

Production-operation management. The chosen aspects

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6.

PROBLEMS OF SUSTAINABLE DEVELOPMENT AND CHALLENGES RELATED TO PRODUCTION AND OPERATIONS MANAGEMENT



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Abstract: Due to the changes taking place in the environment of enterprises, many problems arise in their strategic and operational activities. The basis of the emerging problems is primarily the overproduction associated with short product life cycles. It contributes to the excessive use of various types of natural resources, often in a predatory manner. On the one hand, such an approach increases waste, and on the other, contributes to the destructive degradation of the environment. The result is a lack of food and water in some countries, climate change and related extreme weather phenomena, as well as various types of disasters, such as pandemics, fires, floods, droughts, etc. Water, air and land pollution as well as global warming are reflected in deteriorating quality of life.

Despite many threats, more and more enterprises perceive the danger and undertake various types of adaptive projects. It should also be emphasized that the environmental awareness of both micro-enterprises and large corporations is growing.

The purpose of this chapter is to introduce the reader to the basic problems that companies may encounter in their operations activity. First, changes in the environment are discussed, with particular emphasis on the depletion of natural resources, pollution of a destructive nature, as well as waste and its causes. The next part deals with the topic of globalization, pointing to both positive and negative aspects. Technical progress and related aspects such as new technologies, new processes and materials are discussed in the next part. In this part, particular attention is paid to improving productivity, thanks to the implementation of new technical solutions. Technical progress is directly related to the innovations presented in the next section. This section describes the types of innovation according to various criteria as well as factors that are conducive to increments in the level of innovation in the enterprise. The last part is devoted to the most important factor in operational activity—human

resources. Competences, qualifications and the importance of human resources in the production process were discussed.

Keywords: environment, globalization, human resources in operational activities, innovation, problems and challenges, resources, technical progress, waste.

6.1. Introduction

A challenge is defined as “a new and difficult task or situation that determines the abilities and skills of a specific subject” (Hornby, 2000, p. 192). It requires adequate strength and fitness as well as “tremendous mental or physical effort and therefore is a test of personal abilities and skills” (Glen, 2018, p. 53). In economic terms, it allows to confront the potential, competences and resources of the enterprise with the conditions, assumptions or changes taking place in the environment. The source of “challenges” are usually new events, situations, legal regulations, rules of conduct as well as evolutionary or revolutionary changes that the entity has not dealt with so far and which must be taken into account in its activities.

Facing challenges, overcoming inconveniences or eliminating various types of threats related to dynamic changes taking place in the environment, enable the company to achieve its goals on the one hand and to take a competitive position on the other hand. The emerging problems may relate to various levels of management, ranging from strategic, through tactical, to operational management. They are particularly important related to the current activity which can be broadly defined as “a value and quality adding approach and philosophy to planning, organizing and controlling organizational resources or inputs for optimum results in terms of efficiency and customer expectations. Operations management is viewed as a systems-oriented and highly integrative study of methods, tools, processes, and techniques that coordinate ‘the vital three’ (people, systems and processes) with ‘the central one’ (physical and natural resources) in creating and adding value to meet organizational goals and customer requirements at an appropriate cost of acquisition, production, and distribution” (McFarlane, 2014, p. 16). The emerging complications may be simple what does not require the involvement of significant resources as well as complex, complicated and multi-faceted, requiring the use of experience, knowledge and competences of employees. The ability to solve standard problems is one of the basic duties of base level managers. They concern such aspects as the organization of production and operational activities, including supply, work of warehouses, departments, assembly lines, maintenance, preparation of workstations, quality control, organization of distribution, supervision, motivation, etc.

The challenges deriving from a hyper-competitive environment which is subject to constant changes, both evolutionary and radical ones, are much more important. Evolutionary changes, due to their long-term and predictable nature, do not pose a significant threat, especially for companies that follow and analyse current trends on an ongoing basis. Skilful identification of threats allows to generate a stream of activities, thanks to which it is possible to effectively manage operations in the field of planning, organizing, monitoring and controlling the organization's resources, and at the same time harmonizing the company's priorities with the demand from the market. Unfortunately, not all enterprises make the appropriate toil and effort. The lack of knowledge and skills as well as the lack of business tools contribute to the formulation of erroneous strategies, both in the perspective and in operational terms. As a result, these entities face great difficulties in effectively and efficiently coordinating resources for competitive advantage and success (McFarlane, 2014, p. 17). It should also be emphasized that a significant part of enterprises marginalizes or ignores current threats and changes, treating them as some kind of manipulation or fake news. Noticing a threat too late increases the risk and often contributes to serious perturbations, including the necessity to terminate economic activity.

The radical changes are related to a sudden, usually unpredictable event that fundamentally changes the conditions of running a business. The source of the revolutionary changes may be the sudden emergence of new needs, products, services, materials or raw materials as well as regulations, rules or principles that are most often not consulted with the interested parties. The examples include various types of limits, including production limits, pollutant emission limits, waste generation limits, location restrictions as well as decisions to prohibit specific activities. The dynamics of introducing changes is often a big surprise for entrepreneurs who most often do not have the appropriate means, resources and time to react effectively. The most common results are financial problems, a smaller scale of production, reduction of employment and in extreme situations, liquidation of the enterprise. It should be emphasized that attempts to change the sector, due to time constraints and relatively inelastic property, most often do not bring any effect.

By countering threats, entrepreneurs need to become more aware of changes taking place in the environment in which they operate and in which they plan and implement their operational tasks. Identification and recognition of changes should be reflected in a set of activities within which new, innovative methods and processes should be found, developed and used which on the one hand will reduce the risk, and on the other hand will allow to create new value based on better, more economical and more rational resource use. This collection should contain the most appropriate management tools and techniques, selected on the

basis of knowledge, competence and experience as well as reliable market intelligence. Only their implementation and skilful adaptation in current operations will enable appropriate change management and adaptation to the new reality (McFarlane, 2014, p. 18). Operational management in this context should be defined as the ability to consolidate the company's potential which includes material, human, intangible, financial, relational, etc. resources with methods enabling their effective use. According to Krajewski, Ritzman and Malhotra (2013, p. 2) operation management can be defined as “the systematic design, direction, and control of processes that transform inputs into services and products for internal, as well as external customers”. The authors (Krajewski et al., 2013, p. 3) emphasize that operation management is effective and efficient management of operations or resources that perform all or part of one or more processes in value creation. These processes take place in every organization, both production, service, commercial, and even social or no-profit ones because each offers some type of product or service that must be accepted by market.

Analysing the extensive literature on the subject, it can be indicated that in the last decades, the most important challenges related to the operational activity of enterprises are related to:

- environmental changes related to depletion of natural resources, fossil fuels and global warming, waste, air, water and land pollution, intensive farming and deforestation, products harmful to the environment,
- globalization, i.e. problems related to the processes leading to increasing interdependence and integration of states, societies, economies and cultures,
- technical progress and technology diffusion in production and operational activities (technology has been one of the most important influences on the growth and development of production-operation management, continuous improvement, productivity),
- constant innovation (innovation and agility are imperative to compete in today's business environment),
- employees in operational management (education, key competences, experience, difficulty recruiting the right talent, the lack of right employees—finding the right staff).

The characteristics of the most important challenges from the point of view of modern enterprises are presented below.

6.2. Environmental changes

In the simplest terms the environment can be defined as a system consisting of living and inanimate elements, created by both nature and man. Its individual components

interact with each other, creating a uniform plane of mutual conditions, connections and systems. None of the factors that shape the environment can function in isolation from the others. Any change to one of them causes a whole sequence of events that are reflected in all the other elements. The *Oxford Advanced Learner's Dictionary* (Hornby, 2000, p. 421) translates the environment as:

- the conditions that affect the behaviour and development of sb/sth; the physical conditions that sb/sth exists in,
- the natural world in which people, animals and plants live,
- the complete structure within which a user, computer or program operates.

A similar definition can be found in the *Dictionary of Contemporary English* (2005, p. 523) which indicates that the environment is:

- the air, water, and land of Earth, which can be harmed d by man's activity,
- the people and things that are around you in your life (e.g. the buildings you use, the people you live or work, and the general situation you are in,
- the natural features of a place (e.g. its weather, the type of land it has, and type of plants that grown in it).

The common feature of the above approaches is the possibility of influencing and shaping the environment by various entities, such as: enterprises, factories, organizations, institutions, local and regional government units, and even individual households. This shaping can be negative or positive. In negative terms, it is associated with its devastation, usually through over-exploitation. It takes the form of excessive extraction and use of natural resources, both renewable and non-renewable, pollution of air, land and water as well as waste including food. The positive aspect concerns the implementation of various types of programs and procedures which are believed to counteract negative trends. It should be emphasized, however, that despite extensive campaigns, the process of revitalization and regeneration of the environment proceeds at an alarmingly slow pace. The policy of many countries which translates into the functioning of both individual units and enterprises, is not aimed at the sustainable use of natural resources. Their decisions are usually based on an economic calculation and striving for development at all costs, even at the expense of future generations. It is pointed out that particularly significant problems related to the environment include depletion of natural resources, fossil fuels and global warming, waste, pollution of air, water and land, intensive farming and deforestation, products harmful to the environment.

6.2.1. Depletion of natural resources

Natural resources are all resources that were created without human interference or influence. They include sunlight, atmosphere, water, earth with all its miner-

als, as well as vegetation and animals (*Oxford Dictionaries*, 2020). They can be renewable or non-renewable. Non-renewable resources are all those that cannot be renewed as a result of natural processes or take a very long time in geological terms. Here, coal and lignite, crude oil, iron, sulphur and other metals, etc. can be mentioned. Renewable ones include those that, if properly managed, are not exhausted and can be replaced by their equivalent due to natural processes in the environment. For example, renewable resources include water, air, solar energy, as well as animals and plants. It should be emphasized, however, that human activity, and in particular overexploitation, consumption and waste, contribute to the imbalance, and thus the depletion of renewable resources. In other words, the consumption of renewable resources is so intense that the natural substitution processes are disrupted.

Natural resources, both renewable and non-renewable, are largely used by enterprises in various technological processes. This use is related to the growing needs of people, regions and entire economies, which was reflected in the dynamic development of production. It contributes to the faster consumption of resources in relation to their renewal or replacement. At the same time, the depletion of resources causes an increase in their price, which enables the exploitation of new sources that have not been obtained so far due to the cost. It is indicated that the main causes of resource depletion include (*The needs of 7th billion people*, 2020):

- growing demand for resources related to overpopulation and the need to provide it with adequate living conditions (the population has exceeded 7 billion people, and it is estimated that by 2100 it will reach 11 billion); in addition, a growing population contributes to an increase in environmental pollution,
- wasteful and unbalanced use of resources which leads to over-consumption and waste, especially in industrialized regions,
- excessive extraction and exploitation of available sources which leads to environmental devastation (an example is Adamów S.A. Brown Coal Mine, located in Turek, Poland, whose activity led to a decrease in groundwater level and drying up of water reservoirs (Pepliński, 2016),
- deforestation and the destruction of ecosystems leading to a loss of biodiversity (e.g. the forest area on the island of Borneo was reduced by 68% between 1950 and 2020, see Figure 6.1),
- technological and industrial progress which leads to an increased demand for certain raw materials, materials and energy,
- pollution of the environment and resources, especially air, water and land.

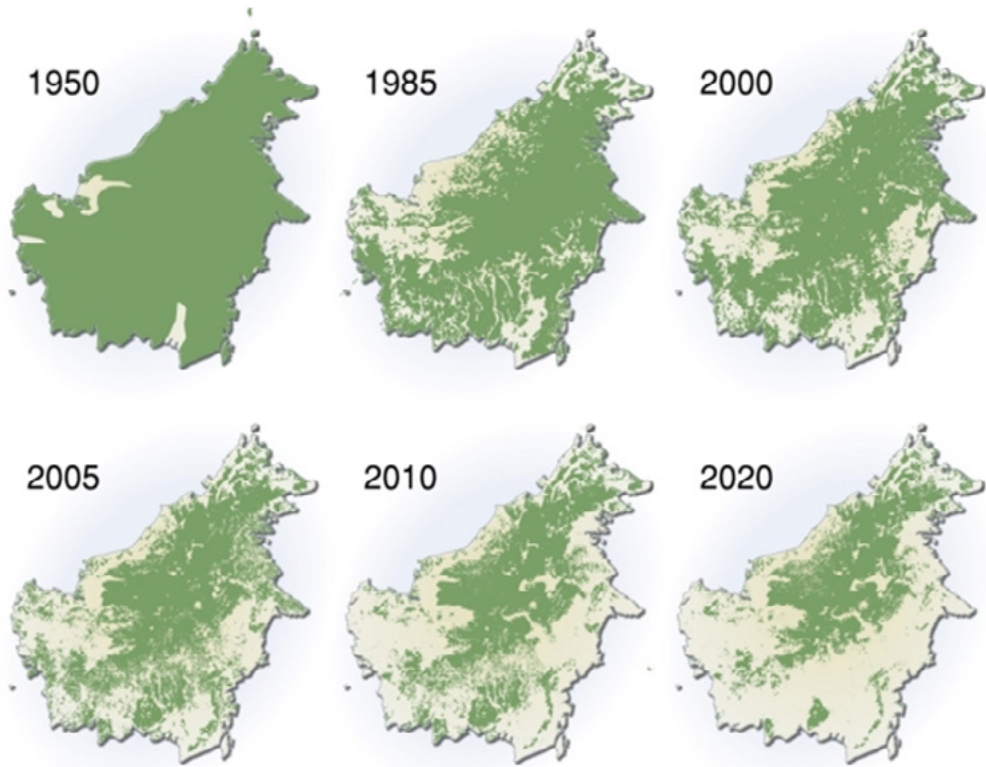


Figure 6.1. Deforestation of Borneo 1950–2020

Source: (*Extent of deforestation in Borneo, 2006*).

6.2.2. Fossil fuels and global warming

One of the biggest threats to the environment is climate change related to global warming. Here it is necessary to distinguish the concept of global warming from climate change.

The first represents a systematic global increase in temperature of the atmosphere, oceans and the earth surface which has accelerated significantly in the last two decades (MacMillan, 2016). Climate change, on the other hand, is a set of complex factors that affect the weather and climatic systems of the planet (Nunez, 2019).

The increase in pollution contributes to the absorption of light and solar radiation which is reflected from the earth surface. As light and energy are absorbed,

the temperature rises, making the planet warmer. Under normal conditions, in the absence of pollution, this radiation would be emitted into space. Factors influencing climate change can be divided into external and internal ones. The external one is related to solar radiation, while the internal one is related to natural processes, such as volcanic and seismic activity of the earth and human activity which uses natural resources to excessively exploit the environment. It is indicated that the main sources of greenhouse gases include (Europejska Agencja Środowiska, 2019; Dobrowolski, 2020):

- the power plants based on hard coal and lignite, which have the greatest impact on global CO₂ emissions; it is shown that one third of the world CO₂ emissions are generated when this raw material is burned; the largest coal production is in: China (3,550 million tons), India (771 million tons), the United States (685 million tons), Indonesia (549 million tons), Australia (483 million tons), Russia (420 million tons), Germany (71.3 million tons), Poland (48.7 million tons) and Turkey (44.6 million tons) (BP, 2018; IEA, 2019),
- the road, air and water transport, especially the growing number of cars, planes and container ships, which emit, apart from CO₂, many other harmful substances, such as: nitrogen oxide, dusts and soot generated during the combustion of mazout (fuel oil) in maritime transport,
- the industry that produces a significant amount of poisonous and toxic industrial waste in the production of goods and services, which is usually emitted directly into the environment; it should be emphasized that the industry also uses oil, gas and coal; these raw materials are used to produce plastics, fertilizers, pesticides, rubber, drugs, solvents, dyes, asphalt and many other products, the production of which emits significant pollutants into the environment,
- the households, especially the energy generated by burning waste and low-calorie coal in the process of heating the house and producing energy,
- the cutting down forests, including tropical forests, which are largely responsible for the reduction of greenhouse gases.
- the agriculture, including animal production and changes in land use, deforestation, drying up of lakes, lowering of the groundwater level,
- the production of waste and their improper storage in landfills,
- the use of fluorinated gases in industry.

The ongoing climate change may lead to a global crisis. A 2-degree increase in temperature will render large parts of Africa and Asia unfit for life due to lack of water and arable land. This will cause a huge, estimated at 250 million people, wave of refugees by 2050 (Dobrowolski, 2020). Therefore, it is required to undertake various types of initiatives aimed at, on the one hand, making global communities aware of the need to reduce greenhouse gas emissions and to use alternative sources to fossil fuels.

Problems of sustainable development and challenges related to production

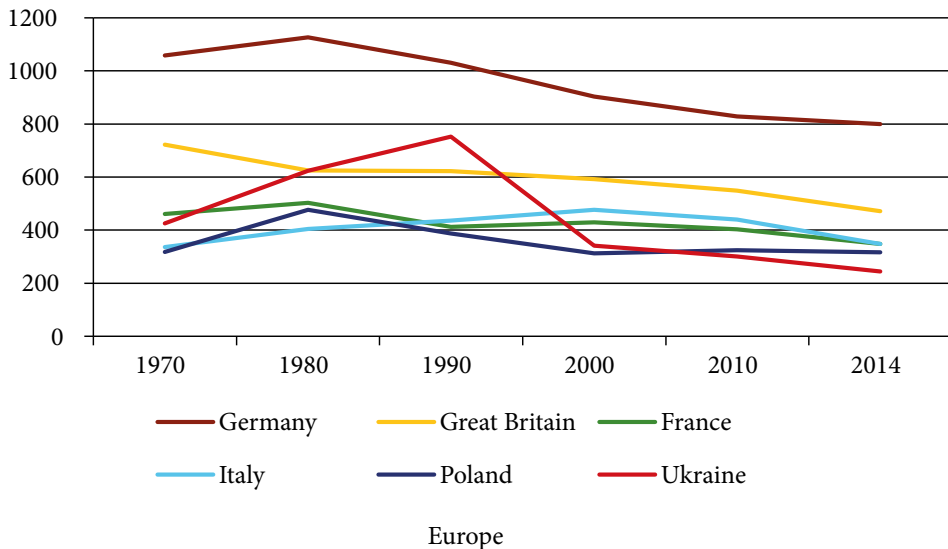
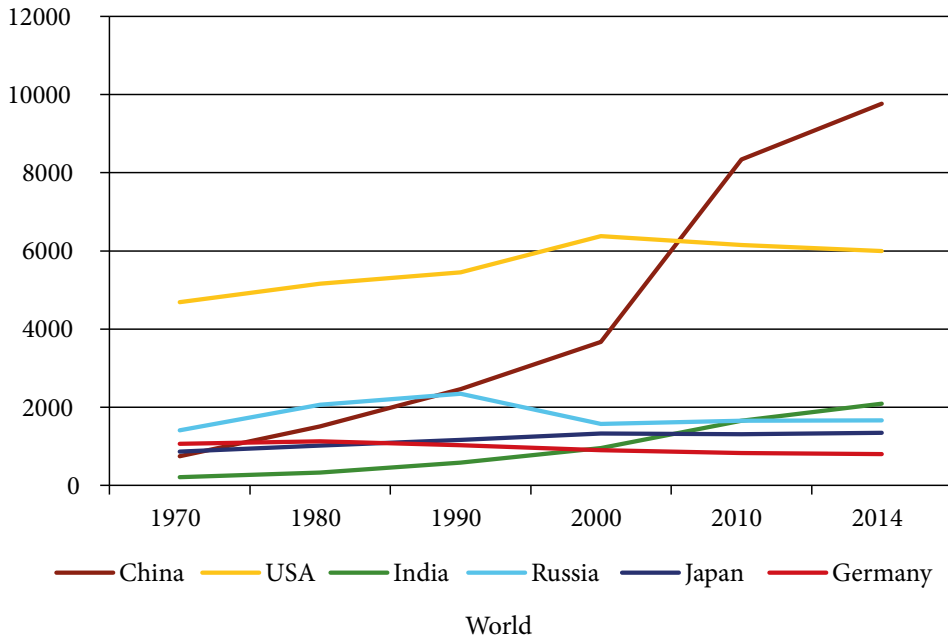


Figure 6.2. The largest producers of CO₂ in million tons in the world and in Europe during the years 1970–2014

Source: Own elaboration based on (BP, 2018).

6.2.3. Waste, air, water and land pollution

Waste, which is defined as consuming more than it is necessarily needful is another threat facing today's organizations. It mainly concerns resources, time, energy, etc. (Hornby, 2000, p. 1459). According to the Polish language dictionary, wastage is identified with "(...) reckless, useless, unprofitable dispensation, managing something, prodigality" (Drabik and Sobol, 2007). The authors also add that it is spending money excessively, dispensation, squandering of something, not using properly what we have, exposing to losses, unjustified spending of resources. It can also be described as a reckless, unprofitable and useless dispensation of some resource, often ignoring the possibility of doing something with less resource expenditure (Wyrwicka, 2009). The dictionary of synonyms shows that they are identified with such words as: mismanagement, extravagance, inefficiency or ineffectiveness (Cieńkowski, 2000, p. 100).

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Wastage also found its explanation on the basis of praxeological sciences. Kotarbiński, in the *Traktat o dobrej robocie* (Treaty of Good Work) (1974, pp. 156–157), thinks that the waste is: "(...) wasting of resources, or consuming resources of rare specific values for the goals achieved through the use of easily replaceable resources, the sluggish ending of the started work where the preparatory contribution is then lost, any unnecessary contribution, the excessive consumption of materials, apparatus, energy—over the real need, incorporating everything what is irrelevant."

Wastage applies to all entities operating on the market, starting from the state or from regions separated legally and organizational, through enterprises, institutions, self-government bodies and offices, and ending with the society and individual households. Each of them, conducting business or operating in a specific environment, needs a variety of resources with strictly defined parameters that provide him with the satisfying ever-growing needs. In practice, however, it happens sporadically that the demand reported by a specific entity closely corresponds to its consumption. The discrepancy between these two parameters contributes to the waste, i.e. the lack of use or incomplete use of certain resources at the disposal of the organization or a natural person. The essence of waste is the disproportion between the effective use of resources and other parameters influencing and deciding on the standard of living or the goals set by the organization. In the case of households, the waste primarily relates to food as well as other articles of everyday use, such as clothing, footwear, household appliances, electronics, etc., which serve

to meet the constantly growing consumer needs. In the case of enterprises and other business entities, this problem concerns raw materials, materials, production potential, space and even labour, its skills and experience. However, taking into account the self-government or state structures, there should be indicated the irregularities in the rational use of resources, including transfer of ownership, abuse, mismanagement, etc.

Wastage can be identified with the non-utilization or misuse (partially or not at all) of certain things. In other words, the unprofitable management of resources that remains with the organization or a specific entity. From the point of view of the company, it applies to all activities undertaken that do not increase the value of the product or service from the point of view of the buyer. This means that waste is all that brings no added value in the process of creating the product and delivering it to the buyer (Roother & Shook, 1999).

Analysing the considered concept from the point of view of the company, it should be pointed out that the sources of waste can be considered through the prism of eight types, seven of which are typically hard, and one is soft. The starting point is the division of activities into such ones that add value from the point of view of the buyer and those that do not make much sense which means that the client will not be ready to pay for them. Analysing the basic activity of the enterprise, particularly important types of waste are (Wiśniewska, 2005, p. 24):

- overproduction understood as the production of more and earlier than the customer needs,
- waiting: i.e. idle production, in other words it is hidden unproductivity caused by delayed delivery of materials or machine failure, planning errors, etc.,
- excessive processing: redoing activities or returning to activities that have already been done earlier in the previous positions,
- excessive transport: carrying out transport activities above the expected level,
- excessive stocks: purchase over demand, storage of additional parts or products that the customer does not currently need. In other words, this problem is related to the capital frozen in articles or work completed and waiting for its turn,
- excessive traffic: all additional or too long lasting activities needed to complete the task,
- errors and defects of products or otherwise the production deficiencies,
- unused human potential, including wasting employee creativity.

The presented approach is associated primarily with the production aspects, however, it should be noted that waste also affects the non-production sphere, associated with the organizational, administrative, legal work, etc. Summing up the considerations of the essence of wastage, it should be emphasized that in practice this phenomenon cannot be completely eliminated. Many activities must be performed although from the perspective of the buyer they do not create the value

(e.g. transport, management, quality control). According to Fabrizio and Tapping (2010), today's wastage has become a normal part of the activities undertaken in the environment.

A particular type of waste is food losses. According to FAO, it means "...any processed products, partly processed or unprocessed product intended for human consumption or for human consumption to be expected as well as those which, despite their manufacture, have not been eaten" (FAO, 2014). They refer to edible parts of food of animal and vegetable origin that arise at all stages of the agri-food chain (BCFN, 2012; Tielens & Candel, 2014).

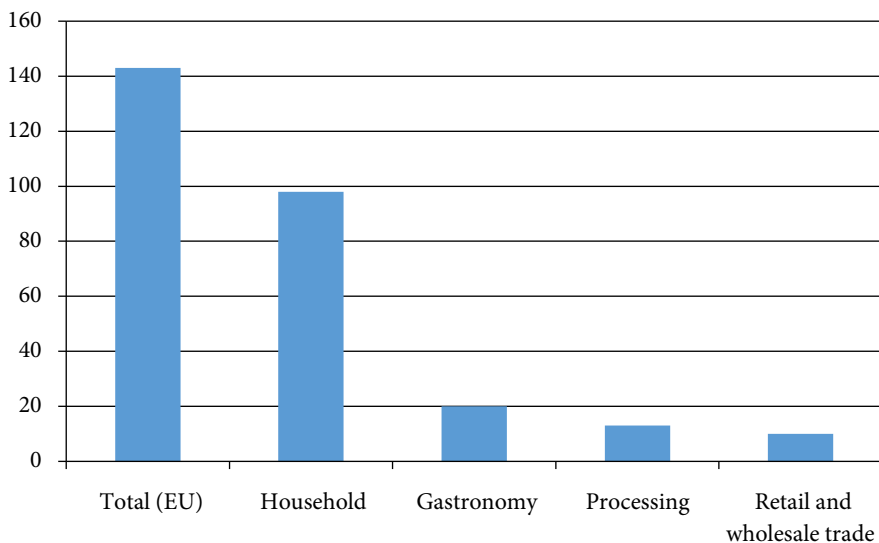


Figure 6.3. Cost caused by food waste in billion EUR

Source: (*Food waste*, 2012).

Analysing the process of food waste appearance, there can be pointed several interlocking stages:

- the first one, at the primary agricultural production stage, is associated with losses caused by the environmental factors; particularly significant losses are those ones caused by leaving raw materials in the field or in the orchard, or not harvested vegetables and undersized fruits,
- the second one, at the processing stage, concerns technical limitations that prevent effective processing,

- the third stage, referred to as the manufacturing process stage, is associated with the production-related activities, such as: packaging, transport, marketing, service,
- the fourth one is related to the storage processes, especially in the area of improper storage of the raw material and exposure to the weather conditions,
- another stage concerns transport, including spoiling, crushing, wrapping or tearing the packaging,
- the sixth stage concerns distribution and sales, in which losses arise as a result of the lack of correct estimation of demand and supply,
- the seventh one concerns the consumer and his approach to waste; it results from the excessive consumption and inappropriate methods of food protection.

It should also be emphasized that the literature distinguishes the concept of waste and loss (Gustavsson, Cederberg, Sonesson, Otterdijk, & Meybeck, 2011, p. 2). Authors say: “Food losses refer to the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption. Food losses take place at production, postharvest and processing stages in the food supply chain. ‘Food’ waste or loss is measured only for products that are directed to human consumption, excluding feed and parts of products which are not edible. Per definition, food losses or waste are the masses of food lost or wasted in the part of food chains leading to “edible products going to human consumption” (Gustavsson et al., 2011, s. 2).

In practice, the problem of waste is universal, massive, ubiquitous and practically applies to all aspects of social and economic life. These traits cause that the effects of waste and mismanagement find their negative reflection in the established and historically elaborated social order. At the same time, it is emphasized that if the negative consumption patterns are continued, soon the society will face a double environmental crisis, what is the shortage of resources on one hand and the excessive waste burden on the other one (Global Waste Management Outlook, 2015; Velenturf & Purnell, 2017).

The paradox is that the majority of individuals, enterprises and even self-governments, both at the local and regional level, are aware of the problem of waste. However, despite relatively high awareness, it is generally acceptable what results from the belief that waste is something irrational on which we do not have a direct impact. It can therefore be emphasized that the problem of waste will be difficult to solve using traditional methods of education, training or introducing specific legal regulations.

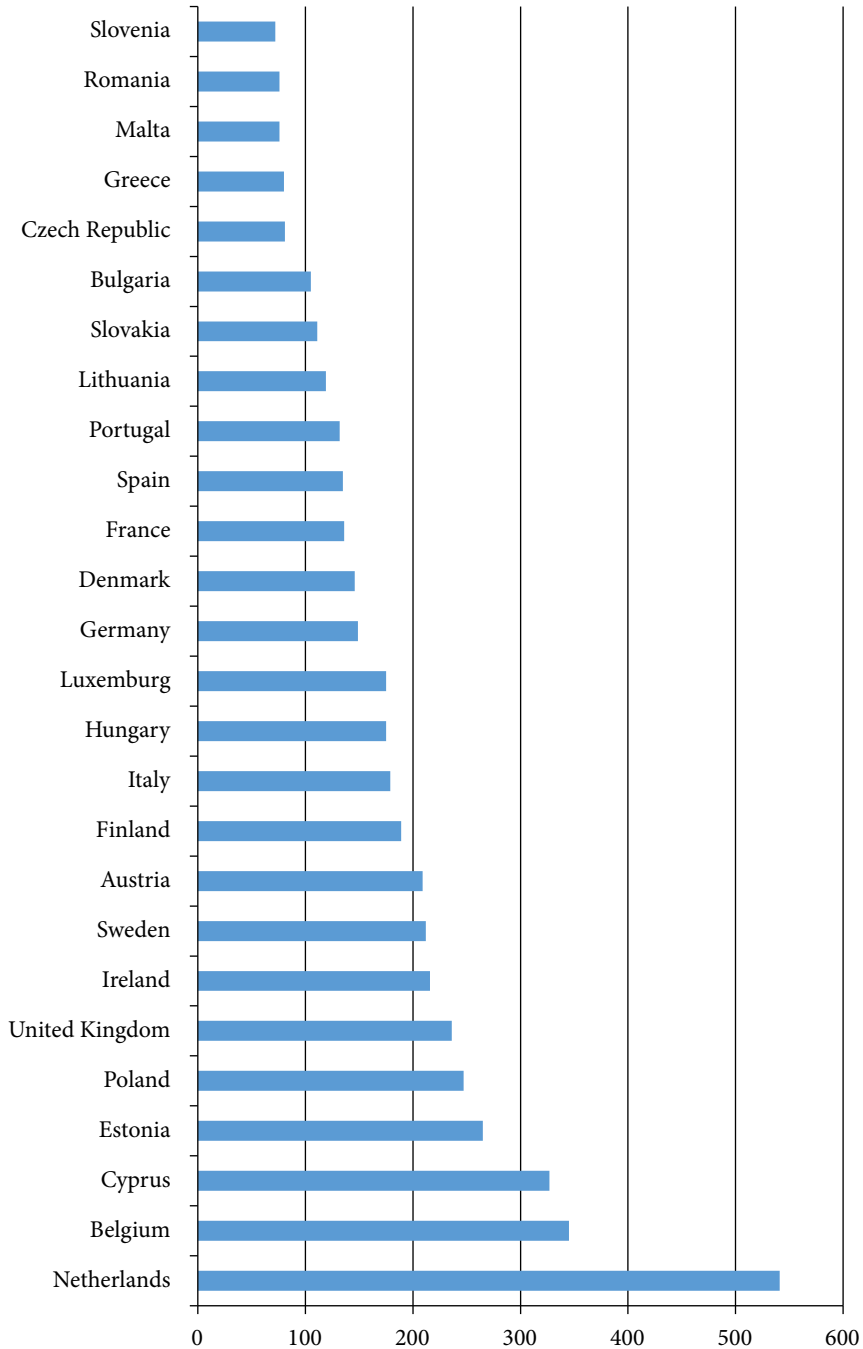


Figure 6.4. Losses in kg per person

Source: (Eurobarometer, 2016).

6.2.4. Problems related to environmental pollution

Another environmental problem that modern enterprises have to deal with, is pollution which should be understood as a process in which various harmful substances and toxins get into the atmosphere, water and earth, exceeding the permissible standards (Albiniak, 2017). As a result, there is contamination, poisoning or degradation of the environment, which becomes dangerous and unusable. Attempts to use such an ecosystem may have negative consequences what is reflected, on the one hand, in the health and condition of people, and on the other hand, in defective products that do not fulfil the functions and tasks for which they were intended. The pollutants emitted to the environment may be permanent or elusive. In the first case, it concerns the emission of specific fractions and components to the environment, which are components of exhaust gases, fumes, liquids, solutions, various types of substances, and even solid elements. In the second one, pollution is caused by artificial introduction of elements such as light, sound and temperature into the environment. The sources of pollution can be divided into natural and artificial ones. Natural ones are associated with volcanic activity, spontaneous outflow of liquid minerals, erosion and weathering of rocks, fires, floods, etc. Artificial ones are caused by human activity and take the form of contamination with household and industrial waste. The main component of household waste is organic materials, plastics, rubber, textiles, metals, wood and glass.

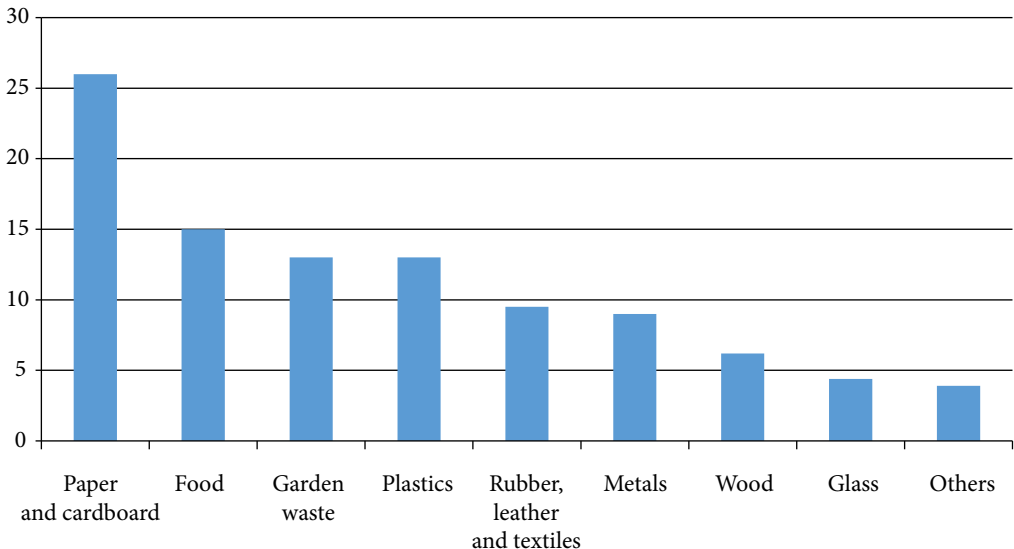


Figure 6.5. The percentage of household waste production

Source: (EPA, 2018).

The development of industry associated with the rapidly growing demand for various types of goods and services has a much greater impact on environmental degradation and disintegration. The most harmful compounds are generated by activities such as: hard coal and lignite mining, steel production, oil refining, pesticides and fertilizers production as well as sawn timber and stone from quarries (Vallero, 2014). Each of these processes produces products along with a few waste products that pollute water, air and land. These pollutants cause long-term damage to the world around us. They are the main cause of deteriorating living conditions as well as turning extreme weather events into natural disasters. They cover the emission of many pollutants, of which air pollution, light pollution, litter, noise pollution, plastic pollution, soil contamination, radioactive contamination, thermal pollution, visual pollution and water pollution are particularly dangerous. They can be liquid, sludge, gaseous or solid waste. It is indicated that the main causes of industrial pollution include:

- the lack of proper environmental policy in many countries,
- unplanned industrial growth, especially in less developed countries,
- the use of outdated technologies, generating large amounts of waste,
- the presence of a large number of small scale industries that emit many harmful substances and are practically out of control,
- the inefficient waste disposal related to the lack of clear and transparent rules regarding responsibility for the elimination of pollution, both in individual countries and in international spaces,
- the leaching of resources from our natural world, mainly related to the acquisition of raw materials and deep-sea minerals,
- the natural resource use which in many cases takes the character of robbery and plunder,
- the lack of regulations and solutions that would force enterprises to regenerate the damaged environment.

By counteracting the harmful impact of industry on the environment, the measures should be taken to reduce the negative impact of enterprises on individual ecosystems. In particular, the efforts should be made to replace old technologies and implement clean technological processes which should significantly reduce the production of pollutants at their source. These activities must be comprehensive and systemic, covering all countries, including, above all, those whose industry degrades the environment to the greatest extent.

6.3. Globalization in operation activities

The company operational activity is conditioned by the ongoing processes related to globalization and increasing global competition. The development of technology, facilitation of the flow of goods and services, new methods of communication as

well as political, social and economic changes make enterprises have to look for new methods of competitive struggle which will ensure their survival on the one hand and expansion on the other hand. The activity based on traditional goals and principles no longer brings the expected results, in the form of an increase in production, sales or the possibility of creating demand. According to Cullen and Parboteeah (2010), the domestic market no longer provides success and long-term profitability. The very concept of globalization is ambiguous as it is a multidimensional and multithreaded phenomenon that occurs simultaneously on many levels (Kucharczyk & Łajca, 2017). It is characterized by the intensity and speed of the changes taking place. Overall, it is the process by which products, technologies, information and jobs spread across national and cultural boundaries. It is related to the intensification of the flow of goods and services between even very distant places. This definition indicates the growing importance of trade and the interdependence between entities from different countries. It may concern various activities of humans and economic entities, including ecological, cultural, political, technological, financial and economic activities. It has many benefits that span multiple areas. In particular, it affects the development of the world economy and the intensification of the development of cooperative relations between enterprises from different countries.

Globalization can be defined as an extensive network of economic, cultural, social and political interconnections and processes which goes beyond national boundaries (Yeates, 2001, p. 629).

The intensification of globalization processes means that more and more companies are looking for opportunities for their development on foreign markets. These activities cover many aspects, from procurement and sales, through transport and financing, to the organization of production processes and acquisition of technologies. There are two reasons for the development of international activity (Ansoff, 1984):

- the first one is related to the operational activity of the enterprise in which materials, raw materials, equipment and technologies are obtained and surplus products are sold,
- the second one concerns the fulfilment of strategic needs, including, in particular, sustainable growth, improvement of profitability, avoiding stagnation, and ensuring the stability of the external environment.

However, according to Brooks (1999), the ongoing transformation is related to:

- the increased geographic dispersion of production,
- the greatly enhanced significance of interfirm alliances,
- the increased ease of engaging in foreign direct investment (FDI),
- the general shift toward “knowledge-based” economies in the most advanced countries.

Benefits of globalization	
<p>Globalization of markets</p> <p>Convergence in buyer preferences in markets around the world</p>	<p>Globalization of production</p> <p>Dispersal of production activities worldwide to minimize cost or maximize quality</p>
<p>Reduce marketing cost New market opportunities Levels income stream</p>	<p>Access lower-costs labour Access technical expertises Access production inputs</p>

Figure 6.6. Benefits of globalization

Source: Own study based on (*Velocity Global*, n.d.).

It is emphasized that these processes are natural and are related to the development of science, technical progress, specialization and unification of production processes as well as the expansion of commodity markets. Globalization therefore enables companies to expand their business and optimize it, thanks to the free possibility of relocating production, quickly changing sources of supply, looking for more profitable sales markets and better financing rates. As a result, investors achieve a better return on investment. There are five factors at the heart of the development of globalization, including:

- The development of international trade which increases the interdependence between cooperating partners. It should be understood as “commercial activity, the subject of which is the paid delivery of goods or the provision of services between contractors based in different countries” (Jaszczyński, 2016, p. 374). According to the author, this development is conditioned by the state trade policy which sets goals to be achieved through international exchange. This policy should define the scope of exchange, its structure, size as well as dynamics and geographic directions (Jaszczyński, 2016). Nowadays, the value of turnover between countries increases with the economic development of individual countries, the deepening of the international division of labour, new production technologies and progress in the field of transport and communication (Białowąs, 2015). Moreover, the following factors are the basis of the development of international

trade: technical and economic, structural, cyclical, and political and systemic. International trade includes export, re-export, import and balance of payments. Both industrial goods, services and capital are interchangeable. In the first case, trading in raw materials, fuels and products of the processing and agri-food industries is particularly important. The scope of services includes transport and forwarding, tourism, IT and telecommunications services as well as commercial services. The last category is related primarily to foreign investments and the flow of patents, licenses, copyrights, rights to inventions, etc.

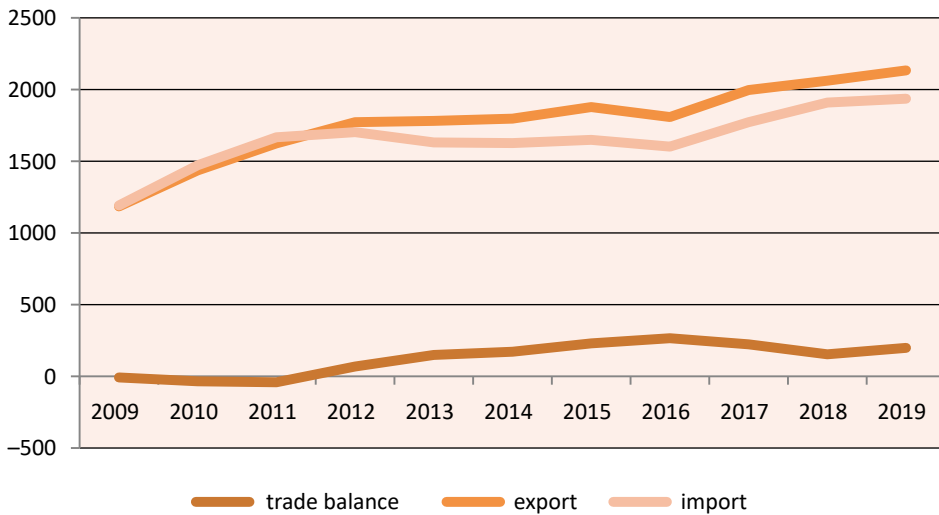


Figure 6.7. Changes in international trade in goods, EU 28, 2009–2019, in billion euro

Source: (Eurostat, 2020).

- The foreign direct investment which can be understood as “an investment undertaken in order to obtain a permanent share in an enterprise operating in an economy other than the investor economy where the investor goal is to obtain an effective influence on the management of the enterprise” (Górniewicz, 2013, p. 61). These investments depend on fundamental factors that shape the economic situation of a given country, including in particular macroeconomic conditions and the legal and regulatory environment (Humanicki, 2018). They can be divided into four basic categories. The first one concerns resources, including natural resources, labour and intangible resources that are not available in the home country. The second category concerns the market, in particular the striving to expand or maintain the current state of ownership, while blocking access to it by competition. The third aspect concerns efficiency which indicates a better use of the possessed capabilities, thanks to the appropriate economic

policy of the host country. The last category is related to capital and the possibility of increasing the ownership level thanks to the acquisition of a company or production capacity in which a foreign investor is interested (Wiśniewska, 2011). It is indicated that FDI has a positive impact on the economy of the host country as they enable the transfer of technology and knowledge as well as the inflow of financial resources which in turn increases the productivity of production resources and improves the quality of manufactured products (Humanicki, 2018).

- The flows in the capital market are related to the flow of money between markets for investment, trading and business purposes. In particular, they relate to foreign direct investment, real estate investment or purchase, investment in securities, granting loans and credits and other operations involving financial institutions (Dyrektywa, 1988). In enterprises they mainly relate to investment capital and outlays on research and development activities. These flows affect the efficiency of the global allocation of savings by financing those activities that are most productive and thus affect economic growth and global welfare (Alfaro, Kalemli-Ozcan, & Volosovych, 2006). At the core of capital flows is investor efforts to diversify their portfolios with a focus on international bonds, stocks and mutual investment funds.
- The migration which should be seen as the movement of people from one place to another, with the intention of temporary or permanent settlement. It can take the form of invasion, conquest, colonization and emigration / immigration. The main causes of migration are economic and non-economic factors. The economic ones are related to the improvement of living conditions, while the non-economic ones are conditioned by political, religious, social, family factors and crisis situations related to natural disasters. From the point of view of the operational activity of enterprises, the economic migration is particularly important. In practice, it is believed that migrants transfer their unique competences to the territory of the host country, stimulate the revival of industries and geographic areas that are not attractive to entrepreneurs of the host country, stimulate economic exchange and transfer of capital resources and bring an “entrepreneurial spirit” which stimulates rivalry and competition (Glinka, 2018, pp. 165–166). The migration affects the development of both host and developing countries. The second aspect is related primarily to the development of entrepreneurship as a result of the re-emigration of people who obtained education and knowledge abroad. Re-emigration may also have a negative effect, especially in the case of the loss of qualified employees who have decided to continue migration or return to their home country.
- The last factor influencing globalization is the diffusion of technology. This development is reflected primarily in communication facilities which affects the faster flow of knowledge, ideas, concepts or various types of initiatives. Moreo-

ver, the formation of transnational corporations contributes to the diffusion of production systems based on modern and innovative solutions (Ferri, 2003).

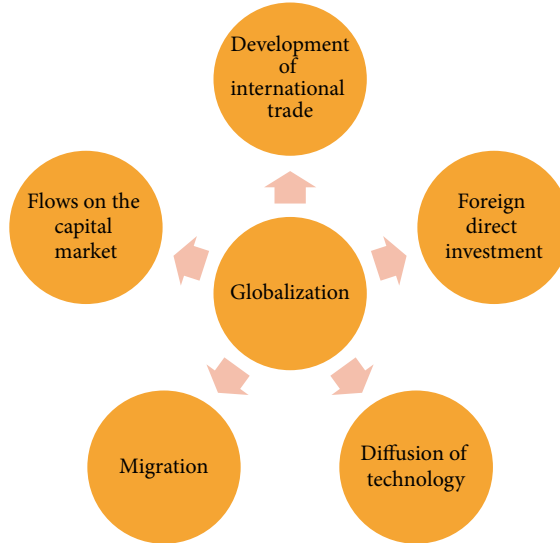


Figure 6.8. Factors shaping globalization

Source: Own study.

From the company point of view, the globalization affects two basic areas, i.e. the market and production. The market is primarily concerned with the processes of consolidation in which one integrated economy is created. This process also contributes to the alignment of preferences and tastes of customers who are influenced by a similar set of instruments. The offer is therefore included in standard, unified products and services which are increasingly taking a mass form. The aforementioned standardization, unification and normalization processes are also reflected directly in production. In operating activities, it may refer to various aspects, ranging from searching for suppliers of goods and services who offer them at an appropriate price and quality, through the relocation of production processes, taking advantage of the differences in labour costs in individual countries, and ending with the sale and distribution based on international multi-warehouses. The large scale of operations also contributes to the reduction of procurement costs. Companies that do business in different countries tend to purchase raw materials, materials and services at much lower prices than local businesses. Therefore, the cost of their operating activity is reduced which may be reflected in the cost of production and the market price of the offered product (Heimeshoff & Klein, 2013). The lower price of the offered products or services has a direct impact on the increase in the competitive position of global producers and thus their share in sales.

It can therefore be emphasized that production does not have to take place in one place. The individual components (elements that make up the product) are manufactured by various companies, located in different places, in different countries and even continents. The manufactured elements are sent to the company where the assembly takes place as a result of which the finished product is created. The division of the production processes of a specific product into many phases and their location in different countries is associated with the desire to improve competitiveness, as it enables the reduction of unit costs of production which, unfortunately, is negatively reflected in the so-called “wage repression” (Islam, 2015, p. 4). The globalization of production implies that firms are basing individual productive activities at the optimal world locations for the particular activities (Okoro, Ogochukwu, Nebo, & Okoro, 2017, p. 112).

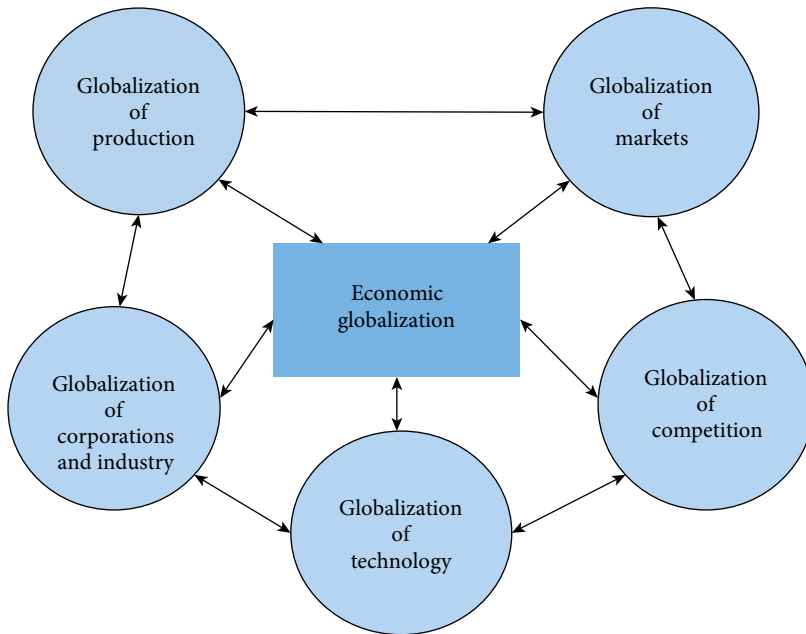


Figure 6.9. Dimension of economic globalization

Source: Own study.

Although such a product has a specific brand, associated with a specific country, it consists of components manufactured in different countries. The deliveries must therefore be properly synchronized, the lack of precise schedules may disrupt production processes which in turn may lead to disruptions in the implementation of plans or incomplete use of production capacity. From an operational point of view, globalization is also reflected in employee flows. The 1990s were characterized by

the intensity of restructuring and privatization processes in the countries of the Eastern Bloc. The negative effect was the drainage of individual economies from employees with high competences, experience and skills who were employed by large multinational corporations. As a result, the activity of global producers contributes to reduction in the pool human resource available to the domestic companies (Clougherty, Gugler, Sørsgard, & Szücs, 2014). The effect of the activities of such companies was, *inter alia*, the liquidation of many research and development centres that specialized in solving the problems of specific industries or enterprises. Because “globalization of production involves splitting of the global value chain into different components, success depends critically on several conditions, including the technical capacity of the producers of components and assembly firms, the availability of workers with necessary skills, and the ability of managers to deliver according to strict time schedule” (Islam, 2015, p. 3). A very positive aspect related to the globalization of production is the possibility of relocating labour-intensive production, i.e. production that requires large amounts of human labour, to countries that have a surplus of labour. Such relocation indirectly contributes to the increase in wages in countries which have so far been characterized by relatively low wages. However, this process is long-term, requiring commitment from both the country in which the production is launched and the company that organizes the production. Moreover, the relocation of production contributes to the development of less developed regions, including the “learning by doing” process and thus contributes to the development of local entrepreneurship (Islam, 2015, p. 4). Strielkowski, Tcukanova and Zarubina (2017) indicate that globalization in operational management is also manifested in the technology transfer. This transfer applies to all areas related to the operational activities, from inventory management, through production, sales and marketing, to customer service, controlling and financial management.

6.4. Technical progress in production-operation management

One of the most important challenges related to the operational and production activity of the enterprise, due to its dynamic and permanent development, is the technical progress. It means a specific but not every change in the company operations. Basically, it is identified with the new technology, new production processes, the use of new raw materials, new production methods or changes in the organization of work. All the indicated elements are directly reflected in the current activity of the enterprise, related to the production of products and/or the provision of services, within the basic domain (Bińczycki, 2007, p. 7).

When discussing the issues of technical progress, it is necessary to point out the differences in terms of technique and technology. In practice, these two concepts are often equated with each other. The technique is most often associated with various types of human activity. Therefore, it concerns aspects such as the way of conducting research, presentation, thinking or demonstrations. It is defined as a set of knowledge of ideas and methods which are the result of many actions, both intentional and accidental. From the point of view of an enterprise, technique refers to the material resources used in the production of goods and services. The technology, on the other hand, refers to the method of preparing and conducting the production process. It can be defined as a combination of practical and theoretical knowledge with the ability to use them in various types of procedures and methods used in production processes (Palka & Stecuła, 2018; Banach, 2010). Technical progress is related to both the development of technique and technology.

The term technical progress should be understood as all types of changes, both in the production technique as well as in the organization of work, leading to the improvement of economic efficiency (Mazur, 2006, p. 87).

In practice, the technical progress is defined as technological development, technological achievement or technological change which are based on innovations, inventions and new, more economical solutions. In the simplest terms it could be defined as new, and better ways of doing things, and new techniques for using scarce resources more productively (Muchdie, Prihawantoro, & Alkadris, 2016). In a slightly broader sense, it can be identified with the process of changes taking place in the enterprise which is based on the implementation of new, better or improved machines, devices and tools as well as new production methods which leads to a more economic use of resources (Janasz, 2006). It is emphasized that the implementation of the indicated solutions in the operational activities must be purposeful because when implementing progressive production methods, the focus should be to obtain more favourable results compared to the results obtained so far. The technical progress must therefore be subordinated to the principle of frugality (Bittnerowa, 1995).

The technical progress is directly reflected in an increase in labour productivity, an improvement in the productivity of production factors and a more favourable use of capital. Its scope includes the development of technology, its verification through research and development processes, and then making available and dissemination. The implemented solutions should be subject to continuous development, improvement and refinement. The technical progress can be characterized as a gradual, multiphase process, consisting of small increments along a clearly defined development path.

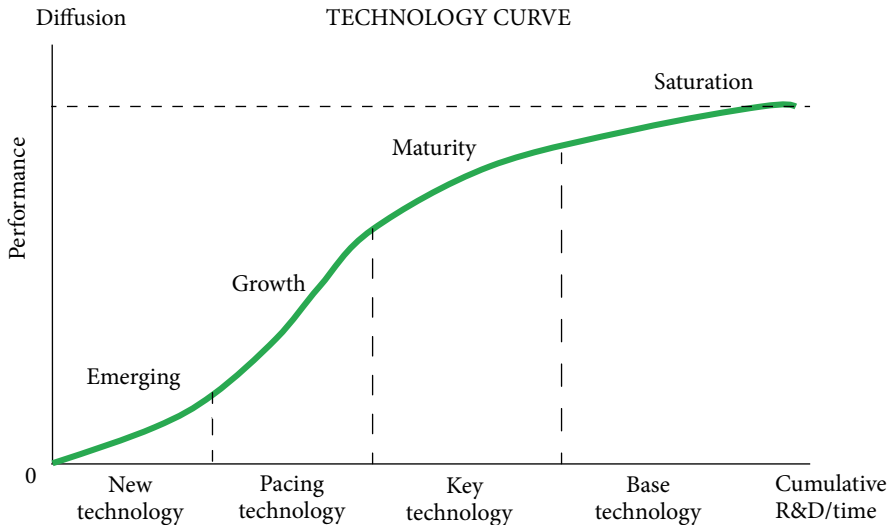


Figure 6.10. The curve concept of technology life cycle

Source: (Gao et al., 2013, p. 399).

In the classical approach, the four phases can be identified on the technological curve: emerging, growth, maturity, saturation. With the passage of time, the new technology becomes more and more popular, it spreads, it begins to be used more and more often, achieving universal acceptance. It should be emphasized, however, that the path of technical progress is not linear, there may be various disturbances, sudden turns and even stagnation which may lead to the interruption of the process related to technical progress (Gao et al., 2013).

The technical progress contributes significantly to better results for a company. It should be emphasized that this development is conditioned by a better, more efficient system that transforms resources and raw materials into products and services. It can therefore be emphasized that it directly influences the improvement of the company productivity, both in general and in part. In terms of partial productivity, there should be pointed out the improvement in the productivity of energy, production equipment and labour.

The technical progress also influences the optimization of the use of raw materials, materials and other substances used in the production processes. In practice, most of them are of a limited nature. In extreme cases, it is non-renewable which means that they are depleted and their renewal as a result of natural processes is impossible or takes a very long time. It can therefore be emphasized that the mere increase in the amount of raw materials or resources, e.g. as a result of greater extraction, is not a source of economic growth and development. It is required to implement an appropriate process, know-how or ideas that will generate more

products and services from a given resource, compared to the previous period when modern solutions were not used. It is also emphasized that the mere increase in production potential is not directly reflected in economic growth. The acquired machinery and equipment must be properly and skilfully used. Therefore, it is necessary to correctly synchronize the production potential with the skills, experience and competences of the employees. In addition, the degree of commissioning of the machine park should also be examined, including its readiness, efficiency and commitment. The technical progress is therefore associated with the company striving to improve productivity, i.e. a favourable ratio of effects to inputs. The economic growth is therefore a product of technical progress and not of an increase in the amount of resources.



Figure 6.11. Factors of technical progress

Source: Own study based on (Bittnerowa, 1995, p. 102).

Therefore, in order to develop, an enterprise must introduce new, more efficient machines and devices, it must seek new production methods and skilfully coordinate human work with objectified work. Such an approach should lead to the improvement of working conditions, its savings as well as a change in the assortment and quantity structure in line with the market requirements, the use of new raw materials, improvement of the quality of manufactured products and services, increased efficiency and lower unit costs.

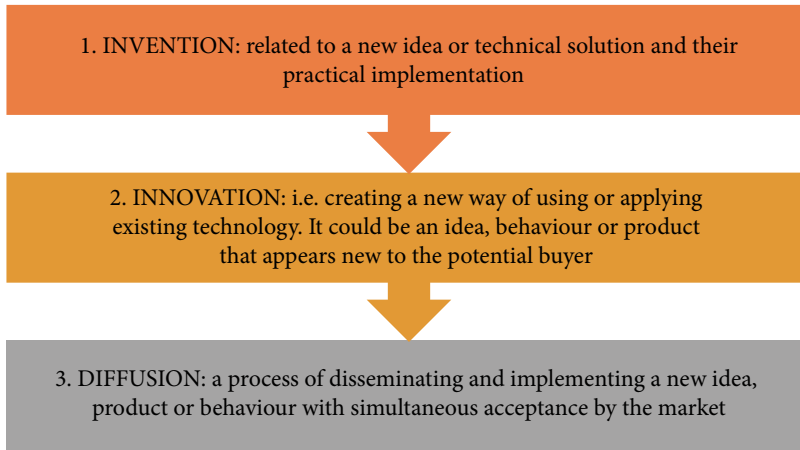


Figure 6.12. Phases of technical progress

Source: Own study based on (CFI, 2020).

From the operational point of view, the technical progress affects both the workforce, the development of production processes and savings in terms of means of production used. From the point of view of human resources, it improves working conditions and reduces the time needed to perform individual operations. In the production process, it contributes to the shortening of production cycles as well as improvements in the flow of materials, raw materials and semi-finished products through the production process. It can therefore be noted that technical progress is reflected in an increase in labour productivity, better, more modern products or services, improved quality and savings in the use of resources and energy.

The labour productivity is defined as the ratio of the effect to the expenditure, and it should express the effect of work per one employee, or per unit of working time. On the other hand, the effect of work is usually equated with the output which is expressed in natural or contractual units as well as in units of value (monetary) such as, e.g., value added, output, sold production and sales revenues.

$$\text{work efficiency} = \frac{\text{production value}}{\text{workload (in value)}}$$

Improving the quality of manufactured products and services is one of the main operational goals of the company. It should be considered through the prism of all functional areas of the enterprise, from design, procurement and production organization, through marketing and distribution, to after-sales service. It can be achieved by using modern machinery in production processes which is understood as machines and devices that constitute the company equipment. The main feature that characterizes the machine park is efficiency. It is emphasized that an

efficient machine park is necessary for the implementation of most production and logistics projects. Its skilful use should contribute to an increase in the value in use of products and this contributes to better meeting the needs of buyers. The quality of products and services can be determined by several criteria, such as: efficiency, functionality, durability, reliability as well as favourable conditions of use. In practice, it is emphasized that the quality of products or services is important not only for users but also for suppliers. For the manufacturer, the quality deficiencies mean additional costs related to control, testing, scrapping, correction, handling of complaints and grievances as well as fulfilling warranty contracts.

The striving to improve quality is related to the aspect of progress in terms of novelty. It means the production of products or the provision of services that have not hitherto been produced. They are often based on an original solution or the use of unconventional solutions, compared to similar products. In practice, however, special attention should be paid to imitations, replications and copies of company products.

The technical progress in operating activities is also reflected in the increasing use of new raw materials and materials, including secondary raw materials. Such an approach contributes to the reduction of the consumption of primary raw materials which are the products of the extractive industry, especially non-renewable ones. Moreover, the new technologies contribute, on the one hand, to minimizing the consumption of various types of resources in production processes, and on the other hand, to maximizing the amount of production with a given consumption of these resources. Therefore, it can be emphasized that technical progress in the company's operational activity contributes to the implementation of the principle of frugality.

The use of modern technologies leads to an increase in production and productivity which in turn is reflected in the generation of financial surplus by entrepreneurs. These surpluses can be successfully invested in the development of an enterprise, region or even a country, so technical progress contributes to the economic development of the country.

The technical progress related to the operational activity of the enterprise brings many benefits. The basic one is related to the use of the economies of scale, i.e. a decrease in average long-term costs along with an increase in the size of production. This growth contributes to expansion, both on domestic and foreign markets. On the other hand, the use of economies of scale in production processes may contribute to an increase in uncertainty and risk, related, for example, to the lack of raw materials, skilled workers or problems with sales. In this case, the effect is an increase in transaction costs, i.e. costs of coordination of the activities of enterprises resulting from the cooperation of many economic entities (Coase, 1937; Williamson, 1998; Gruszecki, 2002).

Summing up, it should be emphasized that with the development and economic growth, the importance of technical progress increases which is basically

conditioned by the innovations of the production process and product innovations. The innovations in the production process are related to the implementation of new production methods with lower production costs, the product innovations refer to a new, better-quality product, causing an increase in demand, increasing the production scale, expanding the market, increasing sales which in turn leads to a reduction in production costs. Thus, the innovations are significantly reflected in the production and operating activities of the enterprises.

6.5. The impact of innovation on production and operation activities

In order to build and develop a sustainable competitive advantage, companies must maintain a high level of efficiency, implement quality control processes and respond quickly to customer needs and requirements. The innovation is a factor that, on the one hand helps and on the other hand enables the implementation of the above-mentioned postulates. They should be treated as a driving force for the development of modern enterprises which at the same time strengthens and enhances the links between the organization and its environment. It is the basis of new ideas, concepts, products, services and processes. It allows to recognize, develop, specify and eventually implement a new solution. The innovative activities can be scientific, specialist, professional, technological, organizational, financial, commercial, etc.

The innovation and innovativeness are a concept defined on various levels, they relate to virtually all aspects related to the human activity. In its simplest terms, innovation means something different or something new. It is commonly associated with a change for the better, the improvement, refinement or modernization. From the point of view of the enterprise, innovation should improve the efficiency of activity.

Innovation consists of the generation of a new idea and its implementation into a new product, process or service, leading to the dynamic growth of the national economy and the increase of employment as well as to a creation of pure profit for the innovative business enterprise. Innovation is never a one-time phenomenon, but a long and cumulative process of a great number of organizational decision-making processes, ranging from the phase of generation of a new idea to its implementation phase. New idea refers to the perception of a new customer need or a new way to produce. It is generated in the cumulative process of information-gathering, coupled with an ever-challenging entrepreneurial vision. Through the implementation process the new idea is developed and commercialized into a new marketable product or a new process with attendant cost reduction and increased productivity (Urabe, 1988, as cited in Kogabayev & Maziliauskas, 2017, p. 62).

The research base for innovative activity were developed by Schumpeter (Szablowski, 2006, p. 18) who considered to be innovation the following:

- the introduction of a new product, new facility or creating a new need,
- the introduction of a new production method (production processes),
- finding new sales markets,
- finding new supplier markets,
- the introduction of a new organization.

The presented definition indicates a very wide spectrum of possible areas of innovation, covering many areas of the company's operation. The innovation permeates all phases of a business and all its functions, it may appear in the design, the product, the marketing technique as well as in the price, customer service, organization and management methods (Drucker, 2005, p. 75).

The innovation is therefore any idea, behaviour or thing that is new because it is qualitatively different from the existing solutions, it is a kind of progressive changes consisting in replacing existing states with new ones, better in the light of the criteria adopted by the organization. Innovation, therefore, is any activity that increases the level of effectiveness, increases the potential and strength of influencing the market, and contributes to the quality of service provision. The term defined in this way refers to (Janasz, 1999, p. 71):

- the concept (idea, concept, project) of some new state of affairs,
- the process of implementing this concept,
- the new state of affairs resulting from this process.

Product innovations	Process innovations	Organizational innovations	Marketing innovations
<ul style="list-style-type: none"> • implementation of a new or significantly improved product quality, unknown competition 	<ul style="list-style-type: none"> • implementation of a new or significantly improved process leading to higher profitability, productivity, with lower unit costs 	<ul style="list-style-type: none"> • changes within the organization and the organization's ability to change its relations with the environment 	<ul style="list-style-type: none"> • implementation of a new marketing method involving significant changes in the design or construction of the product or in the packaging, distribution, promotion, or pricing strategy

Figure 6.13. The types of innovations

Source: Own study.

Innovations are treated in a similar way by the Oslo Manual which states that it is the “a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)” (Oslo Manual, 2018, s. 20). Its significant element is the fact that the innovation must be new or a significant improvement to the existing solutions. It includes those products, processes, marketing and organizational methods that are developed in the enterprise as well as those that are adopted from other companies and organizations.

Innovations understood in this way are divided according to their object into „innovations that change the firm’s products (product innovations), and innovations that change the firm’s business processes (business process innovations)” (Oslo Manual, 2018, s. 70).

Product innovations are divided into two main types (Oslo Manual, 2018, p. 71):

- Goods include tangible objects and some knowledge-capturing products (see below) over which ownership rights can be established and whose ownership can be transferred through market transactions.
- Services are intangible activities that are produced and consumed simultaneously and that change the conditions (e.g. physical, psychological) of users.

Business process innovations concern the different functions of a firm (Oslo Manual, 2018, p. 73):

- production of goods or service,
- distribution and logistics,
- marketing and sales,
- information and communication system,
- administration and management,
- product and business process development.

The literature emphasizes that being innovative means success on the market and the goal of the implemented processes is efficiency and profitability which guarantee customer satisfaction and increased productivity (Cumming, 1998, p. 21).

Innovation is a continuous process, it is a complex and multidimensional course of action which consists of many attributes. A broad view of innovation means it can apply to everything from a simple change to a complete rebuild (Chahal, 2017).

When analysing the operational activity of enterprises, the several phases related to their development can be identified. In the first place, the companies are focused on maximum efficiency, thanks to which there is a rapid increase in production and sales. Another one is related to the adoption of quality as a priority which contributes to strengthening and consolidating brand awareness among customers. The company focus on quality results in flexibility, that is, “the ability of the production system to produce various products without incurring significant capital expenditure on machines” (Budzisz, Urban, & Wasiluk, 2008, p. 37).

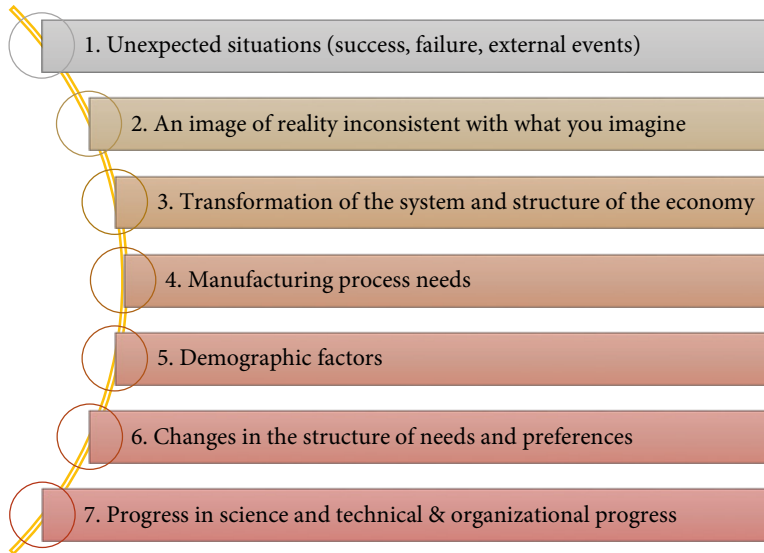


Figure 6.14. Seven factors of innovation

Source: Own study based on (Mazur, 2006).

The highest level is the so-called an innovative company that should be focused on a high level of efficiency, quality control and quick response to customer needs. Cheng, Choi and Yeung (2012) indicate that an innovative attitude, not only in product development but also in production development, is necessary to obtain and maintain competitiveness in the modern business climate. In operational activity, the innovative process is a creative activity in which the main emphasis is placed on the implementation of a new solution. It covers phases starting from noticing an opportunity, through its development processes and ending with the implementation of an idea and its realization (McGowan, 1994). The actions taken may take the form of conservative, complementary, radical and breakthrough changes. However, it is emphasized that an innovation, even if it occurs gradually, must in effect be something new or significantly improved. There is no innovation without novelty. Change is not automatically an innovation, but it can lead to innovation.

The implementation of modern solutions in production processes must be associated with appropriate innovation management which is defined as “(...) the systematic promotion of innovations in organizations and includes tasks of planning, organization, management and control” (LEAD, 2020). This management requires the activation of procedures related to the learning process at all levels of management, with particular emphasis on operational activities.

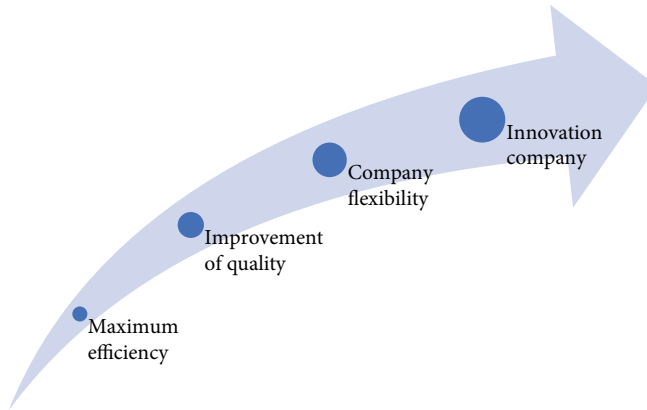


Figure 6.15. Transition of the archetypal manufacturing company

Source: Own study based on (Larsson, 2017).

Production workers should be supported by a system of training and workshops as well as the exchange of experiences related to both successes and failures and strengthening the cooperation network using appropriate tools and techniques (Skowronek-Mielczarek & Bojewska, 2017). All actions taken should be consistent, measurable, systemic, and focused on the development of innovation.

According to LEAD platform (2020) the innovation management deals with all measures to promote innovations in organizations and to generate benefits, e.g.:

- new products and services to conquer new markets,
- improved products and services to stand out from the competition,
- the improvement of internal processes in order to strengthen the company from within or to save costs,
- the development of new business models to exploit new sources of income.

When analysing the issues of innovation in the operational activities of enterprises, it should be noted that the development of production has a multifaceted nature because it is related both to the improvement of the production systems available to the company, and covers part of the process related to the product development. The production system should be defined much broader than the production process. Its scope covers several subsystems, each of which can be developed in order to obtain innovative solutions (Larsson, 2017). The indicated processes related to the development of the product and production technology should be subject to integration, since the development of the former is conditioned by the availability of technology and the related limitations.

The technology available in the enterprise, as a result of replacement and modernization investments, is subject to constant changes. In some cases, this change

becomes radical, as a result of which the company's activity profile is completely reconfigured. According to Larsson, "radical innovations may be difficult to achieve because they may entail too much discontinuity and change, as production systems are tied to current products and usually based on heavy investment" (Larsson, 2017, p. 2).

In many enterprises, the implementation of innovative solutions is the result of restructuring processes which is understood as "a complex conceptual aggregate describing all kinds of structural changes in the enterprise. It may refer to the property structure, capital structure, organizational structure, management, employment, production and assortment, supply and sales, technical and technological, etc. In this sense, restructuring appears to be an equivalent of the term 'reorganization', widely used in relation to strictly organizational changes" (Borowiecki, 2014, p. 17). Restructuring is therefore a consequence of innovative changes and practically applies to all areas related to operational and production activities.

The impetus for restructuring may come from both internal and external factors. Internal ones are related to the ineffective functioning of the enterprise, external ones are related to changes taking place in the environment, including increasing competition, technical progress, the emergence of new technologies, or new solutions in the field of finance, procurement, law, etc. The particularly important ones are connected with the changes taking place due to the fourth industrial revolution which is also a source of innovation. The concept of Industry 4.0 includes a set of assumptions that, on the one hand, constitute a kind of challenge, but on the other hand, will allow companies to achieve great results in the future. They include as follows: cybersystems, Internet of Things, Internet of Services, robotics, Big Data, cloud computing, and augmented reality (Ibarra, Ganzarain, & Igartua, 2017). Investments in these components will contribute to the development of smarter production processes based on machines and production modules that are able to communicate with each other, creating an intelligent production environment (Pereira & Romero, 2017; Sommer, 2015). They provide a framework for the total automation and digitization of production and services, with increased application of electronics and IT (Roblek, Meško, & Krapež, 2016; Vaidya, Ambad, & Bhosle, 2018). According to Stock and Seliger (2016), challenges related to Industry 4.0 concern also other areas, such as equipment, workforce, organization, processes, and products. The emerging changes result in building completely new relationships with clients, a possibility to produce new products and services, and create a new environment for collaborations, all of which contributes to the implementation of a new business model (Ibarra et al., 2017). This model requires adjustments in terms of standardization, work organization, availability of skilled employees and their competences, research investments, professional development, and legal framework (Thoben, Wuest, & Wuest, 2017; Maslarić, Mirčetić, & Mirčetić, 2016).

The purpose of undertaking innovative activities in operating activity is to achieve a competitive advantage, to develop their key competences and, consequently, to increase the effectiveness of the conducted activity. On the other hand, the effect may be the implementation of specific production methods, both focused on production planning and control, next generation production management, processing manufacturing methods, advanced organizational manufacturing methods and others. It should be remembered that the purpose of all changes that are of a different nature, size and scope, is always the increase in value for the customer, mainly by reducing costs and improving quality.

6.6. Qualifications, competences and human capital in the production-operation processes

One of the most important factors, influencing the production and operational activity of enterprises, is the workforce. In the simplest terms, it is defined as “all the people who work for a particular company, organization etc.” (Wehmeire, 2000, p. 1493). In a broader sense, it is a resource of human units capable of working, of productive age, ready to undertake work, in typical conditions in a given economy (Milewski & Kwiatkowski, 2011) or, in other words, “the workforce is the total number of people in a country or region who are physically able to do a job and are available for work” (*Cobuild advanced learner’s dictionary*, 2014). From the point of view of the company’s operational activity, the workforce is often defined as: human capital, human resources, labour resources, employees, staff, human factor, personnel and intellectual capital. The last concept is particularly important as its scope, apart from the number of employees, also includes qualifications, skills, motivations and entrepreneurship. In practice, it is emphasized that the success of an organization depends on employees, their competences, education, experience, substantive knowledge, practical skills, conceptual and organizational skills, etc. In many cases, the rank of the employed people is higher than the rank of fixed assets, and it is the person who decides about their use, withdrawal and replacement. In case of operating activity, they should be treated as production assets, not a cost factor (Hendricks, 2002).

It can therefore be emphasized that human capital is part of the intellectual capital of a given organization. The two terms are often used interchangeably. This is due to the fact that human capital is treated as the most important element of intellectual capital. It can be viewed in a narrow or a wide perspective. In general, it is associated with a human being characterized by the prism of knowledge, skills and experience which he gains both during education and work (Popiel, 2015).

Human capital in wide aspect is defined as: all psychophysical features of the individual, such as possessed innate abilities, knowledge, level of education, skills and

work experience, health, cultural level, socio-economic activity, worldview, etc., which directly or indirectly affect the productivity of work and which are inextricably linked with man as the carrier of these values (Florczak, 2007, p. 113).

In broad terms, a number of additional features are additionally indicated, such as: health, lifestyle, way of spending time, culture, approach to tasks and duties, responsibility, worldview, physical and psychophysical fitness as well as the way of building relationships, both on a private basis and professional one. All the indicated elements should be considered through the prism of the value that may be the source of future income of the employee and the organization for which he or she works (Adamska, 2004).

It is pointed out that from the point of view of operational activity, particularly important are technical skills which are related to specialized tasks performed at a specific workplace. The usefulness of an employee is therefore evidenced by his specific knowledge which should be consistent with specific requirements. It may be associated with education and experience acquired, e.g., in the field of finance, law, management, accounting, budgeting, design. In practice, it is associated with excellent knowledge of the industry in which the employee is employed. From the production point of view, when analysing the employee's competences, the employee's ability to operate machinery and equipment is taken into account which can be accessed through the prism of the intensity of using the machine park. Proper organization of workstations and skilful connection of the employee's competences with the technical requirements of the machine allows to increase production per unit of time, and thus increase efficiency, which is reflected in the increase in production, timely execution of production tasks, quality improvement and, consequently, in achieving better financial results.

When analysing human use in production and operational processes, the concept of qualification should be distinguished from competence. In practice, these two terms are often used interchangeably. Qualifications are generally related to the education and work experience. They must be real, not illusory, measured with a specific resource of knowledge and skills at the disposal of an individual (Ludera-Ruszel, 2012). A skilled worker is an employee with a specific potential, shaped in accordance with the requirements and standards of a specific job. In practice, qualifications are called professional because they are conditioned by the acquisition of certain skills related to the performance of work (Orczyk, 2009).

Qualifications

- education and aptitude required to perform a function or profession

Competences

- the quality of being competent; adequacy; possession of required skill, knowledge, qualification, or capacity (Dictionary.com)

Competences are typically defined as “the scope of knowledge and skills, professionalism, expertise” (Kopaliński, 2006, p. 406). In practice, they are associated with synonymous terms, such as professionalism, expertness, craftsmanship, proficiency, experience, mastery, faculty, reliability, talent, etc. According to Siwak (2015), company competences comprise management competences of the company owners, employees, and associates, which altogether form the human resources of a given entity. It may therefore be said that the concept of competences covers the following aspects (Kossowska & Sołtysińska, 2002):

- mastering the knowledge of a given field,
- skills defined as procedural knowledge,
- an attitude of willingness and readiness to use this knowledge.

In more personalized terms, these qualities are often extended to include personal characteristics, mentality, disposition, individuality, character (Whiddett & Hollyforde, 2003), competences of the company owner and employees, and organizational memory and knowledge (Sigismund, Floyd, Sherman, & Terjesen, 2011).

According to Coulson-Thomas (2009), the identified competences should be grouped as: personality traits, awareness of business environment, sense of responsibility, vision and strategic perspectives, knowledge of corporate governance and its requirements, understanding of the structure and principles of top management, teamwork, decision-making skills, corporate experience, ethics, and respect for other values.

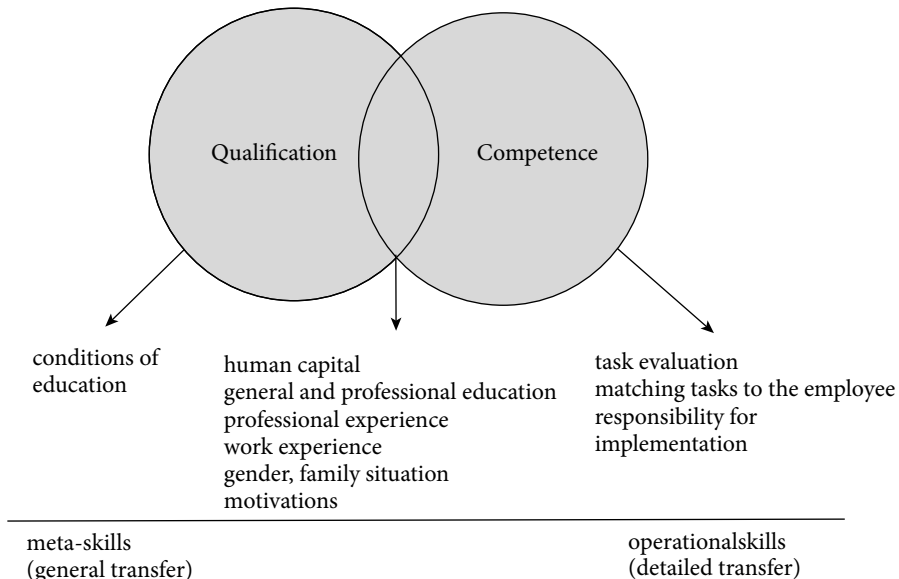


Figure 6.16. Relations between qualifications and competences

Source: (Orczyk, 2009, p. 27).

The effectiveness of human capital depends on its proper use which means that it must be managed. Human resource management means comprehensive activities related to the disposition and ordinance of employees employed in a given organization, undertaken to achieve its goals which are given a strategic dimension (Leleń, 2010). They should be consistent with the ambitions, plans and priorities of employees, both from the point of view of the individual and the community as a whole. Human capital management in operational activity includes five aspects (Muhlemann, Oakland, & Lockyer, 2001, p. 527):

- employment and manpower planning,
- education, training and development,
- shaping interpersonal relations, between employees as well as employees and managerial staff,
- health and safety and welfare,
- remuneration.

The first aspect is related to the recruitment and selection of new employees who must have appropriate qualifications and competences in accordance with the requirements of the position for which a given person is to be employed. Therefore, special attention should be paid to the accuracy of the job description, the needs of the company in terms of new workforce and its availability. In many countries we deal with the so-called structural unemployment which is related to the lack of employees with appropriate qualifications and skills in relation to the needs. This unemployment is most often the result of technical progress, the evolution of the production structure towards more labour-saving production and the liquidation of vocational profile schools. In the recruitment process, a company can use various methods, ranging from document analysis, simple interviews and interviews, to complex tests (*Selekcja i rekrutacja*, 2016). The employed employee should be introduced into the specificity of work, the requirements and obligations related to the position should also be presented to him. When analysing the education, knowledge and experience of a potential employee, it should be remembered that the quality and durability of a product or service depends on him and his approach to duties. In practice, it is emphasized that the key to the company's success is associated with a loyal team that will precisely and accurately implement production plans. This phase also examines the causes and motives of employees leaving which should be the basis for solving problems related to employees in the future.

A company acquiring human capital may use two approaches: on the one hand, to seek qualified employees with appropriate skills and experience, and on the other hand, looking for those who will improve their qualifications during their work. Regardless of the professional preparation and professionalism of the operation, it is necessary to periodically invest in it. Operational and production workers should be treated as one of the most important factors of production, because they determine the results of activity, manifested in the timely execution of tasks, quality

of products and services, cost reduction, optimal use of production potential, etc. In practice, it is emphasized that even the best team will not perform its work effectively, if it does not periodically improve its qualifications. It may concern the operation of the machine park, procedures and methods of performing production tasks as well as organizational aspects whose task is to increase the intensive use of the production potential. It is emphasized that people are a strategic resource of the company, have opportunities to learn, improve their potential, can think conceptually, are creative—these features make it possible to see opportunities and threats inside and outside the company and to use the former ones and limit the latter ones (Butkiewicz-Schodowska, 2015). Investing in human capital is a source of knowledge and innovation, improving productivity and efficiency, it allows individual knowledge to be transformed into the organizational knowledge, thus contributing to the development of the enterprise (Czyż, 2014). A characteristic feature of investments in human capital is their long-term effect, visible in the perspective of several or even several dozen years. The investments in question may take the following form:

- courses, trainings, workshops, etc., related to both apprenticeships to work and acquiring experience and practice in enterprises,
- teaching at all levels of education,
- searching for information about the economic situation of enterprises and career prospects,
- relocation of the population related to the search for a better job or employment opportunities,
- actions to improve living conditions, health protection and other social aspects,
- participation in research costs.

Enterprises that effectively invest in human capital increase their own effectiveness and efficiency which may contribute to rapid growth and development.

A significant problem related to human capital management in production and operational activities is building appropriate interpersonal relations, both among employees and between employees and management. It is emphasized that cooperation is a necessary condition for the functioning of any company. Actions and interactions are created between individual employees related to the performance of specific functions, from planning and procurement, through the organization of production processes, up to control, finance and sales. Proper relationships based on clear, precise and understandable conditions also have a direct impact on work efficiency. In general, interpersonal relationships involve the interaction and collaboration of people in groups that operate in different fields. In the industrial and business environment, the concept has a completely different connotation. In this context, it means the integration of people into a work situation which motivates them to work together effectively, providing them social, psychological and economic satisfaction (Velmurugan, 2016, p. 1).

An interpersonal relationship is an association between two or more people that may range from fleeting to enduring. The context can vary from family or kinship relations, friendship, and marriage, relations with associations, work, clubs, neighbourhoods, and places of work ship. They may be regulated by law, custom, or mutual agreement, and are the basis of social groups and society as a whole. Interpersonal relationship usually involve some level of interdependence (Velmurugan, 2016, p. 1).

In order to maintain a high level of relationship, based on mutual respect, trust and commitment, several rules (MSG) should be followed:

- individuals in an interpersonal relationship must share common goals and objectives; they should have more or less similar interests and think on the same lines; it is always better if individuals come from similar backgrounds,
- individuals in an interpersonal relationship must respect each other's views and opinions; a sense of trust is important,
- individuals must be attached to each other for a healthy interpersonal relationship,
- transparency plays a pivotal role in interpersonal relationship; it is important for an individual to be honest and transparent.

Moreover, when shaping interpersonal relations in an enterprise, it should strive to (Bojarczuk, 2002):

- ensure the actual adjustment of the employee to the organization by employing people with a similar value system,
- provide the employee with a sense of status and identification with the workplace,
- ensure the cooperation was based on mutual trust and commitment,
- make the employee to feel appreciated, pleased and satisfied with the work performed,
- create a sense of economic interdependence within the company.

Proper shaping of interpersonal relations has an impact on the effectiveness of the company and its long-term success. Therefore, it is necessary to ensure an appropriate ambience, acceptable to all employees, so that work becomes a pleasure, and not a necessity or a duty.

In order to ensure a high level of performance of production tasks, the company must also take care of occupational health and safety. Most of the provisions and rules of conduct are contained in the relevant legal regulations appropriate for each country. Some of them are obligatory what means that every company employing an employee must provide him / her with certain conditions, some are additional profits aimed at making the job offer more attractive. Complying with the legal requirements, the company must take into account such aspects as: proper and safe workplace, risk identification, protective clothing (especially for direct production workers), compliance with orders and prohibitions, health and

safety training and medical examinations, marking the workplace, keeping order, etc. (Rozporządzenie, 1997).

The last aspect related to human capital management is connected with remuneration. It is indicated that in this respect four problems should be solved (Muhlemann et al., 2001, p. 534):

- to setting up of a logical structure appropriate to the organization, the technology and the environment,
- the placing of employees within the structure,
- the use of incentive scheme,
- providing additional benefits.

The employee's remuneration includes a number of components, which include base wages, short-term incentives such as bonuses, commissions, etc., long-term incentives, fringe benefits and discretionary benefits (Borkowska, 2012).

Salary structure is the structure or details of the salary being offered in terms of the breakup of the various components that constitute the compensation. Salary Structure is the set of parameters that define the salary. Salary structure is a very important information which determines the in hand pay, gross salary, net salary, allowances etc. All these variables are paid to the employee as a part of his / her compensation and benefits (MBA Skool Team, 2020).

The structure of remuneration, especially in production and operational activities, should be flexible, determined by the actual work performed and not related to the position or status of the employee in the company. Such an approach directly influences the increase of efficiency and motivates the staff to better, more productive use of the production potential. Moreover, only an individualized approach to shaping the structure of remuneration, consisting in reducing the fixed part with a simultaneous increase in the variable part, contributes to the employee's new qualifications, skills and competences.

In operational activity, each task should be subject to evaluation which is understood as the differentiation of jobs and positions, due to the degree of difficulty, required competences, education, etc. In order to rank individual positions, an appropriate scale should be adopted which, for example, may be based on categories relating to ability, effort, responsibility and working conditions. The indicated categories can be broken down into more detailed criteria, but too precise division may make the analysis difficult (Muhlemann et al., 2001). It is important not to compare tasks related to completely different requirements and qualifications. A job valuation can also be used to evaluate it.

When shaping the remuneration, an additional system of incentives can be used, covering both standard aspects and additional benefits. The first group includes activities aimed at increasing labour productivity which should translate into an

increase in remuneration. The second one, in particular, may include additional medical care, insurance, various types of passes, social funding, preferential loans, training, participation in the costs related to raising education as well as a car, trips, holidays and business accommodation. The indicated benefits are individual, depending on the company's policy and its possibilities.

Questions / tasks

1. What are the challenges related to the operational activities of enterprises?
2. Discuss the changes taking place in the company's environment.
3. What are the causes of resource depletion?
4. What are renewable resources and what are non-renewable resources?
5. What is climate change and what are its causes?
6. List and discuss the main sources of greenhouse gases.
7. What is waste and what are its causes?
8. What types of waste do you know in an industrial enterprise?
9. Discuss the causes of environmental degradation.
10. What is industrial pollution?
11. What is globalization and what are its causes?
12. What are the benefits of globalization of operating activities?
13. Discuss the background of the globalization development.
14. What is technical progress and what are its causes?
15. What is the difference between technique and technology?
16. Discuss the phases of technological growth.
17. Discuss the factors and phases of technological progress.
18. What is work efficiency and what influences it?
19. How can you define innovation in an enterprise?
20. List and discuss types of innovation.
21. What is workforce and what is its importance in operational activity?
22. What is human capital?
23. What is the difference between qualifications and competences?
24. How can human capital be managed?
25. How can a company invest in human capital?
26. How to build positive relations between employees and between employees and managerial staff?

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