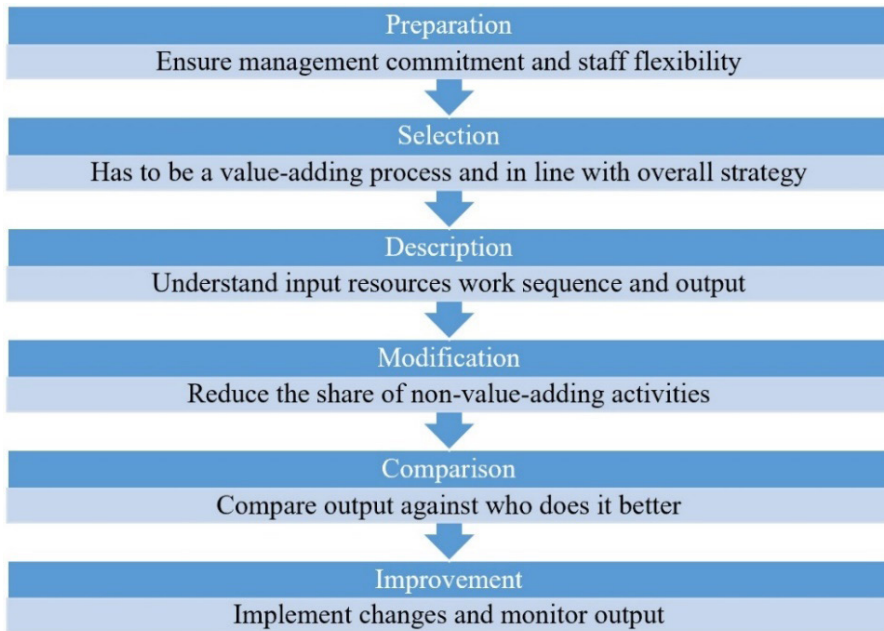


Figure 4.2. The process of external benchmarking

Source: Own study based on (Mohamed, 1996, p. 53).

In order to select an enterprise classified as a benchmark, first the selection criteria should be formulated. For this purpose, a given enterprise has to obtain information about leaders and possible partners who may support a given unit in carrying out benchmarking. This information may come from various sources—both own and external (Kowalak, 2009). Own sources include the database of competition created by the company itself, research and development works, personal contacts of employees, information collected on the basis of press announcements, advertising brochures, showrooms, telephone surveys, as well as an analysis of the biographies of model company managers, awards and distinctions that they have received. Foreign sources of information about leaders and potential benchmarking partners include companies creating databases on the best enterprises, sectoral data banks, professional magazines, conference materials, research institutes, universities.

A proven source of information is the benchmarking system, called the Benchmark Index, which was fully established in the UK in 1996.¹ This system is systematically expanded and provides many standard indicators within a given industry, which can be used for benchmarking comparisons on a regional, national and international scale.

¹ It currently has one of the largest databanks in the world, with companies from various industries and countries, with European countries dominating.

The well-known and widely used international quality standard ISO 9000 can also serve as a model. The ISO 9000–9004 standards have been established by the International Organization for Standardization and describe the requirements that must be met by: design, material sourcing, production, quality control systems and delivery systems in order to produce a high-quality product (product or service). Obtaining an ISO certificate is preceded by a costly and lengthy verification procedure. Having the ISO standard, however, is of great importance for the prestige of the unit and its competitiveness, because ISO accreditation is associated with the entry into the international list of guaranteed suppliers.

The information collected for the purpose of benchmarking is a point of comparison. The data on the unit looking for opportunities for improvement are compared with the figures considered as benchmarks. This allows to determine the deviations that may be (Sobańska, 2003):

- 1) negative (unfavourable), when the phenomenon (quantity) in a given unit does not match the standard, e.g. the production time of a specific product is longer than the time considered as the benchmark, the unit profit is lower than the benchmark or the unit cost is higher than the benchmark,
- 2) positive (favourable), when the phenomenon (quantity) in a given unit is favourable compared to the reference measure, so e.g.: the production time is shorter than the reference one, the product quality is better than the reference one, the unit cost is lower than the reference measure,
- 3) neutral (zero), if there is no discrepancy between the studied phenomenon (quantity) and the pattern.

After analysis, special attention should be paid to negative deviations. They prove the necessity to take actions to improve a specific parameter or phenomenon (process). Therefore, unfavourable deviations should be subject to an in-depth causal analysis. Within its framework, the following activities should be performed (Kiziukiewicz, 2011, p. 397):

- 1) the main factors influencing the achievement of exemplary results by the benchmarking leader (partner) are determined,
- 2) the differences between the results of a given unit and the reference results are determined,
- 3) the causes of discrepancies are investigated,
- 4) evaluation of the real possibilities of achieving the benchmark or better results in a given unit, taking into account its limitations,
- 5) the optimal (real) level of results for a given unit is determined,
- 6) a list of changes is prepared, the introduction of which determines the achievement of the desired level of what is the subject of benchmarking.

Then proceed to the last stage, i.e. implementation or post-benchmarking activities. Actions taken within its framework should lead to the implementation of an optimal solution in a given unit. It is of particular importance to establish rules and

methods for measuring improvement processes. Their selection should be determined by the benchmarking area and the variables (criteria, parameters) adopted for comparisons. The evaluation criteria used for the purposes of benchmarking may be non-economic and economic values. In the second case, the most often used are financial result and the factors that shape it (costs and revenues).

As previously emphasized, during the benchmarking process, an important issue is the selection of appropriate indicators and criteria. Suitable measures can be found, among others in a strategic scorecard, also known as the Balanced Scorecard (BSC). Data is grouped according to four key perspectives: finance, customers, internal processes and development. Examples of measures that can be used for benchmarking comparisons in individual perspectives of a balanced performance card are presented in Table 4.1.

Table 4.1. Perspectives of benchmarking

Perspective	Finance	Customers	Internal Processes	Development
Index	<ul style="list-style-type: none"> • return on investment • economic added value • profitability • revenue dynamics • dynamics of cost reduction 	<ul style="list-style-type: none"> • market share • customer acquisition • customer loyalty • profitability of customers • customer satisfaction 	<ul style="list-style-type: none"> • product quality • development of new products • length of time to introduce new products 	<ul style="list-style-type: none"> • employee satisfaction • employees rotation • employee performance
Example of how to calculate the indicator	<ul style="list-style-type: none"> • probability of gaining a return from an investment • comparing net operating profit to total cost of capital 	<ul style="list-style-type: none"> • number of customers, value, or quantity of sales • number of positive customer reactions, share of new customers in relation to the cost of acquiring them • sales growth rates for existing customers • net profit generated by market segment, taking into account specific costs related to servicing a given customer • customer satisfaction research using surveys 	<ul style="list-style-type: none"> • the number of good products to the total number of production, the number of shortages, the number of returns or claims • percentage of sales of new products, the number of new products launched on the market compared to the competition and in relation to the plan • time to go out with a new offer 	<ul style="list-style-type: none"> • surveys on factors such as commitment to the production process, recognition for a job well done, overall job satisfaction in the enterprise, etc. • percentage of employees who left key positions • revenue per employee, value added per employee, sales revenue ratio related to total salaries

Source: Own study based on (Gmińska, 2006, p. 75).

Benchmarking as a traditional method used in operational management is also particularly useful in strategic management accounting and in strategic management. The changes initiated on the basis of benchmarking and the assessment of the achieved effects require a longer time, because the introduction of changes must be preceded by research into the environment, analysis of the directions and scale of changes, defining the rules for their implementation and then examining the results. The main advantage of benchmarking is the possibility of flexible adaptation of the specificity of the areas and areas of improvement of a given company and the selection of various criteria (parameters) to express patterns (benchmarks) and the sizes, features or processes compared with them. It should be noted that benchmarking should be carried out cyclically and be systematically repeated (Kiziukiewicz, 2011, p. 402).

4.3. Outsourcing

Outsourcing is not a new concept in operational management, as evidenced by the words of Henry Ford, who already at the turn of the 20th century argued that if we cannot do something better, cheaper, faster than others, then there is no reason for us to do it ourselves, and not commissioned it by a better person than us (Radło, 2011). Currently, the phenomenon of outsourcing should be considered not only from the point of view of organizations that take advantage of its possibilities, but also from the point of view of companies that specialize in the provision of outsourcing services.

Outsourcing consists in transferring responsibility for the implementation of specific areas of economic activity (e.g. tasks, functions or processes) to the side of a specialized external partner, taking into account the economic (quantitative) and qualitative benefits and at the same time the possibility of developing the company's key competences and adding new value, which enables strengthening the market advantage and the company's development (Matejun, 2005, pp. 19–20).

Outsourcing means reducing the scope of the company's tasks and entrusting their performance to an external partner. Outsourcing may concern components, individual activities, functions, business processes, and even product modules (e.g. processors in telephones) (Laskowska, 1995, p. 186).

Enterprises often use outsourcing, considering it a kind of strategy that allows to restructure, change the profile of operations and increase flexibility, as well as reduce costs and improve operations. Its strategic dimension is determined mainly by attempts to adjust the size of the organization to the requirements of a changing environment and is related to the following factors (Fill & Visser, 2000, p. 44):

- reduction of operating costs,
- market forces,
- technical factors,
- capital and knowledge,
- production capacity and work efficiency,
- opportunities to focus on key competences.

There are three levels of outsourcing: tactical, strategic and transformational (Brown & Wilson, 2012). Tactical outsourcing is used to solve problems related to the activities of the enterprise. It mainly concerns: insufficient amount of investment funds, insufficient decision-making competences in the implementation of the tasks, functions or processes in question, lack of access to modern methods and equipment used in this area, or reduction of employment (Ghodeswar & Vaidyanathan, 2008, p. 25).

The basis for cooperation with a service provider in tactical outsourcing is a properly prepared agreement (contract). It describes in detail the provisions that are to provide the client with a higher level of quality of the outsourced services compared to self-performance at lower costs and with less involvement in supervising the implementation of tasks in this area by the client. In such a contract, there are usually also restrictions on the service provider's freedom in shaping the methods of performing the tasks assigned to them. Often, the assumptions regarding the methods of performing the commissioned tasks, as well as the anticipated effects, are reflected in the form of appropriate provisions in the contract. The main features of tactical outsourcing include:

- performance by the service provider of additional activities entrusted to him, which may help to solve the existing processes performed by the client,
- minimizing the costs of commissioned tasks,
- the investment risk is shared between the service provider and the principal,
- focusing attention on the profits achieved by ordering the service provider's performance,
- the possibility of changing the service provider when the intended goals are not achieved,
- the service provider's focus on achieving and maintaining the indicated quality level of entrusted orders.

The basic goal of strategic outsourcing is focused on the effective use of opportunities and possibilities offered by the market. The implementation of this level of outsourcing should be preceded by a thorough analysis of the benefits and possible risks associated with delegating to another entity the implementation of tasks performed so far on one's own. Strategic outsourcing is a type of strategic decision and is characterized by the formulation of a long-term business goal for the activity. It can relate to a specific product and market segment and aims to provide the customer with a specific added value. Collaboration is an integral part

of strategic outsourcing (Nowicka, 2016, p. 93). Companies decide to use strategic outsourcing in order to:

- restructuring or transformation of the enterprise,
- business risk minimization,
- increasing own competitiveness and innovation,
- flexible adaptation of policy to the requirements dictated by the market,
- increasing the value of the company,
- reduction of operating costs related to the implementation of individual processes.

Transformational outsourcing is the most developed form of cooperation with a service provider in the field of outsourcing. The service provider makes a radical redesign of the methods of performing the commissioned tasks, also participating in the implementation of essential improvements in the client's operations (Linder, 2004). The main purpose of this type of outsourcing is to achieve, in a short time, gradual, permanent and significant improvements in the performance of the entire activity of the client in which the service provider participates. The people who are involved in working together to achieve these improvements are also essential. The main features of transformational outsourcing are:

- main emphasis on the client's performance,
- the primary goal is to increase the market value of the company—the client,
- the role of the service provider is to cooperate with the client in redesigning his business in line with the client's strategic goals,
- focusing the service provider's efforts on the continuous improvement of the methods of implementing the ordered activities,
- optimization of operating costs and the use of reengineering,
- the change of the service provider made difficult due to the necessity to adapt the activity and equipment of the service provider to the client.

A typical outsourcing process is presented in Figure 4.3 and shows the outsourcing phases from the decision to use outsourcing to its implementation, management and evaluation of results.

The steps and elements in the figure are part of most outsourcing assignment. The outsourcing initiative usually starts in the strategy phase. The company determines the goals, scope and feasibility of the outsourcing concept. Then the total time of the project, planned budget and necessary resources are estimated. At this stage, requests for information are sent to outsourcing partners, so company can gain insight into the details of the outsourcing order. In the next phase, the scope of cooperation is determined and the level of service to suppliers is established. The areas to be outsourced and the areas that are under the company's control are agreed. This is where the request for quotation is usually sent to the recipients. Only suppliers that have qualified under the guidance outlined in the earlier stages may qualify for the next stage. The next phase is negotiation. Here, the client presents

the cost estimate of cooperation. The most common forms of collaboration are full-time equivalent cost, time and material, unit price, volume-based pricing, managed service fee, no solution—no payment, fixed price, etc. (Bartell, 1998). This is where the pre-contract phase ends.

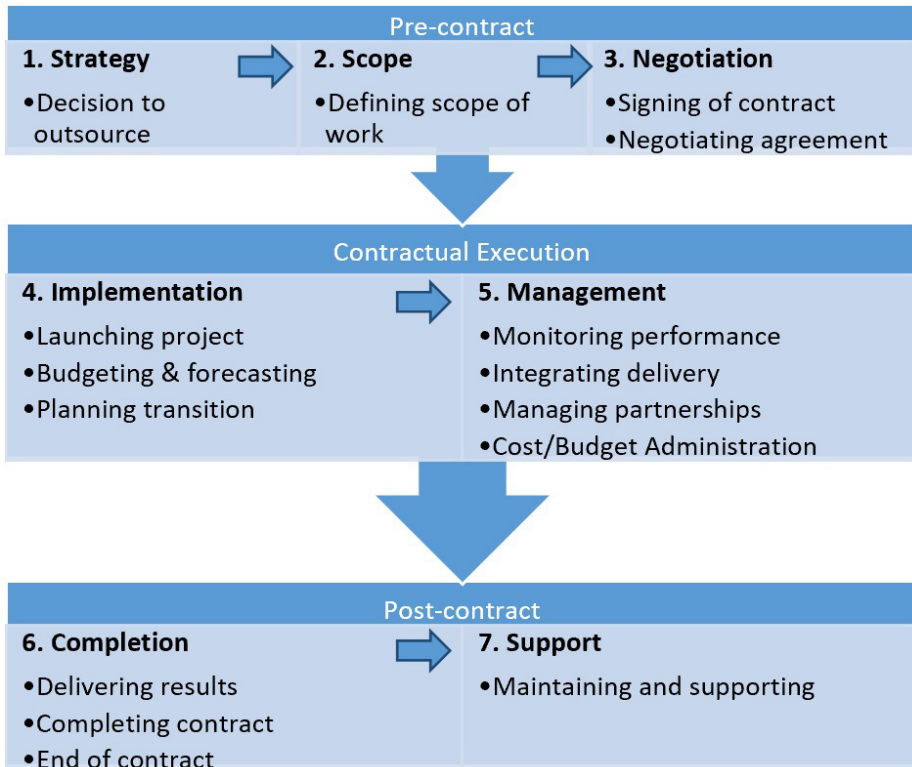


Figure 4.3. Process of outsourcing

Source: Own study based on (Ghodeswar & Vaidyanathan, 2008, p. 29).

Negotiations should end with the signing of a contract between the client and the contractor. In the next stage, the company analyses the quality of services provided and assesses the competences of the service recipient in the scope of activities performed for the company. The implementation phase means the transfer of the internal process to the external provider. This often includes a requirements assessment where the process is thoroughly examined by the host. The supplier can redesign the entire process to optimize it. Successful implementation is followed by a phase of continuous monitoring and management of outsourcing areas. The service provider now has an external company that carries out certain business areas for him and can focus on his own key processes. Initiating and implementing

changes is one of the key elements of this phase for a successful outcome. This marks the end of the contractual execution phase and the beginning of the post-contract phase. Contracts that can be extended are assessed at this stage. The service provider makes the final decision whether it extends the contract, amicably terminates the cooperation in order to consider cooperation with another provider or performs the function on its own.

The phenomenon of outsourcing results from the fact that it can be used in every area of the company's operation. The most frequently excluded from the organizational structure of the company are simple services that are associated with the involvement of significant resources, performing routine activities or little development opportunities. In practice, however, outsourcing is also used in more strategic areas. Examples and popular outsourced functions are presented in Table 4.2.

Table 4.2. Areas of use of outsourcing

Areas enterprises	Division of tasks / subfunctions
IT services	operation of computer networks; operation of data centres; infrastructure maintenance services; application operation; end-user support; group of security services (Disaster Recovery); Internet services
Financial services	accountancy; debt service; controlling; auditing; financial and analytical services
Human resources	recruitment and selection of candidates; employee training; creating incentive systems; personnel management; administration of personnel documentation; temporary employment
Manufacture	production of components; packaging; assembly of products; component design
Legal services	legal advice in various fields; legal services
Transportation services and logistic	product distribution; courier services, warehousing
Customer service	telemarketing; reception; secretary's office; helpline; call centre
Management and administration	maintenance of buildings and cleanliness; keeping archives; protection of people and property
Marketing	monitoring changes taking place on the market; research customer expectations; creating new concepts products; determining the promotional and advertising strategy; distribution; developing public relations

Source: Own study based on (Jagusztyn-Grochowska, 2002, p. 12; Rękas, 2002, p. 173; Trocki, 2001, pp. 46–49).

The business case for outsourcing varies by situation, but the benefits of outsourcing often include one or more of the following: lower costs (due to economies of scale or lower labor rates); increased efficiency; variable capacity; increased focus on strategy / core competencies; access to skills or resources; increased flexibility to meet changing business and commercial conditions; accelerated time to market; lower ongoing investment in internal infrastructure; access to innovation, intellectual property, and thought leadership; possible cash influx resulting from transfer of

assets to the new provider. As with any strategy or model, the outsourcing concept also has some drawbacks, as: slower turnaround time, lack of business or domain knowledge, cultural barriers, lack of control.

4.4. Core competencies

One of the most dynamically developing methods of operational management is the concept of core competencies, which is treated as an excellent tool for the reconstruction of an organization's performance and a driving force for changes at the operational level. It allows company to focus on those areas which (from the point of view of a given unit): are the most important, bring the highest revenues and profits, and the organization has the greatest competencies, characterized by parameters such as experience, practice, skills, equipment, technology, resources etc. (Nowak & Wojtkowiak, 2016, p. 53). The concept of core competencies was popularized by Prahalad and Hamel (1990), who consider it in the context of the source of competitive advantage. They believe that it is a company's predisposition to operate effectively and efficiently, and at the same time rationally, in market conditions, with the ability to respond to the challenges of the modern market at the same time. Core competencies are understood as the joint acquisition of knowledge in an organization, in terms of coordination of different production skills and integration of numerous technological streams. Therefore, it constitutes a certain predisposition to collective learning within strictly defined limits, determined by the potential and abilities of the organization. Within its framework, individual members communicate, exchange information and engage in work. At the same time, they emphasize that this process is a platform for building products and services in line with the expectations of potential and current buyers (Prahalad & Hamel, 1990).

At the beginning it should be noted that the concept of competence can be considered from the perspective of an individual or an organization and can be divided into individual and organizational (Wyrzykowska & Balanovska, 2018, p. 110). Individual competences include knowledge, skills, values and standards, motives, work ethic, enthusiasm and self-image. Organizational competencies, on the other hand, are specific abilities or skills related to the development, coordination and use of available resources. In addition, competencies are also determined by the management style and technological level. The main goals of building and developing organizational competences include:

- understanding what the competition will be in the future,
- developing the ability to find a future market niche,
- ability to mobilize all employees,
- ability to beat competitors without undue risk.

The process of creating competencies can be divided into five levels arranged according to the diagram below (Zakrzewska-Bielawska & Flaszewska, 2013, p. 224) (Figure 4.4):

- 1) resources-asset: concerning everything that the organization “owns”—buildings, machines, technology, reputation and other fixed and current assets,
- 2) skills: including what the company knows—know-how and abilities necessary for the organization to operate,
- 3) competencies: integrating the resources used with the acquired skills in order to achieve the strategies assumed by the company,
- 4) core competencies: higher form of competence,
- 5) meta-competencies: defining competencies of superior nature in the hierarchy of abilities, resources and competences. They are the basis on which enterprise can build, develop and verify their core competencies (Matwiejczuk, 2011, p. 34).



Figure 4.4. The process of the evolution of competences

Source: Own study based on (Javidan, 1998; Nowak & Sobolewski, 2016; Zakrzewska-Bielawska & Flaszewska, 2013).

Resources are the foundation that influences the development of an organization’s capabilities. On their basis, the company creates competencies, some of which are transformed into core competencies. At the very top, there are meta competencies that enable the maintenance of the core competencies developed so far, but also additionally support the development of new resources, abilities or competences.

As already mentioned, the competencies of enterprises and their more developed form, core competencies, are obtained by creating various types of combinations. However, resources are in most cases the basis of these competencies (the so-called complex resources), enabling further implementation of the company’s strategy (Urbanek, 2011, pp. 24–28). In order to show the full architecture of key competences, seven categories can be distinguished that can create them. A special graphic diagram is presented below (Figure 4.5).

The presented system is purposeful, because starting from material resources and then moving clockwise it can be seen that the listed elements are presented in descending order in terms of the possibility of control that the enterprise can exercise over the given elements. However, it is recommended that the process of creating company’s own core competencies take place in areas where companies can create the greatest value for customers.

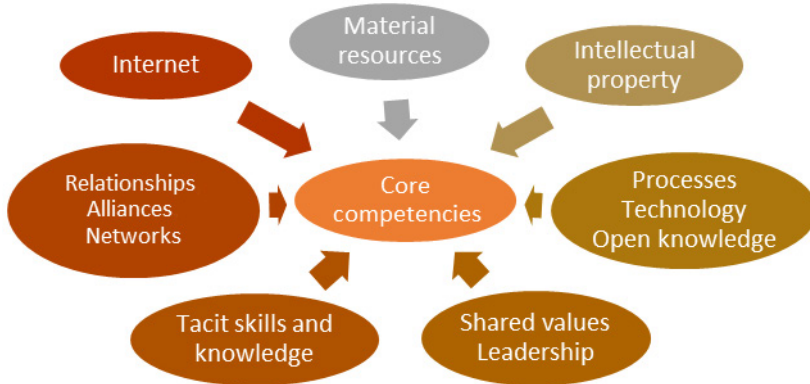


Figure 4.5. Architecture of core competencies

Source: Own study based on (Urbanek, 2011, p. 25).

Material resources are areas over which the company has total control, even when they are not owned by them (e.g. leasing). These assets contribute to the development of core competencies to a certain extent but are not their essential element. Due to the universal availability of this type of assets, they can rarely be a factor that distinguishes an enterprise. Intellectual property consists of patents, know-how, copyrights and trademarks. They are subject to legal protection, so that the company also exercises full control over them. Explicit knowledge, along with technology and processes, includes routines and procedures. It is codified and stored in databases collected in the company. Although this group of assets is largely controlled by the entity, due to the limited possibility of legal protection, it can be quickly copied by the competition. Leadership and organizational culture constitute a group of intangible assets that are of decisive importance in the appropriate shaping and management of the employee environment. The role of leadership is to develop effective procedures that will allow enterprise to select, integrate and retain leading employees. On the other hand, the organizational culture makes it possible to shape an environment in which employees will be able to use the maximum of their abilities. Tacit knowledge and individual or group skills determine the company's ability to properly respond to market opportunities and threats. They include flexibility of action, ideas, creativity and experience. Another category of resources are alliances, networks and other types of relationships that constitute strategic value for the enterprise. By interconnecting internal and external resources in the network, participants (companies) can increase their own strategic flexibility. This allows them to quickly configure their set of resources to adapt to dynamic market conditions. The last category is the Internet, which is one of the new external factors on which modern business models are built. The mobility and availability of this resource enable companies to quickly communicate with

recipients. However, control over numerous processes taking place on the Internet is negligible due to the possibility of creating informal networks for the exchange of opinions and views. In this way, company can quickly promote a product / service, but also destroy, e.g., the company's reputation.

Along with the development of this concept, the conditions that must be met in order to classify the competence as core have been defined:

- must make a significant contribution to the value of the manufactured product or the service provided,
- it must be unique, so it does not exist in the competition and is difficult to copy,
- it must form the basis of the company's operation, so it can be used in various areas of the company's operation.

Core competencies fulfill three criteria:

1. Provides potential access to a wide variety of markets.
2. Should make a significant contribution to the perceived customer benefits.
3. Difficult to imitate by competitors.

The combination of the indicated features into one coherent area allows enterprise to achieve the synergy effect, work coordination and optimal use of resources (Nowak, 2016, p. 14). This definition mainly focuses on certain production aspects of the enterprise. Production companies in the operational management phase, need to examine their core competencies, which are identified with the issues that contribute most to creating value for buyers. They should be adjusted and harmonized with other areas of the business unit's activity, in such a way that the company can react appropriately to the conditions dictated by the environment and at the same time implement the market policy. The lack of properly defined values / strengths of products, processes and production procedures prevents rational management of the company's assets. However, properly defined strengths allow, for example, to decide to outsource those areas and functions that play a smaller role in the value creation process (Halevi, 2001, p. 114). However, proper identification of core competencies is required, which should harmonize with each other. Only properly matched and correlated advantages can be the basis for development.

An essential element of the operational management of any company is the selection of specific strengths, enabling the company to distinguish itself in the market. This choice should take into account the best attributes of the organization that have a comprehensive impact on all areas of activity. The selection of the appropriate composition of distinguishing properties is the essence of the core competencies of the organization, which allow to use all possessed resources to a high degree: material, personal, financial, relational, organizational. However, identifying core competencies is not an easy task. Correct diagnosis requires compliance with

strictly defined procedures, the involvement of many employees (of various levels, representing various cells), knowledge of the market, contractors and competitors, and above all, own potentials and capabilities.

4.5. Just-In-Time (JIT)

The Just-In-Time method is known as the philosophy of enterprise management, and its essence is inventory, production and supply management. In simple terms, it consists in delivering and maintaining raw materials, materials, semi-finished products or finished products in exactly the right amount, at such a time and in such a place that it is possible to produce or deliver the right amount of products. A certain level of inventory should be available when the company actually needs them (Piasecka-Głuszak, 2011, p. 209).

Just-In-Time was first used in the 1920s by Henry Ford and perfected among suppliers by Toyota's vice president, Taiichi Ohno, from the 1950s to the early 1970s (Porter, 2009). His innovative approach to applying the JIT concept to Toyota factories has led to a reactive approach to Kanban inventory shaping. In addition, the time for retooling machines and devices was reduced to 1 minute and the distance between machines used in subsequent production stages was significantly reduced (Witkowski, 1998, p. 47). Nowadays, the JIT method is applied by many other companies such as General Motors, IBM, Apple and others.

Just-In-Time means doing only what is needed when needed and to the extent that is needed. In this way, they ensure the elimination of losses, incompatibilities and excessive needs and increase productivity.

Just-In-Time is a philosophy of action that seeks to maximize productivity by influencing all parts of the company such as purchasing control, engineering, marketing, personnel and quality control (Deneva, Hristova, Ivanova, & Petrova-Vakinova, 2017).

Most production systems use the so-called "Push" (Vonderembse & White, 1988, pp. 474–518) system for moving materials in the production process. Its main idea is that the materials are pushed through the individual operations according to a prepared schedule. The products are "pushed" from one work centre to another, but the centres are not aware of the real needs.

In contrast, JIT uses the so-called "Pull" system (Vonderembse & White, 1988, p. 485). Instead of pushing materials into the manufacturing process, the JIT system uses exactly as many materials as needed. The concept of the "pull" system is built on the basis of consumer demand. Just-In-Time concept aims to create a production system that meets market needs by eliminating all losses and striving

for continuous improvement. The phase Just-In-Time is applied because through it the system works with a low stock of goods and a small amount of inventory from the already finished products (Kumar & Suresh, 2009, p. 189). The products are assembled just before they are sold, the assembly elements are made just before they are assembled, and the components are made and assembled just before the assembly elements are made. This leads to lower costs and reduced deadlines.

Full JIT implementation is not limited to the company's production system, but also includes suppliers and customers. The process of achieving continuity and flexibility of flow between the production system, suppliers and customers is presented in Figure 4.6.

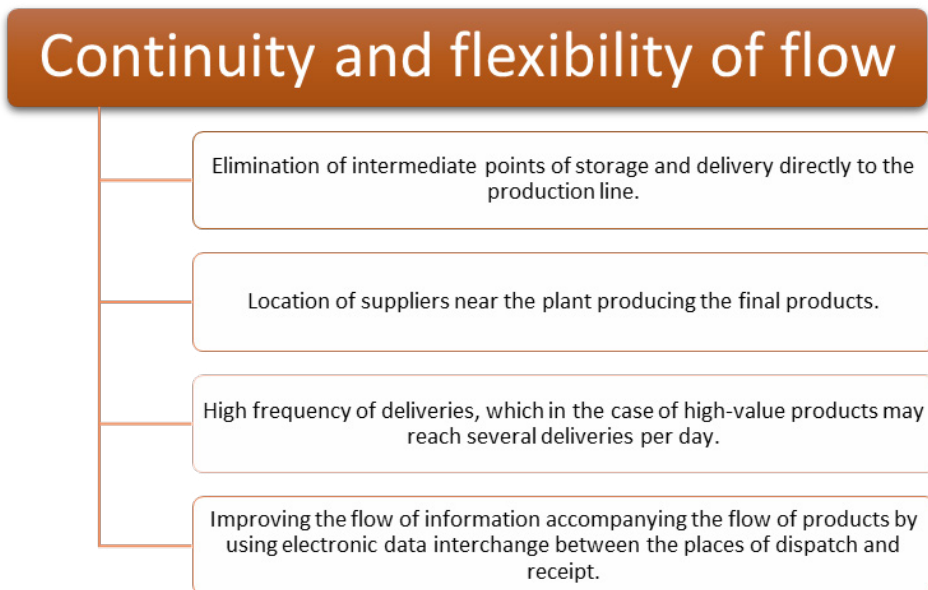


Figure 4.6. The process of obtaining continuity and flexibility of flow

Source: Own study based on (Witkowski, 2010, p. 195).

The Just-In-Time method is based on the waste elimination system (from the Japanese muda) and is based on the continuous improvement of the product flow processes and accompanying information. There are 6 basic principles that should be followed in the Just-In-Time method (Figure 4.7).

The Just-In-Time implementation process should be preceded by a detailed analysis of all factors determining its functioning, including transport costs and problems related to the natural environment. The effectiveness of the implementation work for the JIT method may depend on a number of factors, such as (Bendkowski & Radziejowska, 2011, pp. 161–162; Lysons, 2004, p. 250; Witkowski, 2010, p. 202):

- 1) gaining the approval of the crew, full commitment and training of employees,
- 2) achieving long-term and harmonious cooperation with suppliers,
- 3) the use of an appropriate material needs planning system based on production schedules, which will allow for precise formulation of requirements in the scope of delivery,
- 4) maintaining small stocks in the form of safety stocks only,
- 5) close IT connection based on a system of planning and control of supplies between enterprises and advanced Electronic Data Interchange (EDI),
- 6) proper organization of external transport, taking into account reliability time and transport costs.

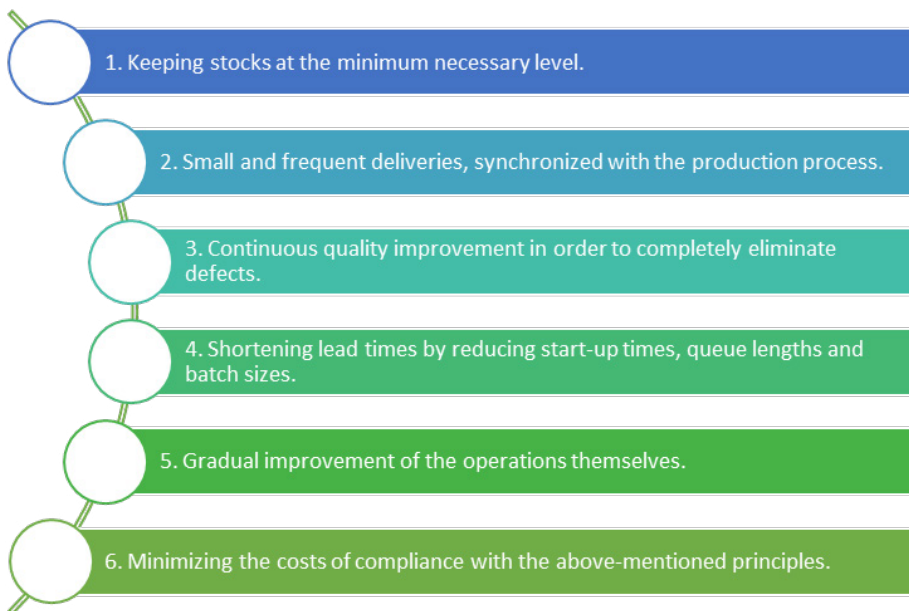


Figure 4.7. Rules for applying the Just-In-Time method

Source: Own study based on (Bozarth & Handfield, 2007, p. 627).

JIT is a manufacturing methodology that aims to improve overall productivity by eliminating losses, which in turn leads to quality improvement. This technique ensures efficient production in the organization and delivery of only the necessary parts in the right quantity, at the right time and place, using minimal resources.

Loss means an activity that does not add value to the operation, so Toyota formulates several types of losses that can be eliminated through operations Just-In-Time (Kumar & Suresh, 2009, p. 189):

- 1) overproduction: it is defined as the biggest source of loss for the enterprise—it should not produce more than is necessary for the next process,

- 2) waiting time: this is the time spent preparing,
- 3) transport: unnecessary transportation of raw materials during the work process is another source of loss, planned changes can significantly reduce travel time,
- 4) manufacturing process: some operations do not add value to the product but exist due to poor design or maintenance of the machines, design improvements or preventative maintenance can eliminate these losses,
- 5) inventories of goods: inventories of various types of goods must be reduced because they are also considered a source of loss,
- 6) movement: simplifying labour movement will reduce losses caused by unnecessary relocation of labour and equipment,
- 7) defective goods: total costs for poor quality can be very high and include scrap materials, wasted working time and fast order time, leading to outstanding orders.

The greatest benefit of applying JIT technique is to improve the firm's adaptability to market changes, thus gaining a competitive advantage through (Kumar & Suresh, 2009, p. 189):

- Production costs: a reduction in costs is achieved by shortening the production cycle, reducing losses, inventories and eliminating value-added operations.
- Quality: is improved through continuous quality improvement programs.
- Design: changes are developed in a timely manner thanks to the quick response from engineers through alternative designs.
- Increase productivity.
- Flexibility of the production system.

In addition to the above-mentioned most important benefits related to the introduction of the Just-In-Time system, it is also worth presenting the advantages and disadvantages of this concept (Table 4.3).

Table 4.3. Advantages and disadvantages of Just-In-Time method

Advantages	Disadvantages
<ul style="list-style-type: none"> • improvement of cash flow and reduction of working capital • reduction of stocks of materials, work in progress or finished products • faster information flow, reduction of documentation • lower demand for warehouse space • less means of transport used in warehouses • establishing close cooperation with suppliers • increasing the level of logistic customer service • faster reaction to changes in projects 	<ul style="list-style-type: none"> • difficulty in eliminating inventories with variable and difficult to predict demand • transport unreliability, delays affect the continuity of the production and sales process • suppliers should be located in close proximity to the company • fear of lowering the level and increasing costs associated with production downtime • difficulty in finding regular suppliers • during implementation, it is necessary to adapt the production and supply subsystem • requires a new approach to management • there must be solutions in the company that eliminate the effects of any disruptions

Source: Own study based on (Piasecka-Głuszak, 2011, p. 208).

4.6. Material Requirements Planning (MRP or MRP I)

The method of planning material needs MRP (Material Requirements Planning) is a computer system used to rationalize planning, by issuing purchase and production orders at exactly the right moment to the desired product appeared at the right moment and in the required quantity (Kowalska, 2005). The MRP system was created in 1964 by Orlicky, as a response to the Toyota's production program. In the beginning, its application was primarily in the automotive and aerospace industries (General Electric and Rolls Royce).

MRP is primarily used to properly coordinate the material requirements for production, determine what and how many materials (or components) should be ordered and when they should be ordered / delivered in order to reduce their storage time in the production process to a minimum. MRP operates in the so-called push system (as opposed to the Just-In-Time method) and consists in the fact that specific tasks are carried out according to the plan and then transferred to subsequent recipients, regardless of their current needs, which results in an increase in the level of maintained inventories (Piasecka-Głuszak, 2011, p. 197).

The MRP system is a supporting tool inventory management and planning the supply of materials and raw materials necessary for production, for which demand depends from the demand for final products (Zięba & Ziółkowski, 2012, p. 354).

The main goal of the system is to ensure the right amount of raw materials and materials necessary to implement the planned production and deliveries to the customer, to maintain the lowest possible level of inventories and to support the company's planning policy related to the creation of delivery schedules and assembly activities. Moreover, the group of intermediate objectives of the MRP includes:

- synchronizing the processes of ordering and delivering materials and components with production needs,
- better control of individual production stages,
- precise determination of the delivery times of raw materials and semi-finished products,
- reduction of material and operational stocks,
- faster response to changes in the environment,
- precise determination of production costs,
- better use of the infrastructure (warehouses, production capacities).

There are three key elements in an MRP system: input data, MRP program, and output data. Starting with the input data, there are three main sources of information as input (Moustakis, 2000, p. 2):

- production schedule: it defines the deadlines for the production of each product,

- **specification of materials:** is a description of all products and components necessary for the manufacture of the final product,
- **time production cycle:** the time and materials required for each stage of the production cycle; delivery times.

After collecting the input data, all information goes to the MRP program. Based on the reported demand for products, specified in the production schedule and on the basis of information from the material register, the MRP program converts and determines the needs for parts and materials needed for production. Then, based on the information obtained from the inventory register, it calculates the demand and prepares orders for the delivery of materials needed for production at a specified time.

The information processed by the MRP program is entered into a table called the MRP information presentation table (Vonderembse & White, 1988) (Table 4.4).

Table 4.4. Presentation of MRP information

	1 week	2 week	3 week	4 week	5 week
Gross material requirements					
Revenue schedule					
Initial inventory					
Net needs					
Planned proceeds					
Scheduled order placements					

Source: Own study.

MRP information contains 7 categories of data:

- **gross material requirements:** the total required quantity of a particular item in each period,
- **revenue schedule:** number of orders placed for an item that have not yet been received; this line records when an order should arrive and how many items should be in it,
- **initial inventory:** contains the planned amount of items that should be available at the beginning of each time period; if this quantity is not sufficient to cover gross requirements, then the line responsible for net needs indicates the need for a new supply of stocks,
- **net needs:** shows when the order should arrive in order to avoid shortage of necessary parts or materials,
- **scheduled order placements:** represents the time periods in which these orders must be placed in order to arrive at the right time.

The information received from MRP is called output data and includes instructions and reports on, for example (Piasecka-Głuszak, 2011, p. 200):

- quantity of ordered materials and order fulfilment dates for the purposes of future production or purchase,
- notifications about placing orders,
- cancellation of product shipment notifications,
- schedule changes,
- changes in order fulfilment dates,
- planned orders to be completed within a specified period.

In order to effectively use material requirements planning as an operating strategy in a manufacturing company, the following five key principles are required (Figure 4.8).

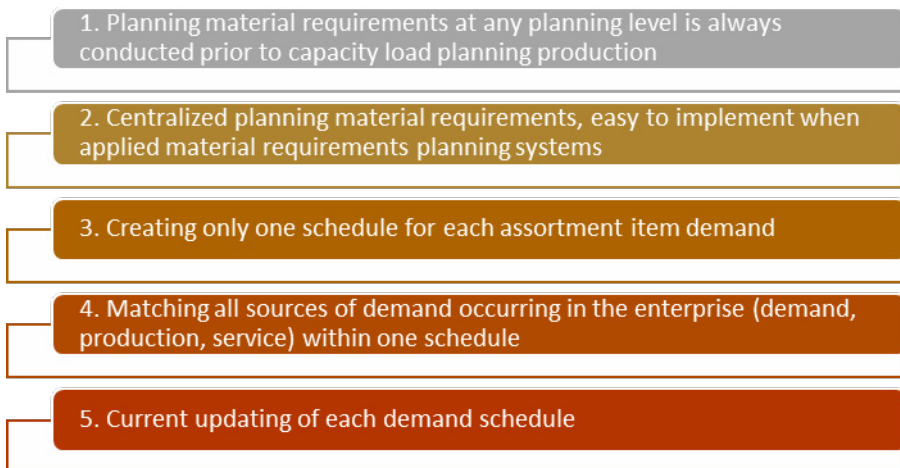


Figure 4.8. Five key principles for applying MRP

Source: Own study based on (Fertsch, 2003, pp. 33–34).

Applying material requirements planning allows managers to easily quantify each component for a particular order size, know when to place an order, and be notified when each product is needed. Others important benefits of using MRP planning are (Stevenson, 2012, p. 525):

- the ability to maintain low levels of stocks, thanks to the fact that the supply of goods meets the needs of demand,
- ability to monitor material needs,
- an opportunity to assess the capacity needs arising from a given schedule,
- MRP planning is a means of allocating production time.

In addition to the above-mentioned most important benefits related to the introduction of the MRP programme, it is also worth presenting the advantages and disadvantages of this method (Table 4.5).

Table 4.5. Advantages and disadvantages of Material Requirements Planning

Advantages	Disadvantages
<ul style="list-style-type: none"> • supporting the management of material flows • maximum use of production capacity and the possibility of long-term planning of their development • cooperation and coordination of the activities of individual logistics subsystems of the enterprise • quick detection of delays in deliveries and quick corrective actions • accelerating and delaying the execution of orders 	<ul style="list-style-type: none"> • difficulties in introducing changes in the functioning of the system • ordering and shipping costs can increase as the company lowers its inventory levels and aims to create a system where smaller quantities of products are ordered and delivered when it needed • insensitivity to short-term demand fluctuations • high complexity and sometimes not in line with expectations

Source: Own study based on (Coyle, Bardi, Langley, Kempny, & Klosa, 2002, pp. 133–134).

4.7. Manufacturing Resources Planning (MRP II)

In 1989, for the needs of production, MRP was transformed into MRP II (Manufacturing Resources Planning) or production resource planning (Stevenson, 2012, p. 526). MRP II expands the scope of MRP by adding other functional areas to the organization's planning process. Compared to MRP I, the planning and control of other production elements, such as: materials, devices, machines, workforce, information, area, energy factors, capital, were taken into account. Such a combination enables the enterprise to use all the resources that are involved in production on a multi-level basis. As a result, greater control was gained over the current production process, sale of products or over the company's finances. Moreover, the application of MRP II allowed to precisely define the evaluation of the achieved results.

MRP II process is the planning of material needs, which begins with the summarization of information from all sources (standing orders, forecasts, safety requirements, etc.) (Deneva et al., 2017).

Just like the Just-In-Time concept, MRP is a pull system with a decentralized system of orders, tasks and execution control for individual cells, and the size of orders for subsequent phases of the production process results primarily from the actual demand reported by other executive or other departments.

The production, marketing and financial staff develop the basic production schedule. Information about the need for financial and marketing resources is important and therefore they must be planned not only in size but also in time. The company must have all the necessary resources for the successful implementation of the plan, so it is possible to revise the original plan based on an assessment of stocks.

After the approval of the production schedule, the needs for materials are planned, and the management moves to the capacity planning. At each of these stages, adjustments are possible in the production program. Most MRP II systems have the ability to perform simulations, which allows managers to answer a variety of questions in order to get a better assessment of the possible options and their consequences.

Therefore, a key element of the MRP II system is the database, which is usually common to all modules included in the program. The essence of MRP II is that the production cycle is described very accurately and in detail. Starting from the phase of orders for materials, through all phases of production, to the sale of the finished product. Only such a holistic approach can ensure an accurate determination of the material requirements for production.

In the case of MRP II, there is the so-called feedback of the production process. All information collected in a common database and computer-aided goes from individual units or departments to other cells, so that the plans and orders are up-to-date at all times, and the analysis takes place in real time. According to this method, the entire economic process in the enterprise is a closed-loop system in the field of production management and control.

Table 4.6 presents most important benefits and threats related to the introduction of the MRP II program.

Table 4.6. Advantages and disadvantages of Manufacturing Resources Planning

Advantages	Disadvantages
<ul style="list-style-type: none"> • high degree of internal integration of procedures • greater synchronization of activities • access to the database to all cells involved in the program • the possibility of shortening the order fulfilment cycle • reducing the frequency of production lines downtime • integration of financial planning with the company's activities • greater sensitivity to changes in demand as a result of receiving up-to-date data on an ongoing basis • more efficient delivery • greater planning flexibility adjusted to market conditions • the possibility of expanding the system with new modules 	<ul style="list-style-type: none"> • need to have a large IT background • need to have centralized network configurations such as central computer-terminal, client-server, client-network • need to provide precise information from individual cells • failure to fully take into account production limitations • does not work well in managing the entire supply chain • very high license purchase price

Source: Own study based on (Piasecka-Głuszak, 2011, p. 202).

4.8. Total Quality Management (TQM)

Total Quality Management is a philosophical concept of management that assigns a decision to the continuous improvement of the quality of work and product. Moreover, it is a concept of achieving higher quality of work and achieving con-

tinuous improvement of the quality of products and services provided. TQM is committed to meeting the quality requirements and sustained satisfaction of both external and internal customers (Wawak, 2008).

The progenitor of the idea of total quality management is Armand Feigenbaum. As early as 1948, working for one of the large American companies General Electric, he created and implemented a quality system known as “quality costs”. Its implementation provides an opportunity to simultaneously increase the efficiency of the quality management system and reorganize the activities of companies. It is the practical experience of building and implementing such systems that allows Feigenbaum to create the theory of total quality control known as TQC (Total Quality Control). In 1961, in his book *Quality Control of Production*, he first began to talk about the need for total quality management, based on the application of statistical methods for quality management and regulation of technological processes.

Total Quality Management is sometimes defined not only as comprehensive quality management, but also as comprehensive quality management, consisting in continuous improvement of each activity at every level of the company’s operation, with the involvement of every employee, so that quality improvement itself becomes the company’s goal (Klimek, 2010, p. 121).

Another American researcher, William Edward Deming, has a very significant and important role in the creation and validation of the total quality management system. Its name is associated not only with the beginning of the so-called American period in quality management, but also with the formulation of one of the first comprehensive approaches to quality management known as the PDCA cycle (Plan, Do, Check, Act). The practical implementation of the Deming system took place in the ‘70s and ‘80s in Japan. In a short time, based on it, Japanese companies managed to make a breakthrough in the quality of manufactured products and Japanese quality became a global criterion for product quality.

Japan has played a leading role in quality management since the middle of the last century, and this is a reason to talk about Japan’s contribution in this area. He is associated with the names of Kaoru Ishikawa, Akao Yozhi, Genichi Taguchi, Masaki Imai and others. Undoubtedly the most famous among them is Ishikawa, who is quite deservedly called “the father of the total quality management system”. In 1962, he not only created the worldwide TQM system, but introduced a new method for analysing causation, known as the “Ishikawa Diagram” and started the activities of quality circles.

The Japanese approach to quality management is significantly different from all the others. It emphasizes the participation of all divisions and all employees of a company in quality management. It is no coincidence that Ishikawa considers total quality management as a set of different approaches—integrated management,

management with the participation of all departments, management with the participation of all employees and workers in the company, total management (Ishikawa, 1994, pp. 161–164). The Japanese approach to quality management, which became known in the world as TQM, is based on four basic rules, closely related to Japanese philosophy, traditions and morals and covers all levels in the company:

1. Participation of all staff in quality management activities.
2. Continuous staff training.
3. Regular internal audits of the quality management system.
4. Wide use of statistical methods for quality control.

The main goals of the total quality management system are related to the constant improvement of the quality of the products and the organization, the rational use of resources and optimization of the costs for quality management. However, before the company starts to implement TQM, first of all, it should adapt activities to the so-called the 14 rules of Deming. It is a set of management practices to help companies increase their quality and productivity (Deming, 2000, pp. 23–24; Hristov, 2020):

1. Create conditions for continuous improvement of work, products and services.
2. Adopt a new philosophy of conduct, reject the existing standards regarding problems, defects, complaints and delays.
3. Don't rely on mass quality control. Use statistical methods to prove that product quality is built into the production system.
4. Don't make purchases based solely on price.
5. Actively support all activities that improve quality and productivity, as this will reduce costs.
6. Introduce the principle of continuous training and learning of employees, the top management of the enterprise must also be involved.
7. Use appropriate forms of supervision. Its aim should be to help achieve better results at work.
8. Introduce freedom of questions and suggestions so that the employee does not feel any fear of presenting ideas or doubts.
9. Remove barriers between company departments. Develop cooperation as well as cooperation with suppliers, co-operators and customers.
10. Don't use empty slogans aimed at increasing productivity and quality.
11. Use numbers-based labour standards with caution as they can be detrimental to quality and production levels. Choose descriptive methods and supervision to help get the job done.
12. Remove obstacles and let employees evaluate their own work.
13. Apply training that introduces the latest methods and ideas. Teach employees new skills. They are necessary in order to introduce changes to new techniques, materials and processes.
14. Give each employee the opportunity to participate in teamwork to organize and make changes.

These principles correspond to the basic goals on which the philosophy of TQM is based (Figure 4.9).



Figure 4.9. The main principles of the TQM philosophy

Source: Own study based on (Evans, 2008).

The TQM philosophy can be divided into 8 main divisions:

- Customer orientation: in modern conditions, companies depend entirely on their customers and therefore it is necessary to know their needs and requirements, even more to strive to meet them ahead of schedule and exceed their expectations. Achieving such an approach requires the formation of consumer confidence in the manufacturer / supplier of the product or service, a balanced approach to the needs and requirements of consumers, consistent with the capabilities of the supplier and periodic survey and evaluation of consumer opinion.
- Leadership: leaders are obliged to create and maintain the necessary conditions for the implementation of total quality management in the organization. In addition, they must participate in the quality improvement process.
- Staff participation: people are the main driving force and essence of any organization. From the point of view of the organization they are not only specific executors of the production activity, but also managers and controllers of the ongoing processes inside the enterprise.
- Process approach: it is associated with the use of structured methods for identifying key quality management activities, clear and strictly fixed responsibilities

and accountability, specifying the internal and external relationships between management functions in the organization, risk assessment, consequences and impacts on consumers, etc.

- **System approach:** the system approach is the basis for building the strategy of each individual enterprise. It ensures its sustainable development. Applied to the quality management system, this approach requires the delimitation of the following main subsystems: quality planning; quality assurance; quality management and quality improvement (Tuzharov & Fileva, 2007). Quality planning includes all activities for the creation and validation of confidence that the product and the processes for its creation meet the established quality standards. Quality management includes methods and activities to meet product quality requirements. They are fully operational and include various standard procedures. Quality assurance, which is divided into external and internal, leads to building confidence in the staff of the company and its managers on the one hand, and in consumers—on the other, about quality. This is achieved through various procedures—internal audits, preventive actions under standard procedures and more. Quality improvement is a continuous process, a composition of various activities leading to improving the quality of processes and products.
- **Continuous improvement:** this idea is present in the earliest quality management systems. Many authors such as Deming, Crosby, Ishikawa and others. emphasize the need for continuous improvement. Indicative in this respect are the Deming-Schuhart cycle, the Noriaki Kano quality model, the ideas of reengineering, the Six Sigma model, and so on.
- **Decision making based on facts:** the analysis of data and objective information is the basis for making effective management decisions. The implementation of the principle leads to the exclusion of the possibility of imposing authoritarian/volitional decisions. In addition, the efficiency and accuracy of decision-making is significantly increased. The necessary facts are collected through the use of statistical methods for control, analysis and regulation.
- **Mutually beneficial relations with suppliers:** since manufacturers and suppliers are closely linked and their connections and relationships depend on the final results of each production system, it is very important that these relationships and relationships are beneficial to both parties.

TQM is a comprehensive approach to achieve long-term quality improvement and a higher degree of customer satisfaction. It includes several main stages (De-neva et al., 2017, p. 172) (Figure 4.10):

Approach for implementing the TQM system is based on the view that quality should be built into the manufactured product or service and possible defects should be prevented as soon as possible and at any cost. For these reasons, the total quality management system is seen not only as a set of methods, tools and tools for product quality control, but to a much greater extent as a new business

philosophy, a new way of thinking and a new perception of the category “quality”. This explains the variety of approaches related to its development and implementation in the enterprise.

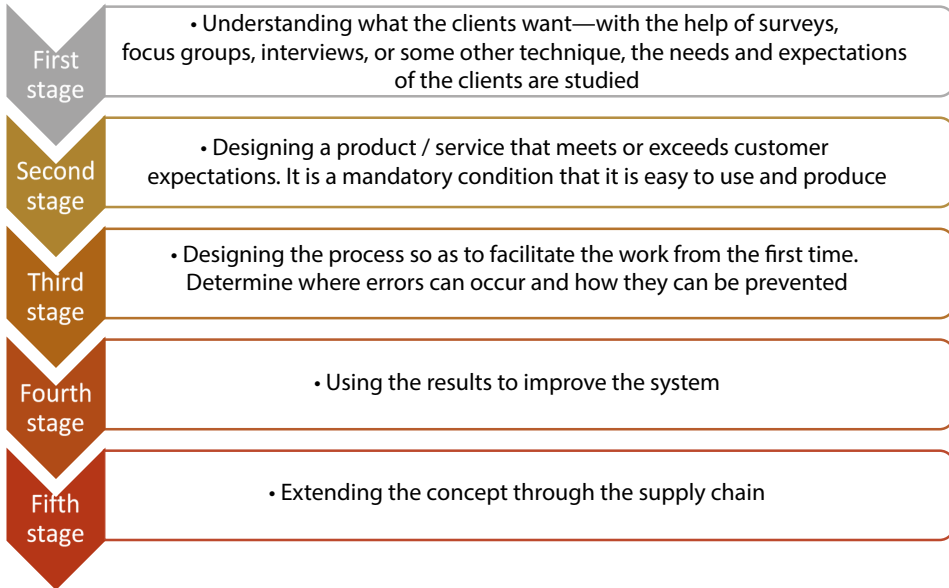


Figure 4.10. Stages of TQM

Source: Own study.

One of the most commonly used is undoubtedly the one proposed by the “father” of TQM—Ishikawa. He proposes to use seven basic tools, now perceived as classic, to build the TQM system. These are: graphs, diagrams and flow charts, frequency map, histogram, Pareto analysis, causal diagram, scatter diagram and control maps. Table 4.7 presents most important benefits and threats related to the introduction of the TQM philosophy.

Table 4.7. Advantages and disadvantages of Total Quality Management

Advantages	Disadvantages
<ul style="list-style-type: none"> • customer satisfaction • positive attitudes of the crew • effective communication • constant improvement • satisfaction of “internal” customers • elimination of losses 	<ul style="list-style-type: none"> • too much innovation in activities • frequent lack of preparation and understanding of the program • lack of adequate training of all employees • lack of clearly formulated and structured rules regarding the organization of the enterprise and the division of responsibilities • lack of patience while waiting for the results • awareness that TQM is a never-ending process of improvement

Source: Own study.

4.9. Kaizen

The concept of *kaizen* derives from the tradition of the Japanese ethical code of warriors—samurai, known as Bushido. This tradition permeated all aspects of life and included, among others: philosophy, care for physical health, professional duties, improvement of culture, work performed, faithfulness and courage. Even after lifting samurai privileges in 1876 this code found application in industry and the military concept of Japan from the beginning of the 20th century. Later in the late 1940's it began to be used in corporations and public administration offices.

Kaizen is a management concept based on the principle of constant search and application of even the smallest improvements in all areas of activity, at every workplace. Its goal is to achieve great success with small steps (Bernais, Ingram, & Krašnicka, 2010, p. 164).

The *kaizen* concept was used for the first time on an industrial scale in Toyota's factories in the 1980s. Its creator is considered to be Masaki Imai, who in 1986 published his famous book *kaizen: The Key to Japan's Competitive Success*. At the heart of this concept is one of the main Japanese philosophical theories and practices—*kaizen*, which focuses on continuous improvement. Its essence is expressed through the sentence: "Every day I do my job better than yesterday."

The main requirement of the *kaizen* concept is the constant improvement of both the production activity and the management of the organization. Everyone from senior management to production workers is involved in its practical implementation. The main goal is to achieve lossless production. Its implementation is based on three key elements:

1. Organization of the workplace.
2. Elimination of unjustified losses.
3. Standardization of processes.

The organization of the workplace (*gemba*) is carried out through the application of five key elements known as the 5S (Goryunova, 2020):

- Seiri (*accuracy*): it is necessary to remove everything unnecessary from the workplace.
- Seiton (*order*): all the elements necessary for the work must be arranged in the field of view so that they can be found easily and quickly.
- Seiso (*cleanliness*): the workplace and the equipment used must be well cleaned and the tools and devices placed in the right places.
- Seiketsu (*standardization*): the first three steps are important should become common practice for everyone. To build a proper organization of the workplace, prescriptions and training are needed.

- *Shitsuke (discipline)*: creating a system for observation and monitoring of procedures for organization and maintenance of the workplace.

The elimination of unjustified losses (*muda*) is associated with the elimination of all activities that do not create value for the organization. These include unproductive and unnecessary movements, delay of individual operations, errors in the technological preparation of production, long-term transport operations, defects, surplus production stocks and overproduction.

Standardization is related to the introduction and continuous improvement and maintenance of existing standards in the organization.

The *kaizen* concept combines many different methods and systems for quality management (Figure 4.11).



Figure 4.11. *Kaizen* concept

Source: (Goryunova, 2020).

There are different classifications of the principles of *kaizen*. According to some of them, they can be reduced to 16 elements (Goryunova, 2020):

1. *Focusing on the customer*: the most important task is the products to meet the needs of customers.
2. *Continuous changes*: continuous small changes in all areas of the organization.
3. *Open recognition of existing problems*: where there are no problems, improvement is not possible, which is a basic requirement of *kaizen*. Therefore, customer complaints are treated as a gift to the company. This is one of the main ways to solve the problem and a chance to solve it and improve the quality of production.
4. *Openness within the company*.
5. *Creation of working groups*: each worker is a member of such a group and its corresponding quality circle, and new workers are included in the “club of the first year”.
6. *Project management*: in order for the individual groups to work effectively, a close connection between them and rotation is needed.
7. *Formation of “supportive relationships”*: for the organization are more important good relationships between its employees and their involvement in the activities performed than the financial results achieved. A good production climate always leads to high results.

8. *Horizontal development*: personal experience is available to the whole company.
9. *Self-discipline*: the ability to self-control, self-respect and respect for others and the organization as a whole.
10. *Self-improvement*: determine the questions for which you are personally responsible and start solving them first.
11. *Awareness of each employee*: all staff must be fully informed about the state of their company.
12. *Delegation of authority*: implies broad-based training, good and diverse work habits and skills.
13. *Managing means planning and comparing results with plans*.
14. *Analysis of the state of the enterprise on the basis of facts*: do not confuse the cause with its manifestation.
15. *Quality embedding*: quality management is a process and inspection does not create quality.
16. *Standardization*: application of methods and procedures for consolidation of the achieved results.

Kaizen is suitable for any company, regardless of its size and field of activity, and this is the greatest advantage of this concept. Other important advantages and disadvantages are also presented in Table 4.8.

Table 4.8. Advantages and disadvantages of *kaizen*

Advantages	Disadvantages
<ul style="list-style-type: none"> • cost reduction • improving the quality, efficiency and effectiveness of work • reduction of order fulfilment time • reduction the number of mistakes • increase in the efficiency of machines and devices • maintaining production continuity • increase in customer satisfaction • increase the level of customer service • introduction clear, legible standards, visualization of works • reduction, or even liquidation, of the number of deficiencies, errors and corrections • elimination, simplification, integration and automation of processes • optimal distribution of production resources allowing more efficient • better use of the production space 	<ul style="list-style-type: none"> • long and slow process of changes • great meticulousness and detail • no radical changes to the existing state • the need to first create a friendly environment for introducing <i>kaizen</i> • the improvement process never ends

Source: Own study based on (Skrzypek, 2011, p. 144).

Questions / tasks

1. Why is the use of benchmarking so popular?
2. What types of benchmarking are there? Describe them briefly.
3. How many levels of outsourcing are there?
4. What does the outsourcing process look like?
5. List and briefly describe the areas in which outsourcing can be used?
6. What conditions must be met to name a key competence?
7. What types of resources can key competences be built from?
8. Briefly describe the Just-In-Time method.
9. On what factors does the proper implementation of the Just-In-Time system depend?
10. What rules should be followed when introducing Just-In-Time?
11. What are the advantages and disadvantages of the Just-In-Time method?
12. What is the MRP System (MRP I) for?
13. List five key principles for the introduction of the MRP system (MRP I).
14. What are the advantages and disadvantages of the MRP method?
15. Develop and characterize the MRP II system.
16. What are the advantages and disadvantages of the MRP II method?
17. What is Total Quality Management?
18. List Deming's 14 principles.
19. List the main assumptions of the TQM method.
20. How many steps are there in TQM (and describe them briefly)?
21. What are the advantages and disadvantages of the TQM method?
22. What is *kaizen*?
23. List a few of the most important assumptions of the *kaizen* method.

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