

CONTEMPORARY ISSUES OF ACCOUNTING AND MANAGEMENT IN POLAND AND IN BULGARIA

**Editor:
Zbigniew Leszczyński**



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Contemporary issues of accounting and management in Poland and in Bulgaria

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Introduction

Globalization processes and increase in competitiveness force enterprises to review existing concepts of activity. The market of the 21st century needs modern enterprises with adequate solutions and tools of accounting and management. Within the last two decades, a number of factors forced the enterprises to drastic changes in technology, organization, and ability to create new value in the form of products. On the other hand, enterprises should be prepared for changes on the market, methods of competition and changing needs of customers. All this means to seek for new ways of action, investing in alternative technologies, early identification of market signals and building ability to compete in new conditions and to create new long-term development prospects.

Competitiveness and development potential of enterprises is a consequence of not only innovation, technology, taking into account the needs of customer, but also a consequence of applying modern solutions and tools in accounting and management. They gain importance in the modern and innovative enterprises that strive to increased market share by the improvement of productivity, efficiency and quality of offered products. Implementation of modern solutions and tools of accounting and management is an important factor in the company success.

Theory and practice of accounting and management has dynamic nature. Business reality creates new concepts and paradigms. Seeking new solutions in the area of accounting, management requires creative approach and sense of realism. The authors of this study made an effort to identify and describe selected solutions and tools in the area of accounting and management used in economic practice of Poland and Bulgaria.

The publication is a monograph written by researchers from the *Faculty of Finance and Accountancy at the University of National and World Economy, Sofia, and Faculty of Organization and Management Lodz University of Technology*. Monograph consists of 16 chapters, each of which is related to the issues of accounting and management of the enterprises. Therefore, each chapter has a specific structure, which includes four components: introduction to the problem, problem analysis, case study or empirical analysis and conclusions.

Deliberations included in the monograph are focused in three main areas of research:

- 1) **financial accounting:** accounting aspects of greenhouse gas emission allowances; accounting models in the reorganization of trading companies; theoretical nature of duality in accounting; the measurement of public works concession according to the national accounting standards; the role of independent auditor; empirical survey on reporting and disclosure of internally

generated goodwill; the role of direct taxes in the state budget structure revenue,

- 2) **managerial accounting:** time-driven activity-based costing; modern methods of the production cost estimation in cost engineering, ratio analysis & benchmarking,
- 3) **management:** logistic process management in modern enterprises; the analysis of influence of circular economy paradigm on company's system of innovation management; eco-industrial parks as a new approach to environmental protection; management of technology in the process of building competitive advantage of the firm; the role of emotional factors in the financial phenomena; online payments in polish e-commerce sector.

The monograph explains how defined solutions and tools of accounting and management affect the level of competitiveness and innovation in Poland and Bulgaria.

Lodz, 14.05.2017
Zbigniew Leszczyński

ACCOUNTING MODELS IN THE REORGANIZATION OF TRADING COMPANIES ACCORDING TO THE REGULATORY FRAMEWORK IN THE REPUBLIC OF BULGARIA

Snejana Basheva*

1. Introduction

The common legal framework on the reorganization of trading companies in the Republic of Bulgaria is established in Chapter 16 of the Commercial Law (see: <http://lex.bg/laws/ldoc/-14917630>). Any entity can be transformed into another one, merge with another one, split into other entities, spin off another entity, or take part in the establishment of a new entity through merger. The reorganization of companies is subject to shareholders' approval or to General Meeting's decision.

Reorganization is a set of legal acts with regard to commercial companies, which aim at introducing changes to the status of their legal personality, their assets complex and capital ownership (Kalaidjiev, 2005). The reorganization of commercial companies generates three main legal effects, namely:

- one or more commercial companies are wound up without liquidation;
- there is legal succession where a portion of, or the entire, property of the wound up company is transferred without any changes into the patrimony of one or more companies;
- the membership relations in the wound up companies are terminated and new membership relations arise in their place in the acquiring, newly established company.

Reorganization could be examined in a narrow and in a broad sense. In a narrow sense, reorganization is reduced to dissolution of a commercial company without liquidation with a general legal succession and establishment of a new company at the same time. In a broad sense, restructuring is associated with the four forms of reorganization within the meaning of the Commercial Law – merger, takeover, spinning off and splitting. There are authors who classify reorganizations into typical and non-typical ones (Kostov, Georgiev, 2014). According to them, typical reorganization involves mergers, takeovers, splitting, spinning-off and change in the legal form, while non-typical reorganization is dissolution of a single-member

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company through transfer of its property to the owner of the capital, who is a natural entity, when this natural entity has a registered enterprise of a sole trader.

Therefore, the reorganization of trading companies in the Republic of Bulgaria could be performed through: takeover; merger; spinning-off; spinning-off of a single-member company; change of the legal form.

The accounting models reflecting reorganization depend on the reorganization form and on the existence of relationships between the participants. It should be also taken into account that two reporting bases are currently applicable in the Republic of Bulgaria – IAS/IFRS and the National Accounting Standards /AS/. Thus, we have two separate standards, which regulate this type of operations – IFRS 3 Business Combinations and AS 22 Business Combinations, and which have to be observed.

In contrast to IFRS 3 Business Combinations, where one method is stipulated for reporting business combinations – the purchase method, AS 22 additionally admits the application of the pooling of interests method. It is considered that the cancellation of the pooling of interests method in IFRS 3 can not repeal the provisions of the Commercial Law, which also arrange the cases of companies' amalgamation beyond the scope of the standard. (Dochew, 2011).

2. Accounting aspects in reorganization through spin-off

The reorganization through spin-off could be realized by establishing a new entity; by transferring the property of the existing entity or through spinning off of a single-member trading company. There is a distinction in kind between the establishment of new companies through spin-off and setting up single-member companies through spin-off. (Kalaidjiev, 2005). When a new single-member company is set up through separation of the property of an existing company, the owner of capital of the single-member company becomes the company being reorganized as a legal entity. The common ground in all the cases is that the newly established company should prepare a startup balance sheet based on the book values of the acquired assets and liabilities or on the basis of their fair values. On the grounds of the startup balance sheet, the main/aggregate accounts are set up in its general ledger. The company being reorganized should write off the transferred assets and liabilities at their book values. Due to the fact that the entity being reorganized is not dissolved, it does not draw up a closing balance sheet. When the property is transferred to an existing trading company, the acquiring company does not draw up a closing or a startup balance sheet.

The reorganization plan or reorganization agreement can provide an earlier date as of which the actions of the entities being reorganized shall be considered completed for the account of the newly established or acquiring entities for the

purposes of accounting. In such a case, the entity being reorganized writes off the assets and liabilities as at the adopted accounting reference date, while the newly established one draws up an opening balance sheet as at the same date. The date of entry into the Commercial Register is of significance only for the purposes of taxation under the Corporate Income Taxation Law. All trading operations performed by the newly established entity between the earlier date intended for accounting purposes and the date of entry into the Commercial register are considered to be performed on behalf of the entity being reorganized.

In order to record the reorganization through spin-off in the accounts, the company undergoing reorganization has to make accounting entries for the writing off of the separated assets and liabilities for the expense of equity (reserves, retained earnings, share capital). Temporarily, an account Other Debtors (Non-trade Receivables), subaccount Reorganization, will be used, which will be debited when writing off assets and credited when writing off liabilities at their book values. The Other Debtors (Non-trade Receivables) account will be closed by crediting it against debiting General Reserves account or Retained Earnings account, or as a last resort Capital account.

In order to reflect reorganization through spin-off and establishment of a single-member trading company in the accounting system, one could for the interim use Other Debtors (Non-trade Receivables) account, subaccount Reorganization (Dochev, 2011). The company undergoing reorganization makes the following accounting entries in order to show the separation of assets and liabilities. With a view to write off the assets and liabilities, which pass over to the newly established (acquiring) company, at their net book value, Other Debtors (Non-trade Receivables) account, subaccount Reorganization will be debited against crediting the accounts of the separated assets. In order to write off the liabilities, which pass over to the newly established company, at their net book value, the account which treats the liabilities should be debited and Other Debtors (Non-trade Receivables) account, subaccount Reorganization should be credited. Other Debtors (Non-trade Receivables) account, subaccount Reorganization shall be closed by crediting it against debiting Investments in Subsidiaries account.

The newly established (or acquiring) company shall make accounting items to reflect the formation (increase) of capital and recording of the assets and liabilities obtained.

For the purposes of recording registered capital of the newly established entity, one should debit Receivables for Subscribed Shares account against crediting Share Capital account. In order to record the assets obtained from the company being reorganized, the accounts reflecting these assets have to be debited against crediting the Receivables on Subscribed Shares account. To book the

undertaken liabilities, Receivables on Subscribed Shares account needs to be debited and the accounts reflecting these liabilities are to be credited.

3. Accounting aspects of the reorganization through splitting

The reorganization of a trading company through splitting could be accomplished in two ways – splitting by establishing a new (or several new) trading entities or by transfer of the existing companies. The owners of the dissolved entity acquire participation interests (shares) in the capital of the newly established or acquiring companies. The share capital of the new (newly established) companies is formed of the amount of the net value of the property acquired. The share capital of the acquiring entity can be increased as far as new participation interests or shares are necessary to be issued for the owners of the company being reorganized.

In the process of reorganization of a trading company through splitting, the dissolved company has to issue a closing balance sheet, while the newly established ones – opening (startup) balance sheets. The acquiring entities reflect the assets obtained and liabilities undertaken in their balance sheets on the principle of balance continuity (Stoyanov, Basheva, Pozarevska, 2015).

In order to reflect reorganization through splitting, the Other Debtors (Non-trade Receivables) account, subaccount Reorganization Accounts shall for the interim be used in the newly established company. In order to reflect the undertaken liabilities, the account will be debited against crediting the liabilities accounts. So as to reflect the acquired assets, the account will be credited against debiting the assets accounts. Other Debtors (Non-trade Receivables), subaccount Reorganization Accounts will be closed by debiting it against crediting Share Capital account.

4. Accounting aspects of the reorganization through takeover

In the reorganization of a company through takeover, the property of the company undergoing takeover is transferred to the acquiring company and the company is dissolved. The company undergoing takeover has to prepare a closing balance sheet. The acquiring entity in the general case reflects the assets gained and the liabilities undertaken at their book values. The owners of the companies being transformed become owners in the acquiring one by right. The acquired shares and participation interests have to be equivalent to the fair value of the shares and participation interests owned in the company undergoing takeover until that moment. With a view to achieve this, legislators allow making additional extra payments under the provisions of art. 261b of the Commercial Law (see: <http://lex.bg/laws/ldoc/-14917630>). In the event that a difference arises between the nominal value of the share

capital of the companies taking part in the reorganization and the amount of the share capital of the acquiring company, it will be covered by capital reserves. The costs incurred in connection with the takeover shall be reflected as current expenses for the period when incurred.

In order to reflect reorganization through takeover, the Other Debtors (Non-trade Receivables) account, subaccount Reorganization Accounts shall for the interim be used. To reflect the liabilities undertaken, the account will be debited against crediting the liabilities accounts. To reflect the acquired assets, the account will be credited against debiting the assets account. In order to reflect the pooling of capital, the Other Debtors (Non-trade Receivables) account, subaccount Reorganization Accounts will be debited against crediting Share Capital account, General Reserves account and other accounts reflecting the elements of equity capital. In case an adjustment in the elements of equity capital is required, in order to adjust the difference between the nominal value of the share capital of the companies taking part in the reorganization and the amount of the share capital of the acquiring company, accounting items of the following type could be made: DR Reserves acc. against CR Share Capital acc. or DR Share Capital acc. against CR Reserves acc.

Reorganization through takeover can also be in place when the company undergoing takeover owns shares in the capital of the acquiring one. After the reorganization, the company undergoing takeover loses its capacity of shareholder in the acquiring one and the released shares in the capital are used for partial satisfaction of its partners (shareholders).

5. Accounting aspects of the reorganization through merger

Balance sheet continuity is applied when reflecting the reorganization of trading companies through merger. The newly established company reflects the consolidated assets and liabilities at their book values. Depending on the proposed share exchange ratio, adjustments to the equity capital of the newly established entity could occur, derived as a sum of the capitals of the companies being reorganized. In order to reflect the reorganization through merger in the accounting system, the Other Debtors (Non-trade Receivables) account, subaccount Reorganization Accounts needs to be temporarily used. The account is debited when recording the pooling of liabilities and capitals of the companies being reorganized, and it is credited when consolidating their assets.

The main specifics of different forms of reorganization of companies in the Republic of Bulgaria are specified in Table 1.

Table 1. Forms of reorganization of companies

Form of reorganization	Company X	Company Y
Spin-off A) case 1 Entity being reorganized – newly established entity	<p>Entity being reorganized „X”</p> <ul style="list-style-type: none"> a) does not draw up a closing balance sheet, b) issues annual financial statements in which the reorganization is disclosed, c) writes off assets and liabilities at book values, d) writing off is for the account of the equity capital (reserves or retained earnings), e) the owners acquire membership rights in the newly established entity, f) the owners retain their rights in the entity being reorganized g) there is no exchange of shares. 	<p>Newly established entity „Y”</p> <ul style="list-style-type: none"> a) draws up a startup balance sheet based on the book values or fair values of the assets and liabilities transferred; the records are based on balance sheet continuity, b) there is no exchange of shares, and the owners get new shares or participation interests by preserving their rights in the entity being reorganized, c) the value of the new shares or participation interests is formed of the net value of the transferred property, while the distribution is specified in the reorganization plan, d) the entry of assets and liabilities and the issuance of the startup balance sheet can be made on an earlier accounting date (the effective date of reorganization is used for the purposes of taxation) e) if an earlier date is provided, the startup balance sheet is drawn up as at that particular date, f) the expenses incurred by the newly established entity between the earlier accounting date and the effective date of reorganization are treated as reorganizing entity's costs. The financial result (profit or loss) of the entity being reorganized will be adjusted (will be increased by the revenues and decreased by the expenses of the newly established entity).
B) case 2 Entity being reorganized – acquiring entity	<p>Entity being reorganized „X”</p> <ul style="list-style-type: none"> a) writes off assets and liabilities at their book values, b) the owners of the company being reorganized get membership rights, shares/participation interests respectively 	<p>Acquiring entity „Y”</p> <ul style="list-style-type: none"> a) does not draw up a closing and opening balance sheet, b) assets and liabilities are entered based on balance sheet continuity, c) has increase in capital,

<p>C) case 3</p> <p>Entity being reorganized – newly established single-member entity</p>	<p>in the capital of the acquiring entity within the limits of the increase of its share capital. They can not be greater than the net value of the property that has been transferred.</p> <p>Entity being reorganized „X”</p> <p>a) the entity being reorganized will record investments in subsidiaries to the amount of the net value of the transferred property,</p> <p>b) writes off the assets and liabilities at their book values.</p>	<p>Newly established single-member entity „Y” (EAD, EOOD)</p> <p>a) draws up an opening balance sheet,</p> <p>b) records the assets and liabilities at their book value or fair value,</p> <p>c) if an earlier date is provided, the opening balance sheet is drawn up at that particular date,</p> <p>j) if an earlier date is provided, the opening balance sheet is drawn up at that particular date,</p> <p>i) the costs incurred by the newly established entity between the earlier accounting date and the effective date of reorganization are treated as expenses of the entity being reorganized. The financial result (profit/loss) of the entity being reorganized will be restated (increased by the revenues and decreased by the expenses of the newly established entity).</p>
<p>2. Splitting</p> <p>A) case 1</p> <p>Entity being reorganized – newly established entities</p>	<p>Entity being reorganized „X”</p> <p>a) is dissolved and it draws up a closing balance sheet,</p> <p>b) the owners obtain ownership rights in the newly established entity. the distribution of participation interests/shares is indicated in the reorganization plan.</p>	<p>Newly established entity (entities) „Y”</p> <p>a) draws up an opening/startup balance sheet,</p> <p>b) the startup balance sheet is drawn on the basis of the book values or fair values of the assets and liabilities gained;</p> <p>b) the share capital is formed of the net values of the property transferred,</p> <p>c) the acquired assets and liabilities are recorded on the basis of balance sheet continuity,</p> <p>d) if an earlier date is provided, the balance sheet is drawn up at that particular date.</p> <p>Acquiring entity „Y”</p> <p>a) Indicates acquired assets and liabilities on the basis of the balance sheet continuity.</p>
<p>B) Case 2</p> <p>Entity being reorganized – acquiring entity</p>	<p>Entity being reorganized „X”</p> <p>a) is dissolved and it draws up a closing balance sheet,</p> <p>b) the owners acquire membership rights in the acquiring entity. The distribution of participating interests/shares is specified in the reorganization plan,</p>	

<p>3. Takeover (under CL)</p> <p>Entity being reorganized – acquiring entity</p>	<p>Entity being reorganized „X“</p> <p>a) is dissolved and it issues a closing balance sheet, b) the assets and liabilities transferred are written off at their book values, c) the owners become partners or shareholders in the acquiring entity, d) the acquired shares/participation interests have to be equivalent to the fair value of the shares and participation interests of the owners in the entity being reorganized, e) there is exchange of shares and the exchange ratio is specified in the reorganization agreement, f) before the takeover, the shares or participation interests in the acquiring entity are used to satisfy the owners of the entity being reorganized.</p>	<p>Acquiring entity „Y“</p> <p>a) records the acquired assets and liabilities at their book values based on balance sheet continuity, b) if it owns repurchased shares (treasury stock), they will be used for exchange and they will not increase the capital of the acquiring entity.</p>
<p>4. Merger</p> <p>Entities being reorganized – newly established entity</p>	<p>Entities being reorganized X,Z</p> <p>a) are dissolved and they draw up closing balance sheets b) there is exchange of shares, the share exchange ratio is based on the fair value of the property, which the entities being reorganized bring into the newly established one.</p>	<p>Newly established entity „Y“</p> <p>a) draws up a startup balance sheet on the basis of balance sheet continuity.</p>

6. Conclusions

Reorganization of trading companies represents a specific type of operations that are more and more frequently being performed in Bulgaria. Various accounting models are applied with a view to the correct accounting treatment of these operations. The applicable accounting models intended to reflect reorganization depend on the reorganization form, the existence of relationships between the participants, as well as on the relevant regulatory framework. There are National Accounting Standards applicable in the Republic of Bulgaria, which stipulate rules that differ from the currently effective international accounting standards.

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THE ANALYSIS OF INFLUENCE OF CIRCULAR ECONOMY PARADIGM ON COMPANY'S SYSTEM OF INNOVATION MANAGEMENT

Robert Blažlak*

1. Introduction

In general speaking innovation play main role in company's development processes. But in today's economy is not so easy to be innovative company. The main problem faced by today's companies is the adaptation of innovation processes to the changing economic conditions. It is not enough to have the newest machinery and equipment, companies for survive must have to learned how to create and sell innovations using external sources. This means entering the company into the world of open innovation, open knowledge (science) or circulating economy and close cooperation with buyers in creating new products and services. This process is not simple, because the company for this purpose will have to reconsider their approach to their business model and strategy already used. The aim of the paper is to indicate the relationship between Circulating Economy paradigm and the companies' innovation management system.

The average number of innovative companies in Poland has fluctuated between 13% in 2013 to 12.5% in 2015. They introduced on market about 11% of new or significant improved products and implemented about 13% of new processes in general. Between 2013 to 2015 expenditures on R&D activity increased among those enterprises from PLN 6 291.2 up to 8 411.4 million PLN. These companies invested primarily in fixed assets from PLN 18532093 thousand in 2013 up to 24024566 thousand PLN in 2015 (Local Data Bank, 2017). The direct objective of the investments was to reduce production costs by using the latest manufacturing technology. The direct objective of the investment was to reduce production costs by using the latest manufacturing technology or post-production waste costs. Unfortunately, they would not be geared towards recycling raw materials and reusing them in the manufacturing process according to new circular economy paradigm.

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2. Circular Economy as a new approach to create innovation

At the base of the Circular Economy [CE] paradigm lies the promise that products do not necessarily have to be quickly turned into waste, but they can be reused to extract their maximum value into subsequent production processes. Therefore, in general, CE approaches „design out” waste and typically involve innovation throughout the value chain, rather than relying solely on solutions at the end of life of a product. This can mean for example (European Commission, 2014):

1. reducing the quantity of materials required to deliver a particular service (lightweighting),
2. lengthening products' useful life (durability),
3. reducing the use of energy and materials in production and use phases (efficiency),
4. reducing the use of materials that are hazardous or difficult to recycle in products and production processes (substitution),
5. creating markets for secondary raw materials (recyclates) materials (based on standards, public procurement etc.),
6. designing products that are easier to maintain, repair, upgrade, remanufacture or recycle (ecodesign),
7. developing the necessary services for consumers in this regard (maintenance/repair services etc.),
8. incentivising and supporting waste reduction and high-quality separation by consumers,
9. incentivising separation, collection systems that minimise the costs of recycling and reuse,
10. facilitating the clustering of activities to prevent by-products from becoming wastes (industrial symbiosis); and encouraging wider and better consumer choice through renting, lending or sharing services as an alternative to owning products, while safeguarding consumer interests (in terms of costs, protection, information, contract terms, insurance aspects etc).

According to Ch. Levêque a CE is an industrial system in which the potential use of goods and materials is optimized and their elements returned to the system at the end of their life cycle (Levêque, 2017).

Also the CE could be understood as a transitioning from a 'take-make-dispose' linear approach to resource use, to systems that encourage reuse and extraction of maximum value before returning resources to the biosphere (The University of Edinburgh, 2015). Walter R. Stahel, in his book *tilte. A New Dynamic – effective business in a circular economy* has pointed out several principles characterized CE, which in his opinion do not exist in a linear industrial economy. He includes the following paradigms (Stahel, 2013):

1. the smaller the loop (activity – wise and geographically) the more profitable and resource efficiency it is,
2. loops have no beginning and no end; value maintained replaces value added,
3. the speed of the circular flows is crucial; the efficiency of managing stock in the circular economy increase with a decreasing flow speed,
4. continued ownership is cost efficient: reuse, repair and remanufacture without a change of ownership save double transaction costs,
5. a circular economy needs functioning markets.

Regarding the policy of the European Union CE system keep and added value to in products for long as possible and eliminates waste by keeping resources within the economy when a product has reached the end of its life, so they can be productively used again and again and hence create value. Industry already recognises the strong business case for improving resource productivity. It is estimated that resource efficiency improvements all along the value chains could reduce material inputs needs by 17%-24% by 2030. Hence to boost the economic, social and environmental benefits gained from the better management of municipal waste and used the assumptions of CE in practice, the Commission proposes to (European Commission, 2014):

- boost reuse and recycling of municipal waste to a minimum of 70% by 2030,
- increase the recycling rate for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025, including targets for specific materials,
- ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by 2030,
- further promote the development of markets for high quality secondary raw materials, including through evaluating the added value of end-of-waste criteria for specific materials.
- clarify the calculation method for recycled materials in order to ensure a high recycling quality level.

3. Basis of innovation managemetn system

The innovation management system consists of two groups of factors (Kollerup, 2016). The first group include organizational factors related to the creation of an environment conducive to the development of innovation in the enterprise, the accepted form of innovation management as well as the leadership in the development of innovation.

The second group of factors are processes related to the development of innovation, i.e. the process of generating ideas for innovation, the process of innovation together with the evaluation and analysis of individual sub processes as well as an indication of possibilities for its improvement.

Implementing into companies' strategy a principles of innovation management system gives companies a definite range of benefits including (European Management Standards, 2014):

- increase in profits from innovation,
- change the approach to problem solving and the new/different set of values,
- help identify and mitigate risk areas,
- combining creativity with the intelligence of the organization,
- increasing value from cooperation with business partners in innovation development,
- increases employee engagement, fosters collaboration and teamwork.

Therefore it can be stated that the innovation management system consists of all the activities that are necessary in the process of innovation including (European Management Standards, 2014):

- organizational conditions,
- leadership in strategy and innovation,
- planning activities to increase the market success of innovation,
- development of drivers and drivers for innovation,
- innovation management process,
- tools for assessing the efficiency of the innovation management system,
- actions to improve the innovation management system,
- innovation management techniques.

To the list of main activities listed above J.Fagerberg, D.C. Moverly and R.R. Nelson pointed out next following activities which can be expected as important for the system of innovation management (Fagerberg, Moverly, Nelson, 2005):

- provision of research and development – creating new knowledge, primarily in engineering, medicine, and the nature science,
- competence building as a provision of education and training, creation of human capital, production and reproduction of skills and individual learning used in innovation and R&D activities,
- articulation of the quality requirements emanating from the demand side with regard to new products,
- networking through markets and other mechanisms, including interactive learning between different organizations involved in innovation processes,

- creating and changing institutions – e.g. intellectual property laws, tax, laws, environmental and safety regulation, R&D investment routines etc. – that influence innovative organizations and innovation processes by providing incentives or obstacles to innovation,
- incubating activities,
- financing of innovation processes and others activities that can facilitates commercialization of knowledge and its adoption,
- provisions from consultancy services of relevance for innovation processes, e.g. technology transfer, commercial information, and legal advice.

The key elements of innovation management standards is shown on Figure 1.

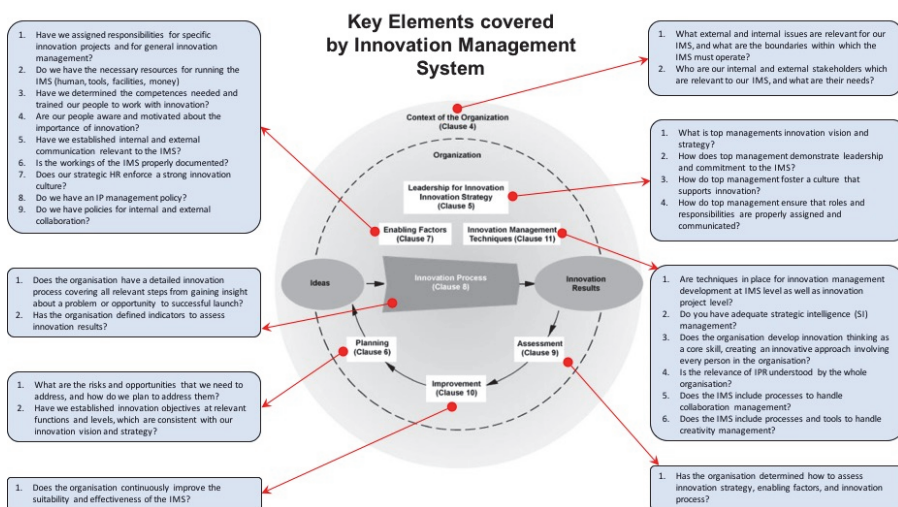


Figure 1. Key Elements cover by Innovation Management System
 Source: F. Kollerup, *Is Innovation & Standardisation an Oxymoron?* 2016.

4. The influence of circular economy on innovation system management

By analyzing the extent of the potential impact of the circular economy on the system of innovation management, it is important to point out that this approach is primarily responsible for changing the consumer behavior. Consumers are becoming more aware of the relationship between satisfying their needs and the protection of the natural environment. Such a move requires from entrepreneurs to change the approach to shaping the system of innovation management. This is dictated by the need to change the approach of this own business model with a 'take-make-dispose' to result-oriented business models, which are targeted at the desired customers' outcomes. This approach implies the generation of the need for

a more complex system of actors, such as suppliers at various levels, recycling and returning facilitators, local authorities and many others, whose main goal is an indisputable change in the product life cycle. What should be understood as a permanent change of orientation in the area of generating value for the buyers. In which the company not only concentrates on the production of the product, but first it gives the buyer the opportunity to repair it, and in the event of disposal it launches the entire recycling system, which makes it possible to obtain raw materials for further production.

Unfortunately, in order to implement the CE paradigm companies must also be prepared to take a special kind of risks. P. Planing believes that the main reason why most consumer products today are not made with repair and re-manufacturing in mind, even if this might be more economical than product replacement from a lifecycle point of view, is that consumers may tend to evaluate new products only by the transaction cost at the point of sale (purchase price) even if the net present value of upgrading to a more expensive but more durable product would be more economical. Such situation also take place then the process of gathering the profits is concentrating mainly at the design stage, but not at the end-of-use phase, e.g. when a product is returned for re-manufacturing or recycling, then this leads to a situation where the optimization of product design is mostly based on cost and production efficiency, what comes to conclusion, that there is no reason for implementing re-manufacturing processes in to company's economic practice (Planing, 2015).

5. Conclusions

The approach of innovation management system emphasis independence and non-linearity. This mean that firm do not innovate in isolation but with the process of interaction with other organizations ant their customers. And what is important is that almost all innovation processes are not only influenced by the elements of the innovation management system, but also by the complex relation between them e.g. CE paradigm and its consequences like new legislation in the field of natural environmental protection.

Unfortunately, according to the conducted research 23.0% of surveyed companies do not allocate financial, technical and human resources for innovation processes. Of the surveyed entities, less than 5% believe innovation is not necessary for their business. In addition, 31.1% of the surveyed companies recognized innovation only to technological aspects, and 13.1% admit that it does not manage innovation at all. Research also shows that only 21, 3% of businesses are analysing customer needs to launch a new product. The research also showed that 24.6% of the surveyed companies have implemented an accurate product

development process, which aims to minimize the time and cost of introducing the product to the market. Interestingly, other studies have shown that information about the direction of technology development and the opportunities to obtain them (60% of indications), trends in labor costs, energy and other factors (37%), and technologies offered by national units Scientific research is extrimlly important for compoanies for successful developing their market strategy. The second group of information (at the level of 20% of indications), required by companies to build a strategy, is the range of research services offered by R & D units, development trends in machinery/equipment engineering and market development. In addition, as many as 78% of surveyed entrepreneurs stated that in the period 2007-2014 they did not cooperate in documented forms with research units, 18% cooperated sporadically and only 4% systematically cooperated with R & D entities. In addition, research shows that entrepreneurs have some problems in acquiring highly qualified workers, as 8% of entrepreneurs require a training period of one to two years, similarly 8% believe that they qualify for employment after their employment. In the case of 56% of the surveyed companies, their owners are of the opinion that newly recruited employees require short-term training

The data collected during the study suggests that native companies are not ready to implement the paradigm of CE for everyday business practice by trnsforming their business models, including systems of innovation management. In the present situation, this is possible only if the legislator will impose such a direction on the development of the economy, which will not only meet all the European Union's CE objectives, but will also define its own long-term strategy in this area. Utilizing for example European Funds as a main tool, which are currently the most common source of capital for business development by innovation in Poland.

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OTHER INFORMATION REPORTING FROM 2017 AND THE ROLE OF INDEPENDENT AUDITOR – BULGARIAN CONTEXT

Atanaska Filipova-Slancheva*

1. Introduction

Economic crisis has initiated major changes, affecting global and EU regulatory framework, while addressing trust, transparency and responsible business practices. These changes affect also international auditing standards. Along with this, as summarized by (Garcia-Sanchez et al., 2013) enterprises are facing growing pressure to report not only on their financial performance but also their management, corporate governance and sustainability records.

International Auditing and Assurance Standards Board (IAASB), which is an independent standard-setting body, develops and issues International Standards on Auditing (ISAs). A number of International Standards on Auditing (ISAs) deal with auditor communication. Key priority of IAASB is to better accommodate stakeholders' needs and enhance the communicative value and relevance of the audit report by amending ISAs.

The International Standard on Auditing (ISA) 720 (Revised), *The Auditor's Responsibilities Relating to Other Information*, was issued by IAASB in April 2015 and is effective for audits of financial statements for periods ending on or after 15 December 2016. This ISA deals with the auditor's responsibilities relating to other information in documents containing audited financial statements and the auditor's report thereon.

The revisions aims to clarify and increase the auditor's involvement with „other information”. Other information is defined in the standard as financial and non-financial information, other than the audited financial statements, that is included in entities' annual reports. Currently and even post ISA 720, in auditor's opinion on the financial statements no coverage of other information exists, as no audit evidence is required along with the one required on the financial statements (Feng et al, 2013). Conclusion is that auditor should consider other information for material inconsistency with the financial statements or the auditor's knowledge obtained during the audit. In case a material inconsistency is faced, two

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options exist – indication of a material misstatement of the financial statements or of the other information. In other words, the report include a statement that there is nothing to report or a statement describing any uncorrected material misstatement of other information.

For (Hollie et al., 2011) it is unclear whether annual reports themselves convey material value relevant information. In this context is the understanding that market reaction to the financial statement information release occurs at the date of the release of unaudited press releases. For other information released in the annual report, in order to be taken into consideration, consistency or inconsistency with the audited financial information is crucial. (Brazel et al., 2009) argues that, when unaudited nonfinancial measures are inconsistent with financial statement information, the risk of fraud is higher. Hence auditors should pay attention to the information in annual reports or in other types of regulatory filings that could be inconsistent with the audited numbers.

In ISA 720 (Revised), „other information” may encompass a wider scope of material published by the entity than the „management report”, as referred to in the EU legislation.

2. Bulgaria and Global/EU Financial Reporting Standards

Bulgaria is a member of European Union (EU) since January 2007. In terms of International Financial Reporting Standards (IFRS) adoption, even prior to joining EU, Bulgaria has adopted IFRS – IFRS Standard for banks in 1997 and IFRS Standards for publicly traded companies and some other companies with effect from 2003¹. Along with this, as an EU member state, Bulgaria is subject to the IAS Regulation adopted by the European Union in 2002². Regulation 1606/2002³ (EU IAS Regulation) on application of international accounting standards, set the basis for endorsement and application of the International Accounting Standards (IAS)/ International Financial Reporting Standards (IFRS) in the EU. It is applied as of 2005, for the consolidated financial statements of European companies with equities traded on a regulated market. As per the EU IAS Regulation, every member state has the option to require or permit IFRS Standards as adopted by the EU in separate company financial statements (statutory accounts) and/or in the financial statements of companies whose

¹ IFRS Application around the world, Jurisdiction profile: Bulgaria (last updated: 16 June 2016).

² http://ec.europa.eu/internal_market/accounting/legal_framework/ias_regulation_en.htm

³ Regulation EC No. 1606/2002 of the European Parliament and of the Council of 19 July 2002 on the application of international accounting standards, OJ L243, 11.09.2002, p. 1.

securities do not trade on a regulated securities market. Currently, Bulgaria has already adopted IFRS Standards for all or some companies.

In respect of accountancy framework, European Union has adopted it more than thirty five years ago. In 1978 the Council adopted the Fourth company law directive on the annual accounts of companies⁴.

For non-financial reporting, overview of some important regulatory actions:

- In 2003 non-financial reporting also became a subject-matter of EU legislation – amending Fourth Company Law Directive and Seventh Company Law Directive;

- Directive 2013/34/EU on the annual financial statements consolidated financial statements and related reports of certain types of undertakings. It introduces obligation for large non-listed and listed extractive and logging companies to report their payments to governments (the so called country by country reporting – CBCR). Large companies are targeted as differentiated by number of employees, total balance sheet and net turnover. Large company is defined as one which exceeds two of the three following criteria: Turnover €40 million; Total assets €20 million and Employees 250. In the report all material payments to governments broken down by country and by project, when these payments have been attributed to a specific project are included. Types of payments to be reported include production entitlements, royalties, dividends, licence fees, rental fees, entry fees and other considerations for licences and/or concessions among others.

Milestone year for non-financial reporting in the EU is 2014, when EU Council adopted and published Directive 2014/95/EU on the disclosure of non-financial and diversity information (i.e. Corporate Social Responsibility („CSR”) matters). New Directive 2014/95/EU amends Directive 2013/34/EU.

The new rules set forth in the Directive shed light on the importance of disclosures on sustainability factors, in particular: social and environmental matters; respect for human rights; anti-bribery and corruption.

The Directive leaves significant flexibility for companies to disclose relevant information in the way that they consider most useful, or in a separate report. Companies may use international, European or national guidelines which they consider appropriate (for instance, the UN Global Compact, the OECD Guidelines for Multinational Enterprises, ISO 26000⁵).

In Bulgaria, non-financial information is disclosed on the one hand by legal obligations (Public Offering of Securities Act – POSA) applicable to all listed companies, while on the other hand voluntary – Bulgarian National Corporate

⁴ Fourth Council Directive 78/660/EEC of 25 July 1978 on the annual accounts of certain types of companies, OJ L222, 14.08.1978, p. 11.

⁵ http://ec.europa.eu/finance/company-reporting/non-financial_reporting/index_en.htm

Governance Code (Peeva, 2008). Internal Codes on association or company level, International Initiatives (UN Global Compact, etc.). Monitoring of corporate governance in Bulgaria is conducted by Bulgarian National Corporate Governance Committee, which is an independent institution. Periodic non-financial information is disclosed in stand-alone CSR reports, bulletins or corporate news (Peeva, 2008).

Public companies and the issuers of securities disclose two broad types of information: regulated information and other information⁶. Other information is disclosed as per the requirements of Art. 100 m and 100n of POSA.

3. Other information, new reports and the role of independent auditor as per new accountancy act

3.1. Other information in the new accountancy act

The new AA was promulgated, SG No. 95/8.12.2015, effective 1.01.2016, amended and supplemented, SG No. 95/29.11.2016 and SG No. 97/6.12.2016, effective 1.01.2017. It transposes the requirements of Directive 2013/34/EU and Directive 2014/95/EU on disclosure of non-financial and diversity information by certain large undertakings and groups. Significant changes involve definitions, classification of entities, requirements for preparation and audit of financial statements, and introduction of new mandatory reports that have to be prepared by certain entities. In addition to the Annual activity report, the following new annual reports, comprising of other information are introduced – Report on payments to governments, Corporate Governance Declaration and Non-financial declaration.

In order to elaborate further on the respective report, some key information:

3.1.1. Activity report

The Activity Report is applicable to all entities, except micro and small enterprises, which are exempted.

Activity Report or Director's Report is considered to be an important element of financial reporting. It provides explanation of the activities of the company and its subsidiaries, including R&D activities, along with a review of the business development, prospects and positioning (Durin, 2016). It is worth mentioning, that not only financial information should be provided, but balanced and comprehensive analysis of business risks (financial risks, price risk, credit risk, liquidity risks and cash flow risk) and risk management. The exact content of the

⁶ <http://www.bse-sofia.bg/?page=InformationTypes&language=en>

activity report, comprising of nine points, is presented in AA, Chapter 7, Section I, Art. 39. In this respect could be summarized that new Accountancy Act is transposing most of the provisions from EU Companies Act.

3.1.2. Report on payments to governments

It is required from large enterprises and all PIEs active in the extractive industry or the logging of primary forests and is effective from 1 January 2017. Report to be published together with the Annual Financial Statement (AFS).

If the entity is required to prepare Consolidated Financial Statement (CFS), a consolidated report on payments to governments is prepared.

The report is to include the total amount of payments to each government by types, for example:

- Copyright, licensing and related rights;
- Dividends;
- License fees, rents, registration fees and other considerations for licenses and concessions;
- Payments for infrastructure improvements.

An annual report on payments to governments is not prepared in the case of a one-off payment or a series of related payments amounting to or not exceeding BGN 195,600 within the reporting period.

3.1.3. Corporate governance declaration

Issuers of listed securities, credit institutions, insurance undertakings and reinsurance undertakings (PIEs under § 1, item 22, „a”, „b” and „c” of the Additional Provisions) include in their annual report on the activities a corporate governance declaration in accordance with the Public Offering of Securities Act, art 100 n.

The corporate governance declaration may be prepared as a separate report published together with the activity report; or a document which is publicly accessible on the website of the entity.

3.1.4. Non-financial declaration

Large enterprises which are PIEs and which, as at 31 December of the reporting period, exceed average number of employees during the financial year – 500 employees, include a non-financial declaration in their annual report on the activities. Non-financial declaration is newly introduced and is effective from 1 January 2017.

The content of the non-financial declaration is set out in art. 48 of the Accountancy Act. It contains descriptions of the policies of the entities in relation

to their activities in the field of ecology, social issues and those related to the employees, human rights, anti-corruption activities, gender diversity and equality in management functions of enterprises – number of female and male employees, age, geographical diversity, education, etc.

The non-financial declaration might be part of the annual report of the activities or a separate report, published along with the annual report of the activities and the AFS.

A subsidiary entity is not preparing a non-financial declaration, in case the entity and its subsidiaries are included in the consolidated report of the activities or in the separate non-financial declaration of another entity prepared as per the requirements of the new AA.

PIEs, which are parent companies of a large group and which, as at 31 December, exceed on a consolidated basis the criteria for average number of employees during the financial year – 500 employees, provide with the consolidated annual report of the activities a consolidated non-financial declaration.

The main changes and the new requirements in connection with the annual reports are presented in the following Table 1.

Table 1. New requirements as per the new accountancy act

Report	Applicable entities	Comment
Activity Report	All entities except micro and small.	Additional requirements for disclosure of information about the financial instruments of the entity, the key exposures and risk management policies are included. Analysis of financial and non-financial KPIs, incl. environmental and HR issues.
Non-financial Declaration as a separate report or as part of the activity report	PIEs with average number of personnel in the financial year > 500.	Policies related to the following issues: ecological and social; personnel; human rights; combatting corruption; gender diversity and equality in the entity's management bodies. A brief description of the business model of the enterprise; policies adopted and followed by the enterprise in respect of environmental and social issues; description of the key indicators of the results of the activities related to environmental and social issues, among others.
Report on Payments to Governments	Large companies and PIEs, operating in the extractive industry or the logging of primary forests.	The nature of the payments to every government as a total amount and by type, for example – copyright, license and related rights; dividends; bonuses; license fees, rents, etc.

		Total amount of payments for each project separately, as well as the total amount on the types of payments for each project. No requirement, in case the payments for the year are up to BGN 195,600.
Corporate Governance Declaration	Issuers of listed securities in a member state Credit institutions Insurers/reinsurers	Information determined in the Public Offering of Securities Act Two publication options: 1) a separate report published together with the management report; 2) a document that is publicly available on the website of the enterprise.

Source: accountancy act (AA), effective from 1 january 2017, own study.

3.2. New accountancy act – legal entities and PIEs

Accountancy act defines explicitly and classifies legal entities (micro-enterprises; small enterprises; medium-sized enterprises; large enterprises) and lists public interest entities (PIEs). PIEs are: Entities whose transferrable securities are admitted to trading on a regulated market of a European Union Member State; Credit institutions; Insurance and reinsurance undertakings; Pension insurance companies and funds managed by them; Investment intermediaries which are large enterprises as defined in the AA; Collective investment schemes and management companies within the meaning of the Collective Investment Schemes and Other Undertakings for Collective Investments Act which are large enterprises as defined in the AA; Financial institutions within the meaning of the Credit Institutions Act which are large enterprises as defined in the AA; Holding Bulgarian State Railways EAD and its subsidiaries; National Railway Infrastructure Company; Commercial entities whose primary business activity is to produce and/or transfer and/or sell electricity and/or thermal power and which are large enterprises; Commercial entities whose primary business activity is to import and/or transmit and/or distribute and/or transit natural gas and which are large enterprises as per this Act; Commercial entities whose primary business activity is to provide water supply and sewerage.

3.3. Other information in the new accountancy act and responsibility of auditor

EU legal framework, along with the new International Standards on Auditing (ISAs) are significantly impacting reporting framework and the role of independent auditor. New audit report is introduced, with a new structure and enhanced content, addressing other information reporting requirements (Table 2).

Table 2. Structure of Auditor's Report from 2017

Structure of Auditor's Report 2017	PIE 2017			NON-PIE 2017	
	Public entities (AA, AP, art. 22a & POSA)	PIE (AA, AP, 22 h-k)	Financial Institutions (AA, AP, art. 22b-g)	Non- public entities POSA, AP, § 1d.**	Non- public Other
Opinion	▼	▼	▼	▼	▼
Opinion basis	▼	▼	▼	▼	▼
Key auditor's questions	▼	▼	▼	N.A.	N.A.
Other information, besides fin. statement and auditor's report	▼	▼	▼	▼	▼
Responsibility of the management	▼	▼	▼	▼	▼
Responsibility of the auditor for the fin. statement	▼	▼	▼	▼	▼
Additional report statements required by Accountancy Act [and POSA]	▼	▼	▼	▼	▼
Statement as per art. 37, 6 from Accountancy Act	▼	▼	▼	▼	▼
– Activity Report	▼	▼	▼	▼	▼
– Corporate Governance Declaration (AA & POSA)	▼	▼	▼	▼	▼
– Non-financial Declaration	Cond*	Cond*	Cond*	N.A.	N.A.
– Report on Payments to Governments	Cond*	Cond*	N.A.	Cond*	Cond*
Statement as per art. 100(n), 10 in connection with art. 100 n, 8, p. 3 and 4 POSA	▼	▼	▼	▼	▼
Additional report related to audit of fin. statement as per art. 100(n), 4, p. 3 POSA	▼	▼	▼	▼	▼
Reporting as per art. 10 Regulation (EU) № 537/2014 and in connection with art. 59 LIFA	▼	▼	▼	N.A.	N.A.

Source: own study – accountancy act (AA); independent financial audit act;

PIE – Entities as per Additional Provisions (AP), § 1, p. 22 accountancy act (AA); ▼ – Mandatory to be included in the auditor's report

N.A. means not-applicable – not mandatory to be included in the auditor's report; Cond* means conditional – report on payments to Governments is applicable only for entities, stipulated in art. 53, 1 of AA, in respect of Non-financial declaration – only for entities as per art. 41 of AA.

POSA, Additional Provisions (AP), § 1d.** – entities whose activity is regulated under the Energy Act and by the Regulation of the Water Supply and Sewerage Services by the Energy and Water Regulatory Commission, the state-owned undertakings under Article 62(3) of the Commerce Act and the commercial undertakings which more than 50% state- or municipality-owned in terms of their capital.

Chapter 5, Art. 37, (6) of AA, deals with independent financial audit and stipulates the requirement for auditor's report. Opinion should be provided in the audit report with broad scope and higher responsibility for the auditor. Opinion involves matching between activity report and the financial statements for the same reporting period. Second opinion concerns the activity report and its compliance with the applicable legal requirements. It is mandatory in the opinion to be stated cases of material inconsistencies in the activity report and indication on the nature of such inconsistencies. Third opinion concerns corporate governance declaration and its compliance with the respective regulations. Fourth opinion concerns the non-financial declaration and its compliance with the requirements of AA. Fifth opinion concerns report on payments to governments and its compliance with the requirements of AA.

The usual approach for reporting of other information is expected to be a separate section, named, for example, Other information and containing sub-sections as per IAS 720. Independent auditor should consider other information, provided in the reports and declaration, for material inconsistency with the financial statements. In case a material inconsistency exists, auditor could require correction by management. In case, management considers auditor's statement, amended other information is reported. In the other case, no correction by management – report include a statement describing any uncorrected material misstatement of other information.

On the other hand it should be taken into consideration, additional report related to audit of financial statement as per art. 100(n), 4, p. 3 of POSA is overlapping with other reports and is additionally burdening reporting process and the auditor's responsibility, with doubtful effects.

4. Conclusions

Annual reports nowadays are ever more extensive, including more narrative and qualitative information (incl. descriptions of the entity's business model, integrated reports). In other words, audited financial statements represent one segment of the typical annual report. Stakeholders are investigating other information and qualitative information, in analyzing business risks and for decision-making purposes.

The aim of this research was to investigate IAS, IAS 720 in particular, along with EU reporting legislation and its application in Bulgaria. These new fundamental changes, coming into force in 2017, impact statutory audits. In respect of new Directives and their transposition in the local legal requirements, new Accountancy Act is analyzed. Other information reporting and the role of auditors, under international standards, is becoming crucial and increase the

importance and responsibility of the auditor. The auditor's responsibilities under International Standard on Auditing 720 require external auditor to read the other information and look for any inconsistencies between the other information and the financial statements. However, the extent of the auditor's responsibility for review of this additional information, as well as the reporting language, needs to be clearly defined.

There has also been a movement towards exploring ways in which to better integrate information in financial statements with other parts of an entity's public reporting package.

The author joins the group of researches, who accept the importance of integrated reporting (IR) in promoting organizational change towards more sustainable outcomes (Eccles and Krzus, 2010). Integrated reporting means not just „publication of one report that comprises both financial and non-financial information and other information” (Jensen and Berg, 2012). It is worth mentioning that although IR provides significant opportunities, considerable scepticism exists, whether IR is the optimum answer for financial reporting. Reporting is evolving and new initiatives are under way, as for Bulgarian independent auditor, new reporting obligations, their enhanced format and variety of declarations, statements, significantly weighs on auditor's activity.

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LOGISTIC PROCESS MANAGEMENT IN MODERN ENTERPRISES

Barbara Galińska*

1. Introduction

This chapter presents the role and importance of logistic management in modern enterprises. At the outset author defined concepts of management and logistics, which play a vital role in the contemporary world. Thereafter logistic process of the enterprise and its four principal components – procurement, manufacturing, distribution and reprocessing has been described. The integration of these elements provides comprehensive management of the physical flow of materials and information transmission in all functional areas of business. In addition, thanks to the efficient organization system it contributes to the development of the company and facilitate obtaining a competitive edge. Management of logistic processes is here of paramount importance, as it determines the success of those processes and therefore – the enterprise itself. At the end author characterizes modern management concepts used in the logistic chain such as Lean Management, Agile Management, Quick Response, Just in Time and Total Quality Management, successfully put to use by a vast array of modern companies.

This chapter as the result of publication concerning the fields of management and logistics, constitutes an interesting study tackling the matter of logistic processes and ways to manage them efficiently. Aspects in question are ubiquitous in almost every manufacturing and trading company.

2. The notion and definition of management

Nowadays in order to efficiently manage the business and obtain a competitive edge, companies must meet many challenges of the developing world, such as globalization of the market for goods and services, rising competition as well as mounting consumers needs or alterations in the technology of data transmission. It goes without saying that to meet those requirements companies are ought to utilize the newest ideas and management sciences without which the organization is deprived of any chances of further development (Blaik, 2010).

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Management is an integral part of running a company, regardless of its profile. It includes setting organizational direction in the way that it is coherent, achieve its goals, develop and stands out from other enterprises. The main task of the person in charge is to make the most of every resource so as to fulfill underlying principles of efficient management. In order to do this one have to implement each and every function of management consisting of: planning, organizing, management of corporate finances, operations, information, human resources, marketing and controlling (Koźmiński, Jemielniak, 2008). Aforementioned actions are ought to be carried out successfully so that to fulfill aims of the company effectively (ie.using the resources wisely, eliminating waste and any activity without adding value) (Griffin, 1996). The main objective of the company is to achieve the greatest profit at the smallest possible cost. So as to obtain that one should offer some goods and services and get clients interested in them.

The creation of a product or service is dependent on the proper functioning of the processes taking place both inside and outside of the company. Volatility of the economy or the needs of customers force the managers to constantly seek new ways and solutions to meet the needs of future and present consumers. A good leader must bear in mind the market dynamics, as well as the welfare of employees. Properly selected and appreciated staff is a very significant resource, and may constitute a highly effective asset against the company's competitors. Efficacious management of knowledge and experience of the employees results in tremendous achievements and enables to avoid many mistakes.

In interpreting the definition of „management” two main aspects should be pointed out. The first one is **people – employees** who constitute a significant potential for the company. They are to be effectively managed, so as to make them feel as a vital part of an organization in which they operate. They should be provided with a number of opportunities for development; the ability to learn makes a good organization stand out. Contemporary conditions for functioning of the companies are somehow difficult hence each and every enterprise must have the ability to quickly adapt to change. This allows them to meet the needs of a broader range of customers, which translates into bigger financial gain and building the enviable reputation. Relations within the organization as well as its ability to communicate with the environment are of paramount importance. Sufficient and rapid flow of information in both directions affect the proper development of relations on the outside of the company. System of management also requires the management stuff to put to use a vast array of indicators which allows them to assess, control and introduce changes while keeping in mind the welfare of the client. Satisfaction of the consumer should be a priority objective of any enterprise, regardless of its type. It is now the key to success, because

a strong competition makes it difficult to attract new customers, and sometimes keep the old ones (Dołhasz et al., 2009).

What is more each enterprise requires an adequate **management of logistic processes** what is discussed later in this chapter.

3. The essence of logistics

The key element that accompanies the management is **the logistics**. It was initially understood as a holistic management of instruments of labor, materials, etc. It is now considered to be an extremely important link, which provides an increase in productivity of the company. It can be achieved through: (Niziński et al., 2011)

- reducing the cost of logistics processes,
- increasing the level of service to meet the needs of customers,
- acceleration of the funds turnover,
- reduction of conflict and loss among the various subsystems of the company as a result of streamlining and coordination of logistics processes,
- improvement of the reliability and accuracy of decision making.

Various definition of logistics are to be found in literature. One of them, provided by Council of Logistics Management (CLM) states that logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements (Coyle et al., 2002). Other definition reads that logistics is a method of managing the supply chain both in the enterprise and between enterprises understood as planning, implementation and control of the flow of products: goods and services, along with the information and funds movement (Gołembska, 2012). The notion of logistics includes all activities that entail planning, execution and control of the space-time transformation of goods and changes in the volume of the range of products. Coordinated implementation of these activities activates the movement of goods, that efficiently links the delivery point with the point of reception (Szymonik, 2010).

There are many definitions of logistics. However, when analyzing them, one can observe three common, vital aspects (Skowronek, Sarjusz-Wolski, 1995):

1. Logistics primarily involves physical flow of products in enterprises and between them.
2. Logistics is the coordination of material flow while minimizing costs.
3. Logistics is a science in the field of economics, which explores the relationships occurring at a flow of tangible goods and information in the economy and its particular links.

Logistics is therefore both a theoretical field of knowledge and a practical tool for supply chain management within the enterprise and between companies, which is understood as planning, implementation and control of the flow of tangible goods, information and finance, in order to meet specific customer needs. It is intended to support various types of economic and social systems. In economic **systems achieving a predetermined level of customer service while maximizing profit** appears to be the essence of logistics. In social systems its aim is to **achieve a predetermined level of customer service while minimizing costs** (Korzeniowski et al., 2010). **The time** is also an important aspect when addressing the needs of the customers. It affects service levels and overall consumer satisfaction, which is a prerequisite in the era of wider competitiveness. Another key objective of logistics is **to provide a high standard of service delivery**, covered by the term „**quality**” (Figure 1).

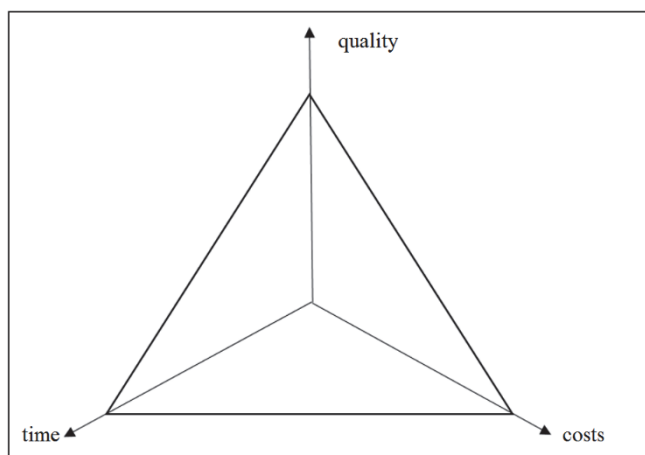


Figure 1. The aims of logistics

Source: Kisperska-Moroń, Krzyżaniak, 2009.

Logistics activities in a company is treated as a so-called competitive advantage due to the fact that it enables a real increase in the attractiveness of the offer, by lowering the prices of products, while raising their quality. In order to achieve that it is essential to improve the flow of goods and information, not only in the business environment, but also within the co-operating units, ranging from suppliers of raw materials to the market outlets for the finished products (Coyle et al., 2002).

Unification of activities in the area of the flow of goods and information exerts a significant impact on the speed of order fulfillment, as well as speed of response to changes in customer demand. Recognition system allows the integration of logistics activities in this field. Due to the fact that logistics is

currently inextricably linked with achieving a competitive edge **it has been treated as one of the main areas responsible for the management of the company.**

However, the area of logistic activities is primarily dependent on the location of logistics in business management strategy (Figure 2), then the integration of major and minor areas of logistics enterprises and their supply chain partners.

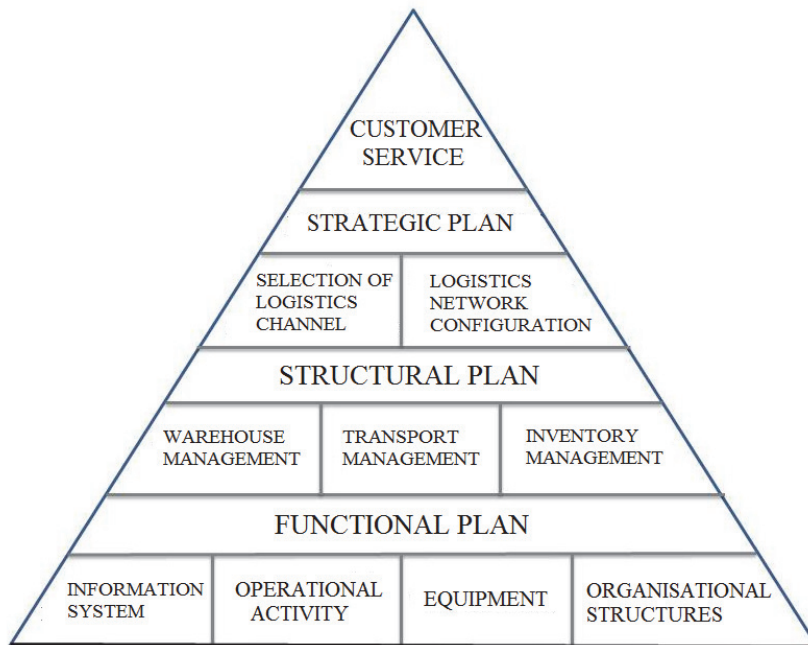


Figure 2. Logistics in the enterprise strategy

Source: Golembaska, 2009.

Logistic activities consists of multiple areas, such as (Kisperska-Moroń, Krzyżaniak, 2009):

- customer service,
- transport,
- inventory control,
- storage,
- the location of production plants and warehouses,
- order fulfillment,
- procurement of materials in production,
- demand forecasting,
- information management,
- manipulation of materials,
- supply of spare parts and after sales services,

- packaging,
- support for return freight,
- management of waste and scrap.

These areas are characterized by high dynamics of changes, stimulated by the environment of enterprises. Achieving **the main objective of logistics, which is a high level of customer service** is also difficult to complete as each recipient of goods and services has different needs and views on the criteria that are taken into account when deciding on cooperation with suppliers of tangible goods and services. Customer preferences apply differently when it comes to the purchase of consumer goods, or capital goods, and another way to purchase services. Logistics in every company is different. That is why it is so important for managers to be competent enough so as to take decisions in an effective and efficient manner.

For the above reasons, it should be emphasized that **modern logistics is characterized by dichotomy**. It causes a lot of complications in resolving significant problems within specific logistics systems. On the one hand, the management of the logistics department must be able to resolve the quality, market and strategic problems of logistics, on the other hand it should take heed of its in-depth troubleshooting in terms of quantity on current and tactical ground. Figure 3 depicts two faces of modern logistics.

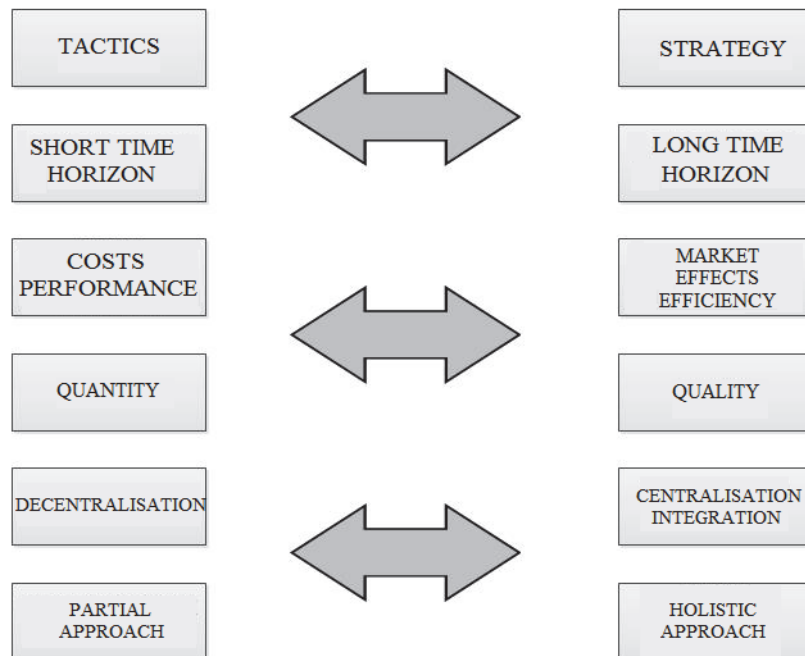


Figure 3. Two faces of modern logistics

Source: Blaik, 2010.

With awareness of the problems outlined above and knowing the array of skills to solve them, one can integrate logistics functions with other areas of the company. Moreover, compliance with the general purposes of logistics and directional objectives of the organization ensures the implementation of the system concept of logistics.

Currently, one can determine a number of factors influencing the constant development of logistics. These comprise the need to make the most of the available space, increasing the productivity and automation of processes, as well as reducing the costs associated with the staff. It is expected that properly functioning logistics in the company will benefit in reducing the cost of production, transport, shortening lead times, rational planning of inventory levels and a higher quality of service and products.

In conclusion, the understanding of what logistics is and how important a role it plays in every company delivers the proper organization of the company and its sound management. Logistics contributes significantly to the success of enterprises whose main purpose is to satisfy the final recipient. Every company, with significant market power makes every effort to deliver the customer service and hence the logistics, on the highest possible level, ensuring adequate quality and competitiveness.

4. Logistic process in the enterprise and its components

The definition of the logistics process is directly linked with the definition of logistics. **The process is called „logistic”**, when the distribution, status and flow of its components, and hence people, goods, information and funds require coordination with other processes, due to the criteria of location, time, cost and effectiveness of meeting the desired objectives of the organization (Krawczyk, 2001). Logistics processes are associated with both the flow of materials and products (from suppliers in the distribution centers to stores) and information (from the end-user by the procurement system to suppliers and from suppliers of factors of production to their users) (Harrison, van Hoek, 2010; Urbaniak, 1999). They represent a set of interrelated tasks to ensure proper deployment, condition of items and the flow of material goods, information and funds. It is the logistics processes that must ensure sufficiently strong bonds between individual links in the supply chain. This is forced by the market economy, which causes the need for fusion, integration and coordination of these processes (Figure 4). Above-mentioned factors enable the company to achieve the assumed product quality and generate a profit (Kisperska-Moroń, Krzyżaniak, 2009).

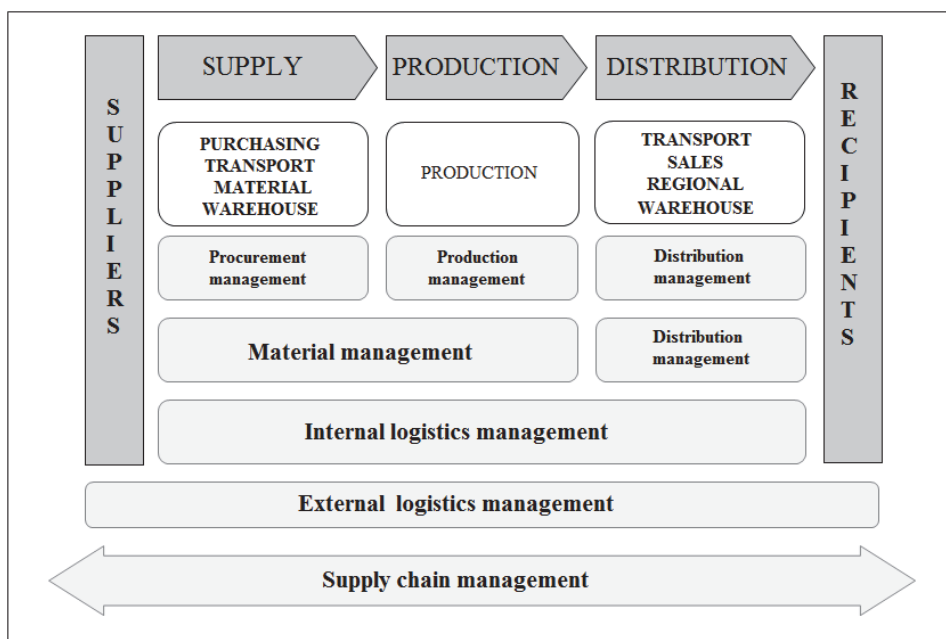


Figure 4. Integration of logistic processes in the supply chain

Source: Kisperska-Moroń, Krzyżaniak, 2009.

The activities of logistic processes are carried out by competent persons (including groups of employees) and / or means of work called carriers of work. The structural element of the process is the adequate object of a physical and informational character (Blaik, 2010).

Logistics processes consist of many directly related elements. Therefore they should not be considered separately but as a whole, due to the fact that such action may lead to incorrect conclusions. The basic components of the logistics process include:

- procurement process,
- production process,
- distribution process,
- recycling process,

They have been described in detail below.

Procurement process

Purchase is considered as the exchange transaction, which starts when the needs of concerned organizations and a place where it can be carried out are known. Purchasing in the organization can be defined as a function responsible for obtaining materials, equipment, goods and services needed in an enterprise for the production process by the transaction of purchase, lease or other legal ways (Krawczyk, 2001). The main objective of purchasing processes is to ensure the

necessary supply of goods in the right quantity, the right kind at the right time, with the desired quality at optimum cost and in the most preferred form of delivery (Radziejowska, Mastej, 1997).

Supply warehouse or (in the case of direct delivery) the first stage of production is the place where the direct demand is covered (Pfohl, 2001). Procurement logistics links the processes of the flow of materials and information from the companies that supply the company to its supply warehouses. This integration comes down mainly to synchronization of the supply of materials. It is important that the supply of products used in the production are collected at the right time and place, and their subsequent batches are delivered within a specified timetable (<http://www.logistyka.net.pl>). Complexity, quality and on-time delivery condition efficient service production processes (Skowronek, Sarjusz-Wolski, 1995).

Procurement process as the process of movement of goods ensures the quality of components maintains of relationships with suppliers minimizes the costs and integrates the other areas of the company. It is responsible for cooperation with each link of the supply chain. Its efficient course is conditioned by a number of variables, such as: the selection of reliable supplier, control of sources of supply and creating appropriate relationships with contractors (Zimon, 2013).

The process of procurement is particularly significant because it supports the operation of the other subsystems of the company, mainly manufacturing and distribution. When properly organized it affects the quality of the product, the cost of the company and the level of logistics customer service (Dembińska-Cyran et al., 2001; Szpon et al., 2005).

Manufacturing process

Production logistics deals with planning, organizing and controlling the flow of all essential goods during the manufacturing process, from supply warehouses, through the intermediary warehouses until the finished goods warehouses. Production is the link between the processes of supply and distribution. Its task is to ensure the availability of necessary materials and deliver the proper efficiency in the internal supply chain. The process provides rhythm and continuity of production while minimizing inventory quantities and costs associated with them.

The smooth functioning of the internal supply chain is possible as a result of proper control and rationalization of production processes, such as (Kardas et al., 2011, p. 120):

- inspection of goods prior to the start of the production process,
- control of individual stages in the course of production,
- quality control of the product after its manufacture.

Ensuring the above aspects can be obtained by applying various methods of logistics management, including TQM – described later in this chapter.

Distribution process

The principal objective of distribution is to provide consumers with their desired products, in the right place, at the right time, maintaining the lowest total cost of distribution and the highest quality (Czubala, 2001). Distribution is now the main activity of any modern and focused on its development company. This is the field in which the enterprise can achieve a wide range of effects of management on a large scale and whose area of operation remains largely unrecognized (Christopher, 1999).

Considering the distribution process in the logistics chain we must focus on its most important element – the client. Distribution logistics ensures the efficient flow of the finished goods leaving the production passing through the processes of storage, transportation and ultimately brought to the end users. The validity of this process results from the continuous rivalry of the companies with speed, efficiency and optimization of every single stage of the distribution (Zimon, 2013).

The success of the distribution process is dependent on several factors related with the expectations of consumers, which in the era of globalization as well as diversity of products and services is difficult to satisfy. The efficiency of the distribution process is based on skilful classification of clients and analysis of their needs. It is also important to implement the feedback received from the distribution process and the development of adequate distribution policy (Zimon, 2013).

Distribution phase is the last stage of the logistic process. It combines the production phase with the phase of the purchaser supply. When efficiently organized it ensures efficient flow of finished goods to end recipients, thereby contributing to a faster turnover of funds used in the production of goods. It provides the disposal of the enterprise products and may therefore contribute to the increase of its market position.

Recycling process

In every production process different kind of waste is generated. Their number began to cause significant adverse effects on the environment. The problem called the reverse supply chain or otherwise waste supply chain has been created. Environmental perception of the world has led to the treatment of such chains as indispensable in the entire logistics chain. The necessity of disposal of products resulting from the production process has become the ultimate goal of many companies who want to be seen as environmentally friendly. For that to happen, companies need to introduce some new rules (Szołtysek, 2009):

- selection principle – looking for alternative means of satisfying customer requirements, eliminating dangerous to the environment substances and materials;
- minimization principle – is based on the smallest possible space in packaging of the product in order to reduce the consumption of a given

material, it involves the adequate choice of packaging, so that the space was maximally utilized;

- maximization principle – provides reduction of wastage as a result of the greatest use of the available space by minimizing the free, unused area, eg. on the pallet;
- segregation principle – facilitates fast and efficient disposal of given types of materials.

The process of recycling is of paramount importance in every whole company. By determination of suitable sites for the production waste the safety of workers is improved. It can be applied at every level of the organization and should not be underestimated.

All the elements of the logistic process described above play a significant role in the company. Their integration enables comprehensive management of the physical flow of materials and information in all areas of the plant. In addition, these elements, thanks to efficient organization, contribute to the development of the company and its market position. They should therefore be planned, implemented, integrated and controlled. Furthermore those elements are to be merged because only the full integration of the activities in the logistics process ensures high efficiency (Skowron-Grabowska, 2010).

5. Management of logistics processes

Nowadays **logistics processes management** plays a special role and have a significant impact on the functioning of the company and its position in the competition. Initially, the scope of the logistics activities in the companies consisted mostly of transport zone and the organization of distribution and storage. However, these processes cannot do without the flow of information on raw materials or semi-finished products, storage and control of the inventory and customer service (Sadowska, 2014). Each of these elements exerts an effect on the processes. Wider perception of the logistics process enables their consistency and smoothness. **Contemporary logistics and logistics management constitute an important aspect of the company's strategy and are a guarantee of its development.** They facilitate the acquisition of new customers and enable the implementation of innovative solutions (Gołemska, 2010). Opportunities and dynamics of development, flexibility and openness in relation to the client's are the characteristics that the company can be proud of. This speaks volumes about their competitiveness, increases their value and reduces costs of conducting a business.

Logistics Management runs through all processes of the company. It starts with the identification of development strategies and then deals with processes of

production, storage and movement of raw materials, transport, control and exchange of information. The flow of data enables an appropriate respond to customers needs.

In order to obtain the pre-planned objectives of the organization, including its development or growth of competitive position, the concepts of company management should alter. Needs of modifications occur mainly due to the rapid development of industry, implementation of new technologies and innovation or the use of new solutions. Processes of transport and storage in the enterprise must be aimed at building efficient supply chains to the recipient. This is based on the sale, which ends the process and returns incurred costs as well as yield a profit. The flow of goods from supplier to customer, as well as the flow of money from the customer to the supplier, must be smooth and last as short as possible. The function of the planning of production, which comes from contracts or other marketing arrangements is of vital importance (Pisz et al., 2013). The condition and value of the company is often determined on the basis of its financial results, included in the documents. Given these features, you can say that the flow of goods is the basis for the development of the organization. It is of strategic importance that maintaining inventories is conducted in such a way as not to incur the high costs of storage and yet meet the needs of production, especially in moments of crisis. In contrast, innovation and continuous improvement should confer an advantage, thereby facilitating the work.

6. Concepts of logistics processes management

To improve the functioning of the supply chain and increase its efficiency many methods and management tools are used. They facilitate decision-making, make it possible to analyze logistics processes, ensure the harmonization of activities of individual cells in enterprise, minimize costs, reduce the time tasks, guarantee effective inventory management, knowledge and understanding of customers' needs and improve the overall efficiency of the organization (Szymonik, 2013). Management approaches within the supply chain include:

- Lean Management,
- Agile Management,
- Quick Response,
- Just in Time,
- Total Quality Management.

These concepts have been widely characterized below.

Lean Management

Nowadays, numerous and dynamic changes in the market, caused by the customers and competition, force companies to systematically improve the course taking place in their processes, primarily of logistics and production. The method of buying new machines and hiring additional staff is no longer, as it once was attractive, hence notwithstanding increased production the company is not able to compete with its market rivals. Increasingly important organizational changes are an essential element of one of modern management concepts, known as lean management (Wasilewski, 2011). It takes its origin in Japan, destroyed in the Second World War did not have a chance to compete with the giants of world industry, like the United States. The creator of the new thinking was Taiichi Ohno, a Japanese engineer who saw the need for organizational changes in then existing activities of the automotive company Toyota. The changes, which he steered into the reduction of waste contributed to the creation of the production system of Toyota (Toyota Production System – TPS), which became the model for most modern operating companies (<http://lean.org.pl>).

Lean management is a philosophy, a management strategy, which is based on a set of principles, techniques, behavioral and specialized tools. It can be defined as a management concept, which involves providing the client with an expected value, using the fewest resources (Grycuk, 2011). Its main task is to eliminate or reduce the processes that may pose a threat in the final positive assessment of organization by its suppliers. Keep in mind that the primary value to create the proper environment and work culture are the people. Thanks to them the implementation of Lean philosophy gives the company the ability to provide customers with products of good quality and in a timely manner (Sayer, Williams, 2015).

Lean management can also be described as the quest to provide the product desired by the customer, using half the resources (time of design, tooling, manpower, production space) that competition needs. In addition, efforts should be made to maintain minimum required reserves in place to reduce or eliminate the number of errors and to increase the variety of assortment (Womack et al., 1990). Lean management is based on the ideology of the removal and elimination of activities that do not bring added value as well as a continuous reduction of waste in all business areas. The aim is to involve a minimum number of materials, people, time, at the lowest possible cost. It is based on (Stachowiak, 2010):

- commitment and systematic improvement of the company's staff,
- treatment of the company's employees as „internal customers”,
- continuous evolution of the company due to the changing market,
- determination of the profits by the level of costs and not the size of the price,

- the involvement of employees in the elimination of excessive consumption of resources,
- standardization of documentation, methods of conduct, processes and performance measurement.

Companies using lean management are able to enhance the human resources management, which is reflected in the quality of products and services. They do this in the most efficient and economical way.

Agile Management

Agile management is used in the logistics chain that undergoes changes that are difficult to predict. They can result from a number of crises, as well as unforeseen and customized customer orders. This method focuses on the skilful management of knowledge and experience, which is to be ensured by:

- skilled employees who share their experience and knowledge,
- innovation and the ability of creative thinking by employees,
- quick availability of products,
- the creation of added value.

The intellectual capital of the organization is essential to counter the unexpected phenomena occurring in the supply chain. Therefore, it must be skillfully collected and used (Szymonik, 2013).

Quick Response

This method consists in rapid response to fluctuations in demand of tangible goods across the supply chain. It focuses on the recognition and rapid response to the varying size of the demand. This is possible thanks to the efficient use of time, based on partnership and trust of the suppliers. Information technology plays there an important role since it provides the advantage of time through the ability of rapid identification (eg. Bar codes, etc.) and automation in the area of procurement. Implementation of „Quick Response” to the organization occurs in stages by:

- appropriate training and counseling,
- analysis of the existing conditions between certain links of the supply chain,
- identification of expectations and goals,
- negotiations,
- reorganization of the prevailing motivation systems and existing technologies,
- control and observation.

The aim is to increase revenues while minimizing costs and increasing the quality of service in a short time (Suri, 1998).

Just in Time

„Just in Time” is a concept of shaping relations between the company and its suppliers, customers and employees. It focuses on meeting the needs of customers, cooperation between suppliers, reducing inventory, increasing operational flexibility and problem solving (Fertsch, 2006). It is based on four assumptions: (Ciesielski, 2009)

- zero stockholding,
- small and frequent deliveries,
- short cycles of order execution,
- high quality.

The aim of the Just in Time is the preparation of products and services through appropriate planning, command and control of all material flows and their relevant information streams (Dworecki, 1999). With specific synchronization it is possible to reduce these streams, which has a positive impact on the speed of all processes in the organization (Sarjusz-Wolski, 2000). Just in Time is also, and perhaps above all, the elimination of all kinds of waste that occurs in the process. Its limitations should seek to minimize various factors, such as: (Harrison, van Hoek, 2010)

- a minimum of defects,
- a minimum of interruptions,
- a minimum of delay,
- a minimum of inventory.

JiT is the concept of production initiated by demand, which is why organization focused on material and information flow is that important. Hence the processes of supply, production and distribution should be organized in the way to facilitate its timely (as soon as possible) pursuit and the elimination or reduction of inventories was a direct result of the system. The company should focus on removing the causes that interfere with timeliness and thus discipline its employees and suppliers (Fertsch, 2006). The JiT applied in practice leads to the elimination of any kind of possible stock. It is usually used in the direct-line production and in automated production cells and assembly lines (Durlik, 2007).

The essence of the Just in Time is the reduction of inventory at the expense of increased frequency of smaller supplies. What follows is a required full coordination of material procurement, production processes, distribution and sales. Without the cooperation of these elements it is almost impossible to introduce this method to the enterprise. Moreover, the company must strictly observe the deadline of ordering and delivery (Figure 5).

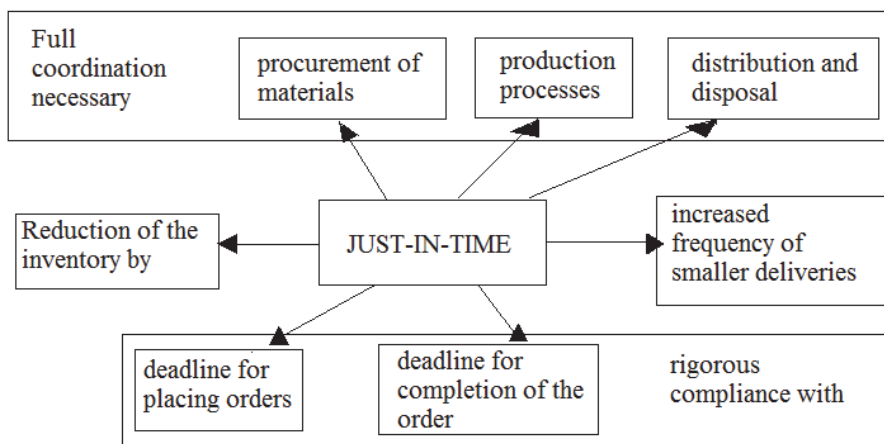


Figure 5. The essence of the Just in Time concept

Source: Niziński, Żurek, 2011.

It should also be noted that in the system JiT stocks are seen as a so-called „cover” for the problems occurring in the enterprise. Basically, they should protect the company from such situations like e.g an inefficient information system, machine breakdowns, quality problems, changes in schedules, absences of employees, change of tools, the problems associated with switching production, poor availability of raw materials, unreliable suppliers, unreliable transport. In fact maintaining a high level of inventory is not the actual way to solve the problems of the enterprise, it is just „covering” them. According to the philosophy of Just in Time lowering inventory levels reveal problems occurring in the enterprise whose solution requires an analysis in order to identify their source (Kowalska, 2005).

The benefits of Just in Time include, among others (Imai, 2007):

- shorten manufacturing lead time,
- reduction of the time spent on activities not directly related to production,
- improving the quality of logistics services,
- shorter cycles stable orders,
- reduce inventory,
- elimination of all troublesome supply,
- a better balance between the various processes,
- quick explanation of problems.

The drawbacks of that method are high costs, a long time of implementation and achieving the benefits. In order to meet the needs of the customer the quality of services and products must be close to perfection. Due to the diversification of orders the company has to be ready for changes in the supply and take into account many options of production. This aspect also involves adverse effects on the human factor. Permanent pursuit of perfection, delivery perfectly on time and in

the right amount can cause poor morale, thereby increasing the level of the work related stress (Ciesielski, 2009).

Total Quality Management

TQM is a management philosophy for total quality management, possible to implement in each organizational unit of the company. It is linked directly with the requirements that are contained in ISO 9001. It is a strategy for continuously improving performance at every level and in all areas of responsibility (Zimon, 2013). The concept ensures the success of the company by the right strategy, processes, training, motivation, commitment, tools and resources. This applies in the total customer satisfaction (Grajewski, 2012). TQM can also be implemented to improve the supply chain, as shown in Figure 6.

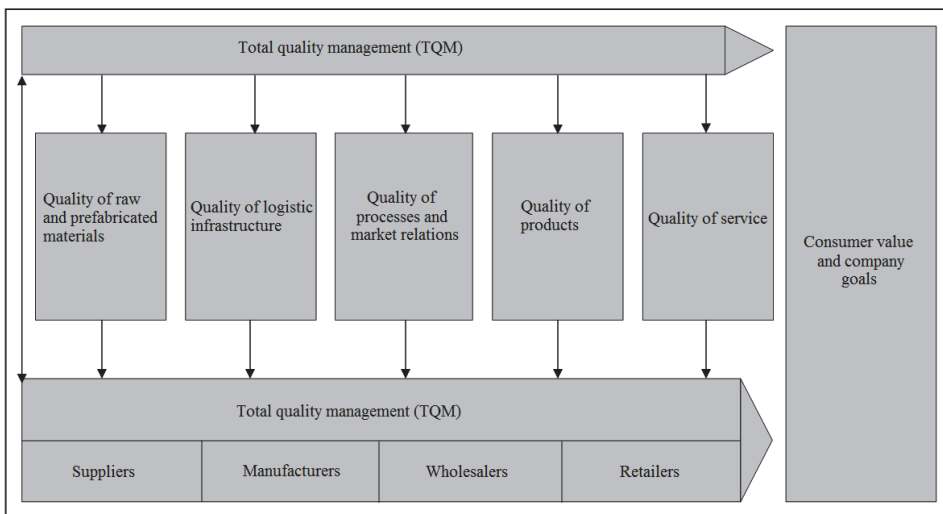


Figure 6. Supply chain in the area impacted by TQM

Source: Ciesielski, 2009.

TQM involves the whole company in the change processes that leads to the subordination of the existing structure to the culture of teamwork. Compulsory participation of every department of the company and all its employees is of paramount importance. Each process occurs by all levels of the organizational structure.

The main objective of the concept is the continuous quality improvement of products and services for complete customer satisfaction. The central element here is therefore the customer and its contentment (Figure 7). The client can be both an external customer, as a buyer or supplier of products, as well as an internal customer, also an organizational unit (eg. the magazine as a customer of purchasing department).

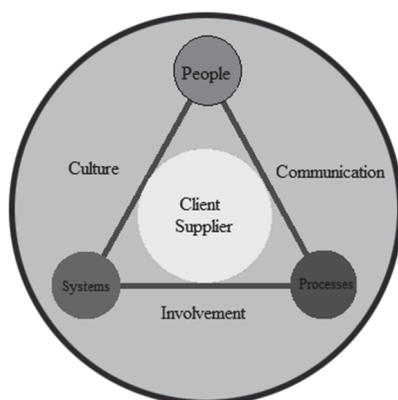


Figure 7. Presentation of the TQM model

Source: own elaboration.

Quality management is based on four assumptions:

1. Involvement of every employee of the company in its improvement.
Improvement takes place through frequent streamlining of various elements in the enterprise. It should be noted that this ought not be done at great expense. A real increase in efficiency can be seen when the effect is caused by a myriad of small, significant but low-cost changes.
2. Processes optimization.
Simple but universal machines and tools that can be quickly and easily rearmed must be used. This allows to maximize the time available for production. Synchronization of work can help to minimize inventory costs.
3. Reduction of the number of problems.
Attention should be focused on business management, work organization and motivation.
4. Long-term use of methods.
It is a long-term use of methods that will facilitate gaining a competitive edge leading to success. It must translate not only into the organizational activities, but also benefits the society or the environment. The company should take on the social responsibility.

One of the creators of the TQM' concept is an American statistician, Edward W. Deming. His concept in the field of quality management is based on (Hamrol, Mantura, 2002):

- control of the quality of processes and products, which take place in a series of actions, the so-called „Deming wheel”,

- application of fourteen principles in the work of the management company.

Deming scheme (ie. Wheel of Deming) illustrates the basic principle of continuous improvement – Figure 8.

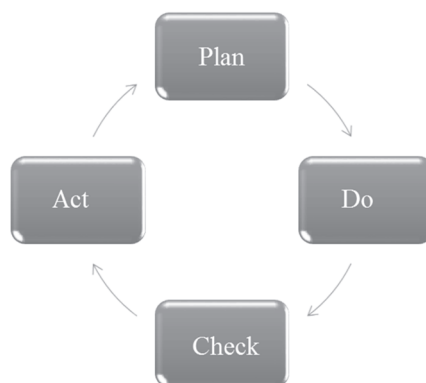


Figure 8. The Deming Cycle

Source: Hamrol, Mantura, 2002.

Deming wheel consists of four consecutive actions:

- Plan – one should plan a better way of action, using a better method. One should determine the current state, analyze the causes of the problems on the basis of the collected data and build an action plan to improve.
- Do – one should carry out pre-deployment changes on a small scale, and under controlled conditions. An action plan must be implemented.
- Check – one must thoroughly analyze the results of the experiment and draw conclusions. It is also advisable to confirm the deletion of the main causes of problems.
- Act – one should take appropriate action to implement the standard of the process, which has produced the most desirable results.

There are many other methods functioning in the area of supply chain management, but they put emphasis on other aspects of the company, including in particular, factors associated with improving the performance, processes planning or human resources management.

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EMPIRICAL SURVEY ON REPORTING AND DISCLOSURE OF INTERNALLY GENERATED GOODWILL

Lilyana Kamburova*

1. Introduction

The current economic development is increasingly based on the knowledge economy, a strategic pillar of the EU Lisbon Strategy. The sharpening competition is objectively imposing the doctrine of turning knowledge into material strength and a driving agent to achieve a competitive advantage. In the language of business this translates into constant transformation of knowledge into intangible assets. The focus of investment decision making shifted from tangible assets subject to commercial transactions to intangible assets that are not the subject of such transactions.

The main thesis of this paper is that the internally generated goodwill is a key factor in the economic development of the company it should be reported and disclosed properly from the accounting department of each company using appropriate approaches and methods, to facilitate the proper management of the economic development of the company.

To prove the main thesis of the empirical survey that is outlined above, the following working hypotheses have been formulated:

- 1) Internally generated intangible assets, including goodwill do exist in the companies and there is no proper accountability for these assets;
- 2) Reporting and disclosure of internally generated goodwill will lead to higher investments in these assets.

Comprehensive review of the current academic literature on the accounting for goodwill clearly demonstrates that it is not possible for goodwill (both for the internally generated and the externally acquired) to be logically and fully represented in the context of the historical cost. This can be observed by the asymmetry of the ban on accounting for internally generated goodwill, on the one hand, and the very well-structured method of accounting, which is obligatory for the externally acquired goodwill. This asymmetry occurs despite the universal perception confirmed by the Australian Accounting Standards issued in 1996 that

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there is no qualitative difference between the two forms of goodwill. This standard explicitly recognizes that the concept of goodwill as an asset is the same whether it is acquired in a commercial transaction, or generated internally.

Despite the common acceptance that in practice both types of goodwill are indistinguishable in terms of their ability to generate revenue, many researchers still continue to support the limitations of the existing accounting system that do not recognize and do not report the internally generated goodwill. Therefore, a real problem for the practice of the accounting profession still cannot be solved properly, namely, the need for true and accurate representation of economic reality of the company in the annual financial statements. In fact, this is a necessity and a basic requirement for information disclosure as a part of the annual financial statements.

In the last quarter of the twentieth century, the market value of the 500 companies comprising the leading market index S&P 500 has departed significantly from their carrying value. This „gap in the value” indicates that tangible and financial assets reported on the balance sheets of the companies included in the index constitute less than 20% of the true value of these companies.

The data in the chart shows that in 1975 the tangible assets accounted for 83% of the market capitalization of the companies included in the index. The percentage has sharply decreased until 2010, when it accounted only for 20% of the market capitalization.

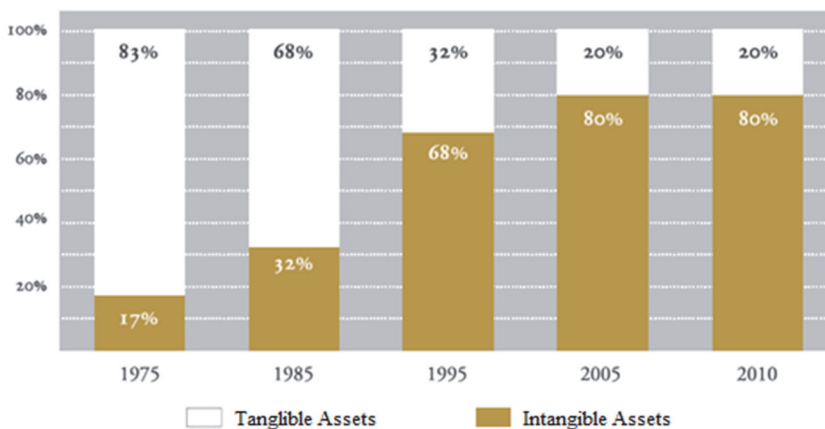


Figure 1. Share of tangible and intangible assets as a percentage of market cap in S&P 500

Source: <http://www.oceantomo.com/productsandservices/investments/intangible-market-value>

To qualify as an asset, internally generated goodwill similar to the externally acquired goodwill should also represent future economic benefits arising from other assets that cannot be individually identified and recognized as separate assets. In the case of externally acquired goodwill these assets were acquired through external purchases. When there is an internally generated goodwill, these assets are created in

the company itself. Combined with the other assets in the company, their mutual synergic existence creates the internally generated goodwill.

The internally generated goodwill is the result of the combination of the following assets, which in general are almost or entirely indistinguishable: (Lonegan, 1995).

- 1) Benefits in the form of synergies arising from the relationship between people, systems and / or connections in the company;
- 2) The quality of the marketing team and the overall market experience;
- 3) Customer loyalty;
- 4) Economies of scale within the organization itself;
- 5) Well-developed distribution network;
- 6) The benefits arising from the location in a particular area;
- 7) The possession of monopoly in one or more areas of economic activity;
- 8) Know-how (unlike patents) and technical skills provided by individual performers or teams within the organization;
- 9) The innovative use of technology;
- 10) The management of the company/enterprise as a separate resource.

IAS 38 „Intangible Assets” supports the traditional approach towards the internally generated goodwill, namely „goodwill, which is internally generated by the company should not be recognized by the company”. The following reasons are specified in the accounting standard:

- a) It is not an identifiable resource, in that way it is not separable from the company and it is not the result of contractual or other legal rights;
- b) It is not controlled by the company as a resource;
- c) It cannot be reliably determined.

The nature of the internally generated goodwill and the externally acquired goodwill is the same and the unequal treatment under the accounting regulation on the recognition, measurement and disclosure lacks sufficient arguments and is also not proven by academic research. This is a cause of concern for the practice of the accounting profession, because the accounting information provided by the annual financial statements cannot be used by the management team in order to solve problems related to the economic development of the company.

2. Empirical survey of intangible assets and goodwill

In order to fulfil the main purpose of this paper, there was conducted a survey among accountants, managers and other stakeholders. The survey included 53 participants (Kamburova, 2017).

The purpose of the empirical study is to examine some of the existing problematic issues related to:

- the non-recognition of the internally generated goodwill which creates a misrepresentation of the true and fair financial position of the company;
- the lack of accountability due to the non-recognition of internally generated intangible assets;
- the need for legislative changes.

The survey includes responses from working professionals employed in various companies from five different segments. The highest share of people that responded to the survey were employed in finance and insurance – 38%, followed by services. Most people from that segment are employed in consulting.

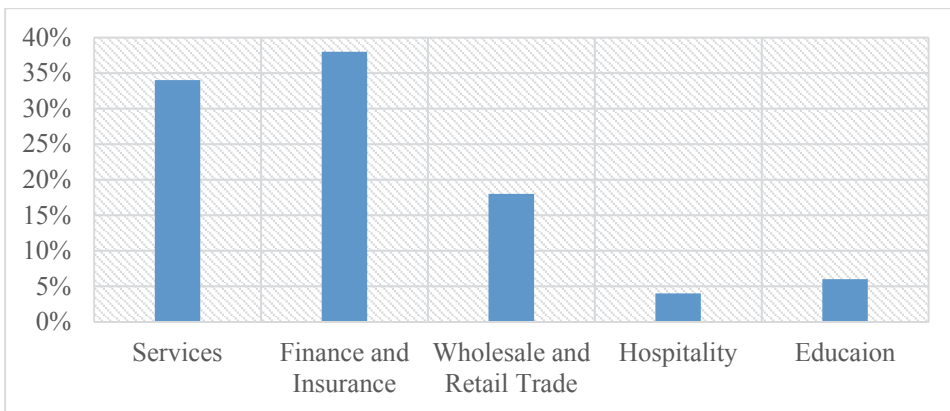


Figure 2. Distribution of respondents by segment of occupation

Source: own survey data.

The respondents who participated in the survey are not only accountants, although their percentage is the highest – 43% of all respondents. The reason that the survey was not confined only to accountants is that the: survey aims to identify attitudes toward internally generated goodwill, which at this time is not recognized for accounting purpose and not legally regulated. Following the results of the survey it can be observed that accountants find it difficult to think out of the box of the current accounting regulation and are not interested in assets that are not recognized by the accounting standards.

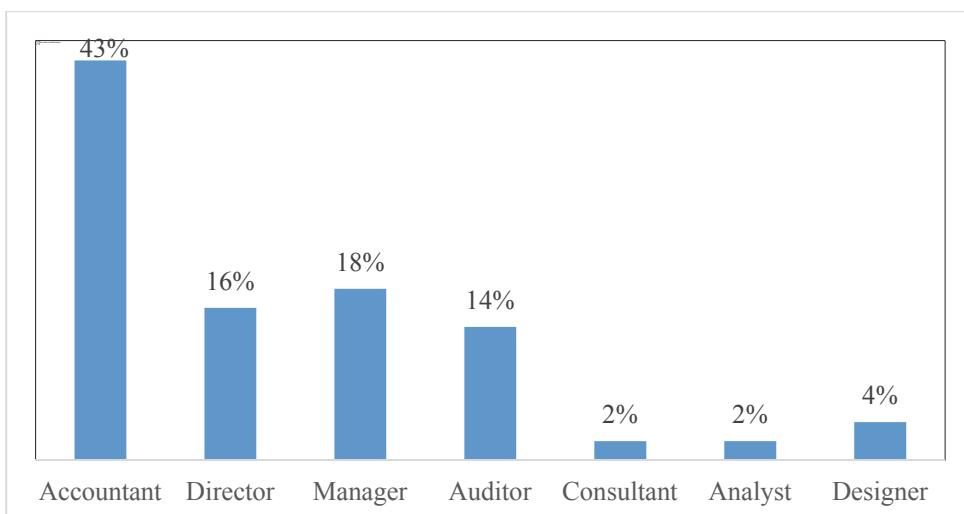


Figure 3. Distribution of respondents by professional occupation

Source: own survey data.

Accountants and auditors take a little over half – 57% of all respondents, as far as the first create accounting data and the rest verify the authenticity of the same data.

3. Analysis of survey results

Question 1. Are there in your company unrecognized internally generated intangible assets?

Table 1. Distribution of answers to Question 1

Intangible Assets	Number of Respondents	%
Client Lists	6	11%
Know-How	4	8%
Employee Training	7	13%
More Than One	17	32%
Marketing Strategies	2	4%
None	17	32%
Total	53	1

Source: own survey data.

The responses in the survey show that 68% of the companies represented in the survey have at least one unrecognized internally generated intangible assets, while 32% of the companies have more than one of these. This proves the main hypothesis that the current accounting regulation does not recognize assets that actually exist.



Figure 4. Distribution of responses to Question 1

Source: own survey data.

Question 2. Is there any accountability for the unrecognized internally generated intangible assets in your enterprise?

Table 2. Distribution of answers to Question 2

	Number of Respondents	%
Yes	15	28%
No, because they are not recognized	38	72%
Total	53	100%

Source: own survey data.

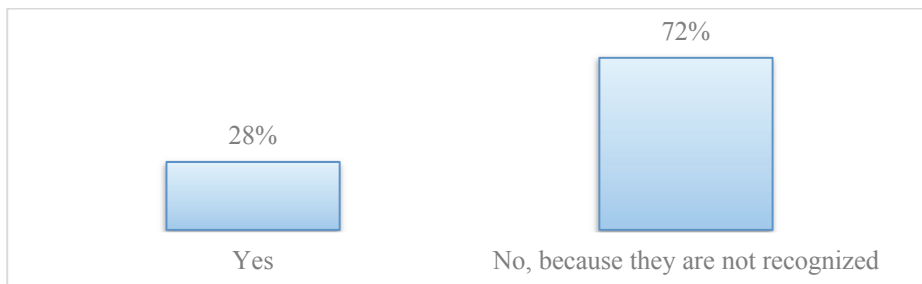


Figure 5. Distribution of responses to Question 2

Source: survey data.

Here is confirmed the next hypothesis that the ban on recognition of internally generated intangible assets by the regulator leads to underreporting of these assets. It is a paradox that, on one hand, there are such assets existing in the company, while, on the other hand, they are not recognized and there is no trace of them in the accounting documents.

Question 3. Is there in your company internally generated goodwill?

Table 3. Distribution of answers to Question 3

	Number of Respondents	%
Yes	30	57%
No	23	43%
Total	53	100%

Source: own survey data.



Figure 6. Distribution of responses to Question 3

Source: own survey data.

As long as the internally generated goodwill is an intangible asset is difficult to determine whether such an asset is generated in the company without an additional assessment and analysis using the appropriate methods. The prevailing positive responses – 57% – again show that even though it is not measured, this asset is not „invisible” to the company.

Question 4. Do you think that recognition at this stage of the internally generated intangible assets does not present a true and fair financial position of the company?

Table 4. Distribution of answers to Question 4

	Number of Respondents	%
Definitely Yes	15	29%
Yes	16	31%
I Don't Know	8	15%
No	10	19%
Definitely No	3	6%
Total	52	100%

Source: own survey data.

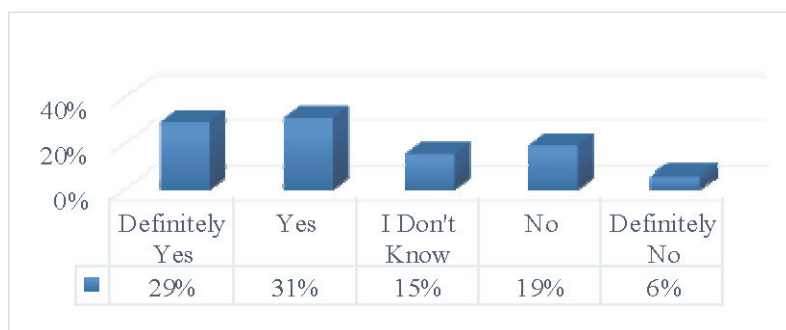


Figure 7. Distribution of responses to Question 4

Source: own survey data.

The responses of this question strongly confirm the main thesis of the paper, as 60% of the respondents gave some kind of positive answer. Only 6% of respondents indicated „Definitely No”. Assuming the answer „I Don’t Know” is neutral, the positive responses get 25 percentage points of the responses more than the negative ones.

Question 5. If the internally generated intangible assets are recognized, will that fact increase the investment in them?

Table 5. Distribution of answers to Question 5

	Number of Respondents	%
Definitely Yes	10	19%
Yes	21	40%
I Don't Know	15	28%
No	7	13%
Definitely No	0	0%
Total	52	100%

Source: own survey data.

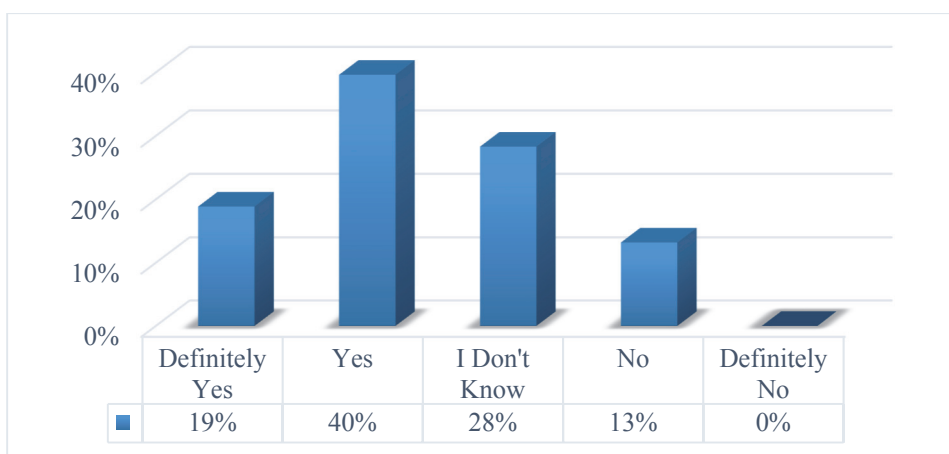


Figure 8. Distribution of responses to Question 5

Source: own survey data.

This shows that if you recognize internally generated intangible assets investment in them will increase. Over half of the respondents (59%) think that the investment in them will increase and that shows undeniably that there are future economic benefits expected from these assets. Those who would not invest in internally generated intangible assets are only 13%.

Question 6. Do you agree that legislative changes for recognition of unrecognized internally generated intangible assets, respectively internally generated goodwill should be adopted?

Table 6. Distribution of answers to Question 6

	Number of Respondents	%
Definitely Yes	6	11%
Yes	20	38%
I Don't Know	13	25%
No	11	21%
Definitely No	3	6%
Total	53	100%

Source: own survey data.

As long as the development of the local accounting legislation in the years after the planned economy has largely followed the international development of accounting regulation, our legislative bodies would rather wait for the change in IAS on the issues discussed in this paper and then eventually this change would be transposed into our local laws and regulations.

4. Conclusion

One of the fundamental qualitative characteristics of the accounting information is the fair representation of the financial position of the company. The survey shows that the company has assets that are not properly accounted for and this violates the principle of fair representation. A possible solution to this issue is their voluntary disclosure in the annual financial statements. The valuation of these assets could be the object of future academic research.

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MODERN METHODS OF THE PRODUCTION COST ESTIMATION IN COST ENGINEERING

Zbigniew Leszczyński*, Tomasz Jasiński**

1. Introduction

Cost is one of the most influential factors affecting the profitability of products within many of today's industries. More often in the enterprises, reducing cost is essential for survival. To compete, enterprises are increasingly required to improve their quality, flexibility, product variety, and novelty while reducing their costs. Customers expect higher quality at an ever-decreasing cost. For this reason, cost reduction are very essential within today's highly competitive market place. Since cost has become such an important factor of success, cost needs to be carefully considered and estimated. Recent research demonstrates that enterprises unable to provide detailed, meaningful cost estimates, at the early development phases of product (Clark, Lorenzoni, 1997). It is important, that the cost of a new product/project development be understood before it actually begins. It could mean the difference between success and failure of enterprises.

Cost engineering is concerned with cost estimation, cost control, profitability analysis of engineering projects ,product and processes (Rajkumar, 2003, pp. 1-30; Leszczyński, Jasiński, 2015). The cost engineer is a qualified professional dedicated to cost management over the life cycle of a project or manufacturing activities. The cost engineer needs to knowledge of technology and its impact on level of costs.

Cost engineering helps the enterprises with decision-making, cost management and budgeting with respect to product development. It is a methodology used for predicting/forecasting/estimating the cost of the product . Cost estimates during the early stages of designed product are crucial. They influence the decision concerning a development of product. If the estimate is too low it could mean the is unable to produce the product and make a reasonable profit. In this ever-increasing competitive market, cost engineering is becoming a necessity for survival the enterprises (Rajkumar, 2003, pp. 1-30).

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Many authors claim that 70-80% of a product cost is committed during the concept phase (Brinke, 2004, pp. 534-545; NASA, 2002a; Taylor, 1997; Mauchand et al., 2008, pp.159-172). Making a wrong decision at this stage is extremely costly further down the development process of product (Fig. 1). Product modifications are more expensive the later they occur in the development cycle. Thus, estimated cost need to approximate the true cost of manufacturing a product, based on empirical data, with the purpose of satisfying both the customer and enterprises. Therefore cost engineers need company-wide co-operation and support, to assist them in proces of estimates preparing.

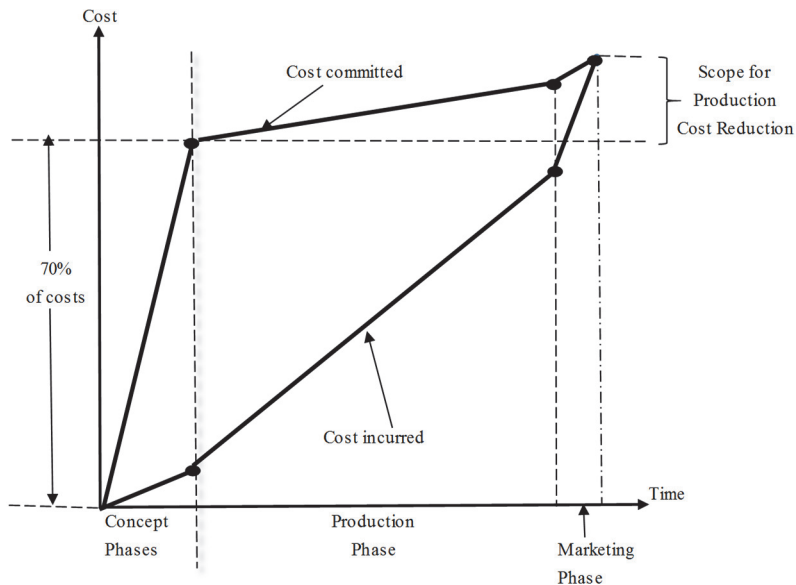


Figure 1. Cost committed vs. Cost incurred
Source: Horngren et al., 2012.

The major obstacles in the estimation of cost product at the conceptual design phase are (Rush and Roy, 2000):

- Working with a limited amount of available data concerning the new product,
- The changes within technology of production over the life cycle of a new product,
- Cost of outsourcing a part to a supplier,
- The estimates need to be accurate.

Existing the methods of cost estimation soon become outdated and require updating to reflect the new technological environment. Thus, it's extremely difficult to predict cost within this new technological environment with existing

methods of estimation. (Rush, Roy, 2001, pp. 271-284). This situation forces engineers to introduce new approaches to old methods of cost estimation.

The aim of this chapter of monography is to analyze activity based budgeting, parametric models and artificial neural networks in terms of their suitability as estimates of the costs of production. In the first part of the chapter, methodology of activity based budgeting is analyzed. In the second part of the chapter a conceptual framework for the construction of parametric estimates of production costs, single- and multi-dimensional ones with linear and nonlinear dependency is presented. It then discusses the nature and the use of artificial neural networks as nonparametric estimates of production costs. In both parts of the article, an empirical study was conducted with the use of adequate statistical tools and artificial neurons. This empirical research presents the construction procedure of activity based budgeting, parametric and nonparametric estimates of the production costs and their advantages and disadvantages. During the research procedure the application and usefulness of the three methods for estimating production costs in production environment are presented.

2. Activity based model in the estimation of production cost

2.1. Conceptual framework of Activity Based Budgeting (ABB)

Nowadays, the most modern cost budgeting strategy used in production companies worldwide is the so-called activity based budgeting, which is closely connected to the ideas of activity based management and activity based costing. The conventional way of budget generation is based on repeating negotiations between the heads of cost centres and company management. The former constantly aim to increase the volume of resources at their disposal, whereas the managers struggle to control the increase in amounts allocated to these decentralised bodies. As a consequence, the following year's budget is based on the previous one with a mere difference of a couple of percent, depending on the results of the negotiations between company directors and local managers (Leszczyński, Jasiński, 2015).

Some basic limitations related to this traditional approach to budgeting are as follows:

- focus on resources in historical aspect,
- focus on departments,
- application of financial trend projections,
- static picture,
- lack of link to actual demand.

In contrast, activity based budgeting offers the opportunity to stick to facts instead of power, influence and negotiation skills during the above clash between belt-tightening directors and resource-hungry managers. There are, however, certain challenges to modern budgeting based on ABB, like (Mak, Roush, 1994):

- traditional budgeting is not always effective;
- competition increase, along with e-business, inflict additional pressure on the effective planning process;
- companies must comprehend the real causes of cost generation;
- companies must be able to forecast and plan according to rapidly changing external conditions.

Activity based budgeting is just a reversed version of activity based costing (ABC). The ABC process is initiated by allocating resources downwards to activities, and then, by means of activity cost drivers, to cost objects like products, services or customers. So we can conventionally say that costs flow from 'North to South'. On the contrary, in activity based budgeting the analysis is made in the reversed direction, i.e. from 'South to North' (Fig. 2).

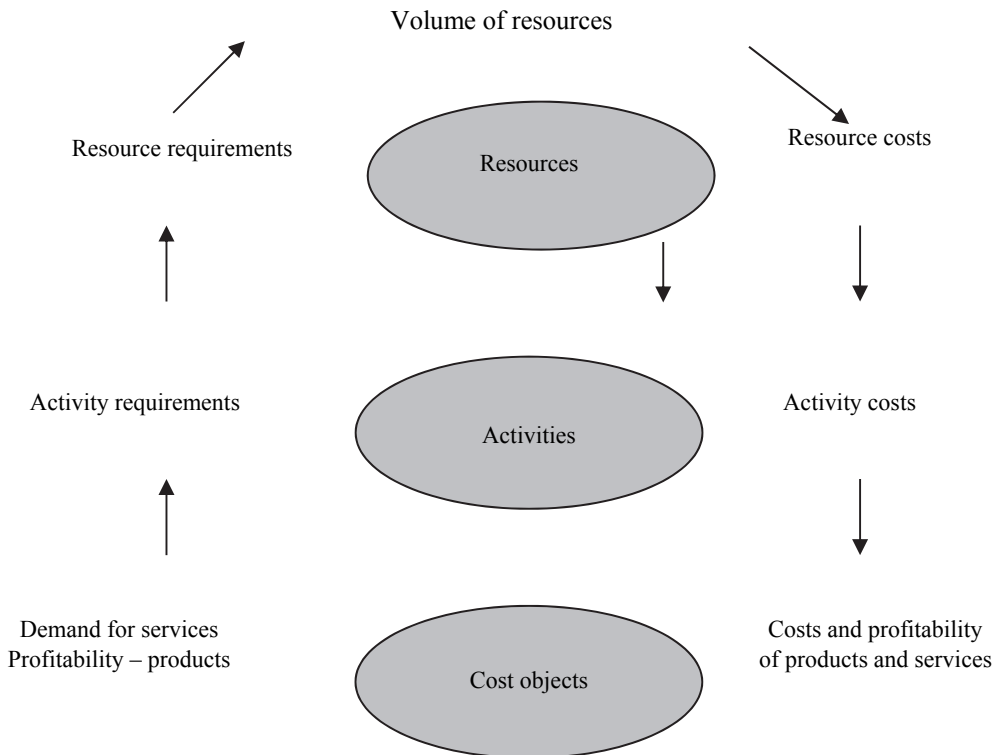


Figure 2. ABB in Estimation Process

Source: Leszczyński, 2012.

The stages of activity based budgeting are as follows (Kaplan, Cooper, 2000, pp. 366-374):

– **Estimation of production and sales volume forecasted for the next period for particular products and customers.**

The budgeting procedure within the company is initiated with the assessment of expected volume and structure of sale, which takes into account not only products and services which are to be sold, but also particular customers who are expected to buy the products and services offered. The estimated data in question should include total production and sales volume, as well as details of production and sale processes within the company. The resulting budget should account for the number of production cycles for each product, frequency of ordering and acceptance of materials, number of orders placed by a customer, dispatch methods etc.

– **Estimation of required activities and their drivers.**

Activity Based Budgeting is a way to expand the traditional budgeting procedure by estimating the demand for all indirect and auxiliary activities, e.g. ordering, acceptance, material handling, as well as processing of customer's orders, complaints and technical assistance requests, scheduling, and configuration of production cycles, not to mention all other activities included in the ABC glossary.

– **Estimation of production resources necessary to implement the activities (the estimation of cost pool for activities).**

Knowing the expected demand for action, a budgeting team estimate the volume of resources which are to be delivered in order to execute all the necessary actions. The resource delivery broadcast is based on the understanding of the underlying efficiency of activity realisation.

Bearing in mind the above, we can definitely say that Activity Based Budgeting is not (Leszczyński, 2012):

- an extrapolation of unit costs of products,
- an extrapolation of unit costs of activities.

Since Activity Based Budgeting:

- is based on demand,
- is based on consumption indicator,
- takes production capacity into account,
- takes resource costs into account,
- specifies resource level necessary to meet demand.

2.2. The use of the activity based budgeting method in cost production estimation

The implementation of the activity based budgeting process in production firms is possible under the following conditions:

- a) transition from functional to process model management (Activity Based Management),
- b) comprehensive knowledge and experience of the managerial staff in terms of:
 - process management,
 - production, sale and logistics technology,
 - up-to-date management technologies,
 - value-added and process analysis,
 - constant improvement in the company,
 - implementation of Activity Based Costing (ABC),
 - implementation of integrated IT systems for management.

Nowadays, the vast majority of our companies are not prepared in terms of knowledge, IT infrastructure and financial resources to use this kind of budgeting system.

Let us now analyse the ABB planning loop on a practical case:

– **Estimation of production and sales volume for particular product groups.**

On the basis of sales forecast, a production program has been created which says that the production plan for product „X” amounts to 9800 items.

– **Estimation of required activities and their drivers.**

Taking into account the technological requirements of the production process in question, demand for the following production activities has been specified:

- quality control,
- storage,
- production preparation process,
- general production process,
- assembly.

Cost drivers and their consumption by the finished product (unit consumption) are as follows (Table 1):

Table 1. Unit consumption for activities

Activity	Cost driver	Unit Consumption
Quality control	control operations	4 contr. Op./item
Storage	m ²	0.5 m ² /item
Production preparation process	number of runs	2 runs/item
General production process	machine-hours	0.32 Mh/item
Assembly	assembly operations	3 ass.ops./item

Source: own study.

Unit consumption for activities is calculated with the following formula:

$$\text{Unit Consumption} = \text{Cost driver volume} / \text{number of final products}$$

Table 2. Estimated volume of cost drivers

Activity	Cost driver	Estimated number of products (items)	Unit Consumption	Estimated volume of cost drivers
1	2	3	4	5 = 3x4
Quality control	control operations	9800	4 contr. Op./item	39200
Storage	m ²	9800	0.5 m ² /item	4900
Production preparation process	number of runs	9800	2 runs/item	19600
General production process	machine-hours	9800	0.32 Mh/item	3136
Assembly	assembly operations	9800	3 ass.op./item	29400

Source: own study.

– **Estimation of production resources necessary to implement the activities (the estimation of cost pool for activities).**

Based on the forecast of activities and their cost drivers, resources necessary to realise the activities are estimated. In order to do that, we will need information concerning the activity costing rate (Table 3).

Table 3. Estimated cost pools of activities

Activity		Cost driver	Estimated volume of cost drivers	Activity costing rate	Estimated costs pool of activity
1		2	3	4	5 = 4x3 (\$)
Quality control		control operations	39200	1.5 \$/contr. op.	58800
Storage		m ²	4900	3.4 \$/m ²	16660
Production preparation process		number of runs	19600	6.7 \$/run	131320
General production process		machine-hours	3136	32.2 \$/Mh	100979
Assembly		assembly operations	29400	2.5 \$/ ass.op.	73500
Total overhead production cost					381259

Source: own study.

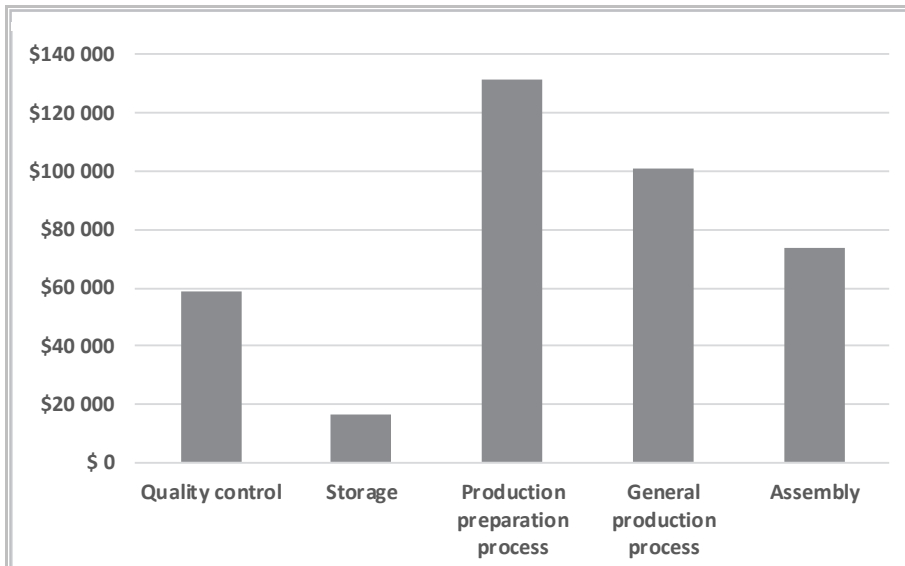


Figure 3. Estimated cost pools of activities

Source: own study.

Table 3 and Figure 3 above presents the estimation cost pool of activities, necessary to implement these activities. One has to bear in mind, however, that our example implied a „collective” kind of a resource for a given activity. In practice, there will be many more kinds of resources to be considered. All in all, the estimation technology will be identical, with an increased number of planning loops.

The application of ABB in estimating process for production firms:

- Optimises demand for activities pursuant to the production program,
- Based on production technology applied, precisely sets the output level of activities for the needs of production programs,
- Calculates an optimum level of resources needed to meet an established level of the activities' output,
- Specifies the unit cost of a product depending on a production technology applied.

3. Parametric models in the estimation of production cost

3.1. Parametric estimating – theoretical approach

Cost estimating and cost engineering are separate disciplines, yet are inextricably linked. Cost estimating refers to a commercial business process whereas cost engineering is more concerned with design trade studies.

A widely used method for estimating object cost at the early stages of development is known as parametric estimating (PE). Within the field of cost estimating this relationship is known as a cost estimating relationship (CER). PE is a method used to estimate the cost of a future product or process. PE is used during the early stages of development of a product/process, when there is little product information available. The main principle of PE is to develop a statistical relationship between the attributes of cost object and cost in order to predict the cost of a new product or process.

A parametric estimating model is a mathematical representation of cost relationships that provide a logical and predictable correlation between the physical or functional characteristics of a project (plant, process system etc.) and its resultant cost (Dysert, 2008). A parametric estimate is comprised of cost estimating relationships and other parametric estimating functions that provide logical and repeatable relationships between independent variables (such as design parameters or physical characteristics) and the dependent variable (cost). The independent variables are known as cost drivers, and typically may be physical, performance, or operational characteristics associated with the project to be estimated.

Capacity factor and equipment factors estimates are simple examples of parametric estimates; however sophisticated parametric models typically involve several independent variables or cost drivers. Similar to other conceptual estimating methods, parametric estimating is reliant on the collection and analysis of previous project cost data in order to develop the cost estimating relationships (CER). An underlying assumption of parametric estimating is that the historical framework on which the parametric model is based is applicable to the new object (i.e., the technology has not radically changed).

The main steps of process of developing a parametric model are: (Dysert, 1999); Sae-Hyun, 2010, pp. 844-852; Sonmez, 2008, pp. 1011-1006; Setyawati et al., 2002):

- determining the scope of the parametric model,
- analysing data to support of model development.

The first step in developing a parametric model is to establish its scope. This includes defining the end use of the model, the physical characteristics of the model, the cost basis of the model, and the critical components and cost drivers. The end use of the model is typically to prepare conceptual estimates for a process, system, project. The type of process, system, project be covered by the model, the type of costs to be estimated by the model, the intended accuracy range of the model, etc. should all be determined as part of the end use definition.

Data analysis is the next step in the development of a parametric model. There are many diverse methods and techniques that can be employed in data analysis, and are too complex to delve into in this paper. Typically, data analysis consists of performing regression analysis of costs versus selected design parameters to determine the key cost drivers for the model. You may need to use reasoned hypotheses or expert opinion to initially identify and test the best cost drivers.

Most spreadsheet applications now provide regression analysis and simulation functions that are reasonably simple to use. The more advanced statistical and regression programs have goal seeking capabilities, which can also make the process easier. Generally, a series of regression analysis cases (linear and non-linear) will be run against the data to determine the best algorithms that will eventually comprise the parametric model. The algorithms will usually take one of the following forms:

$$Y = a + bX_1 + cX_2 + \quad \text{(Linear Relationship)}$$

$$Y = a + bX_1^v + cX_2^z + \quad \text{(Non-Linear Relationship)}$$

where X_1 , X_2 are input variables; a , b , and c are constants derived from regression; and v and z are exponents derived from regression. Note that there are many forms of non-linear relationships that may apply.

The various relationships (cost versus design parameters) are first examined for „best-fit” by looking for the highest „R-Squared” value. R^2 has the technical sounding name of „coefficient of determination”, and is commonly used as a measure of the goodness of fit for a regression equation. In simple terms, it is one measure of how well the equation explains the variability of the data. The resulting algorithms from the regression analysis are then applied to the input data sets to determine on a project-by-project basis how well the regression algorithm predicts the actual cost (Dysert, 2008).

Regression analysis can be a time consuming process (especially with the simple regression tools of a spreadsheet program), as iterative experiments are made to discover the best-fit algorithms. As an algorithm is discovered that appears to provide good results, it must be tested to ensure that it properly explains the data. Advanced statistical tools can quicken the process but can be more difficult to use. Sometimes, you will find that erratic or outlying data points will need to be removed from the input data in order to avoid distortions in the results. It's also very important to realize that many costs relationships are non-linear, and therefore one or more of the input variables will be raised to a power (as in the equation above). You will need to experiment both with the variables you are testing against, and the exponential powers used for the variables. Regression analysis tends to be a continuing trial and- error process until the proper results

are obtained that appears to explain the data. Several individual algorithms may be generated and then later combined into a complete parametric model (Dysert, 2008).

3.2. Parametric model example

As an example of developing a parametric estimation model, we will examine the cost production and technological parameters (cost drivers) of two production lines: assembly, quality control. Table 4 and Table 5 provide the actual costs and cost drivers of these two production lines.

Table 4. Actual costs and cost drivers of assembly line

Assembly line		
Actual costs (Y_p) (\$)	Volume production (cost drivers) (X_1) (Mh)	Number of series production (cost drivers) (X_2)
130600	301	11
149860	344	15
127910	298	10
130090	301	11
126280	299	10
131550	310	12
124020	294	10
131990	311	12
138740	321	13
141560	332	14
132120	315	12
154820	351	16

Source: own study.

Table 5. Actual costs and cost drivers of quality control line

Actual costs (Y_K) (\$)	Number of quality control cycles (cost drivers) (X_3)
12400	150
13100	160
14500	180
16900	200
19000	210
19800	220
23800	230
25000	250
30300	270
32000	287
37000	298
39000	310

Source: own study.

Regression analysis based on the data from Table 4 and Table 5 to determine a sufficiently accurate algorithm for estimating costs. The following cost estimation algorithm was developed:

$$Y_P = 358.35 X_1 + 1320.47 X_2 + 6106.44 \quad (1)$$

$$Y_P = 4132.61 * e^{0.0073 X_3} \quad (2)$$

From this equation 1, we can see that the cost drivers (X_1 , X_2) affect cost production in a linear fashion. The approach is positively correlated with costs. The regression analysis resulted in an R2 value of 0.99.

From this equation 2, we can see that the cost drivers (X_3) affect costs production in a non-linear fashion and this approach is positively correlated with costs. The regression analysis resulted in an R2 value of 0.92.

Using the estimation algorithm (1 ; 2) developed from the regression analysis, we can estimate the cost of production for the various cost drivers – (Figure 4; ($X_1 = 320$, $X_2 = 14$), (Figure 5; $X_3 = 240$).

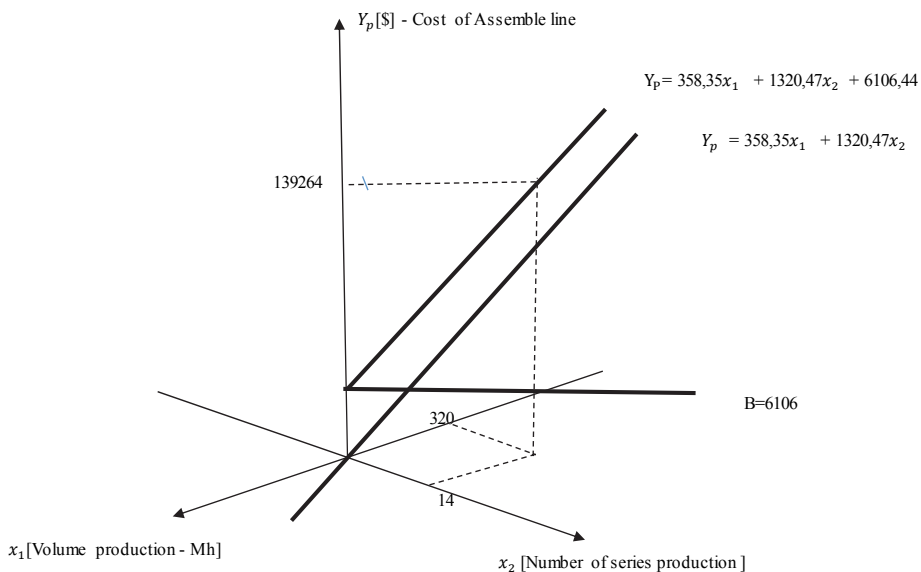


Figure 4. Estimated cost of assembly line

Source: own study.

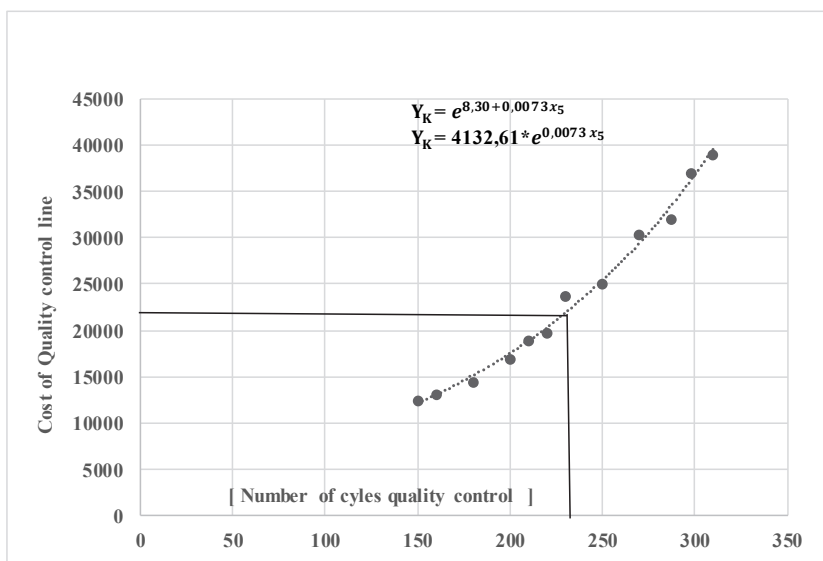


Figure 5. Estimated cost of quality control line

Source: own study.

Parametric cost models can be a valuable resource in preparing early conceptual estimates. Parametric models can be surprisingly accurate for predicting the costs of complex process systems. Parametric estimating models can be developed using basic skills in estimating, mathematics, statistics, and spreadsheet software. It is important to understand that the quality of results can be no better than the quality of the input data and great care should be taken during the data collection stage to regression analyzes.

4. Artificial neural networks in the estimation of production cost

The use of artificial intelligence (AI) in estimation of production costs gained popularity within the last decade. The concept of AI includes many different models – both operating based on the Darwin's theory of evolution, and imitating processes occurring in brains of living organisms. Artificial neural networks (ANN) are an example of tools ranked to the second of these groups.

4.1. Principles of neural networks

ANN results from the attempt to imitate occurrences in biological nerve cells. They are formed by interconnected artificial nerve cells, built analogously to its biological prototype. Definition of the single neuron for the first time was presented in 1943. Its construction presents Figure 6.

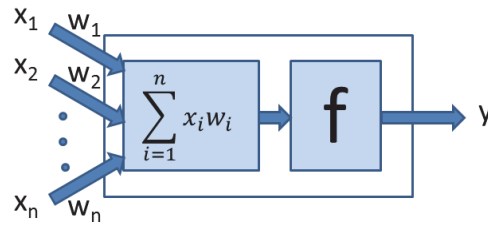


Figure 6. Artificial neuron

Source: own elaboration.

Equivalents of dendrites of the biological cell (structures responsible for implementing signals inside the neuron) are so-called inputs (indicated on Figure as x_1 to x_n). Axon function, i.e. structure, which the role is derivation of the signal from the cell, so-called output (indicated on Figure as y). A certain real number (w) is coupled with each of recalled x inputs. It is so-called weight, which in the process of ANN training is modified. Since each of x input signals, before it reaches the cell, is multiplied by the weight corresponding to the given input, the proper modification of weights in the process of network training enables to change the response generated by ANN as a reaction to emergence of the input data. Therefore, recalled weights constitute the intelligence of model. Products of input signals and weights, which will enter into the cell interior, are added up (e – net input), and then transformed by so-called activation function. Amongst the most commonly used functions in the area of widely understood economics are listed such continuous functions as: logistic, hyperbolic tangent, modified sine function, Gauss function. The first two are particularly popular. Their graphs were presented in Figures 7 and 8.

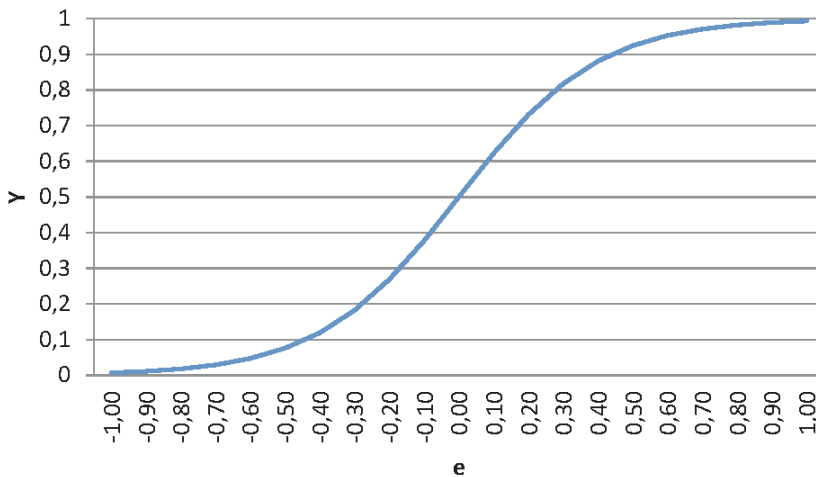


Figure 7. Logistic function

Source: own elaboration.

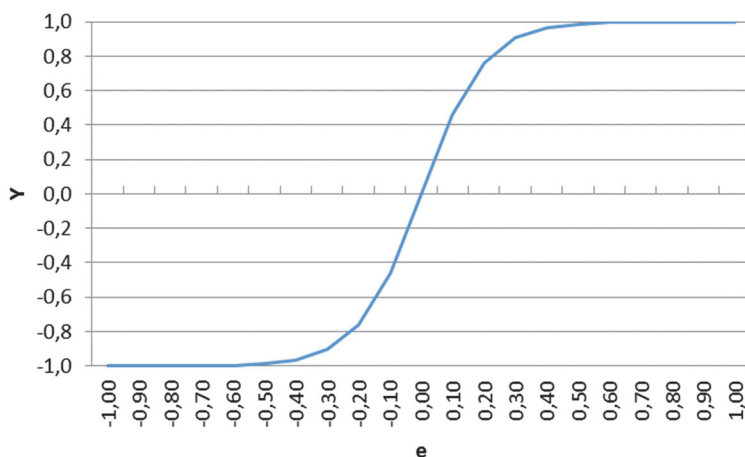


Figure 8. Hyperbolic tangent function

Source: own elaboration.

The first has surjective function included in a range of $(0, 1)$, second in a range of $(-1, 1)$. The nature of their changes – from smaller (0 or -1) to larger value (1) is supposed to constitute an analogy to potential changes in biological cells during the communication process. Then so-called action potential appears on the synaptic connection, and the potential grows from -40 mV up to 70 mV. Figure 9 presents an example of action potential progress.

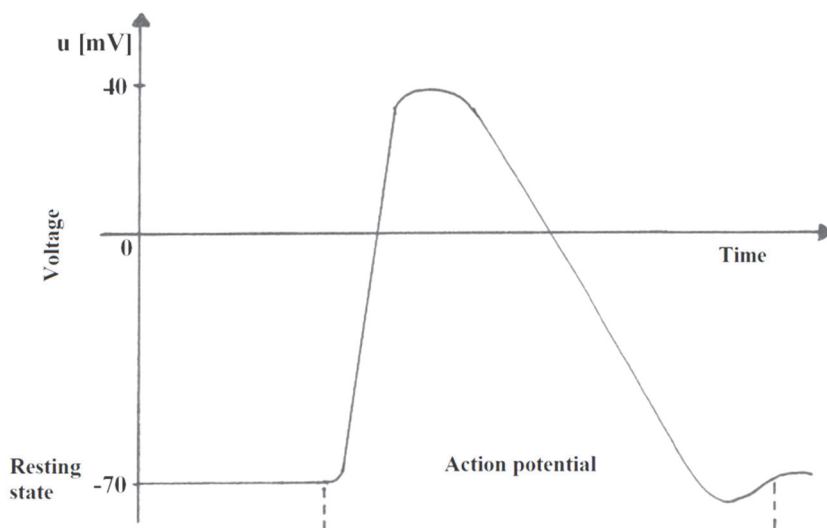


Figure 9. Action potential transmitted across a synapse

Source: own elaboration based on Kosiński, 2002, p. 23.

Single neurons are connected to each other creating ANN. They are usually grouped into so-called layers. Multilayered perceptron is one of the most popular networks. It includes a single input layer. Its cells do not participate in the process of study, and thus their weights are not modified. The task of this layer cells is to receive input signals from the outside model, and their distribution among the cells of another layer. It is known as the hidden layer. ANN most often has one or two such layers, although formally their number is not limited. In individual cases can be found in the subject literature correctly functioning models equipped with even three hidden layers. At the present stage, it seems groundless to study the use of their larger numbers, because according to empirical research in the area of economics it does not translate to the improvement of the quality of model's performance. The last layer (output) is responsible for transmitting signals outside the model.

4.2. Modelling production costs

Selection of explanatory variables should be associated with the enterprise data, as well as with the nature of production. As an example may be the use by Kim, An and Kang (2014) of ANN to estimate costs in the construction industry. Input data of the model determined: (i) total area, (ii) number of floors, (iii) number of premises, (iv) time of construction, (v) type of roof, (vi) type of foundation, (vii) the use of basement, (viii) standard of finishing. In similar studies Setyawati, Sahirman and Creese (2002) tested the possibility to use seven sets of input variables in a form of: (i) Total area, (ii) Total area, Number of floors, (iii) Total area, Height of building, (iv) Total area, Type of Foundation, (v) Total area, Number of floors, Height of building, (vi) Total area, Number of floors, Type of foundation, (vii) Total area, Number of floors, Height of building, Type of foundation. Studies have shown that the smallest Percent Error managed to develop using a set of explanatory variables (iv). However, it seems that there is a possibility of far-reaching optimization of the model by applying the following explanatory variables. An example of ANN estimating building costs presents Figure 10.

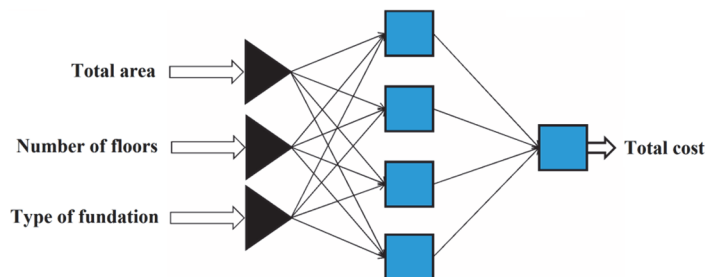


Figure 10. An example of ANN estimating building costs of the real estate
Source: own elaboration based on Setyawati Sahirman, Creese, 2002.

Wang, Stockto and Baguley (2000) studied the estimation of drilling costs with ANN. Simulations were based on such data as: (i) type of drilled material, (ii) hole diameter, (iii) type of used tool. This model constituted an alternative to traditional cost estimation using the forecast of working hours (and hence its costs). Another example is the model of Bode (2000), which task was to estimate the production cost of computers at early stage of their design. As explanatory variables of the model were used different combinations of technical data such as: (i) memory capacity of RAM type, (ii) type of installed processor, (iii) its speed (clock frequency), (iv) computer size (palmtop, notebook, desktop), (v) capacity of hard drive, (vi) optical drive, (vii) predicted improvement of the product in relation to already available products, (viii) predicted technical problems in the design process (estimated in a scale from 1 to 10), (ix) predicted production volume. The author, by creating the general function of production costs, conducted its division into three components: (i) fixed production costs, (ii) variable production costs, (iii) development costs. As far as the first two cost groups can often be estimated in a „traditional” way, the last of cost types is not simple to include in commonly used parametric models. Therefore, the use of ANN in this case is highly justified.

It should be noted that above models were not based in a significant part on the data of time series. However, such a situation may occur if one of the cost factors will change with a fixed time interval (currency exchange rate is an example). Its modelling using ANN is, firstly, possible with relatively high accuracy (Jasiński, 2014c), secondly usually requires using tools of the technical analysis, and finally thirdly – can constitute the estimation element of production costs (Leszczyński, Jasiński, 2015). Another example is the prediction of electricity prices. Although its price is often determined in advance, the contract usually guarantees stability of prices up to the set limit. Therefore, ANN may be used in this case to predict the energy demand (which enables both to predict and optimize costs), as well as for modelling of future market prices for electricity (Jasinski, 2014b). Depending on forecasting needs, it may be short-term (Jasiński, 2014a), and long-term (Jasiński, Ścianowska, 2014).

The system of cost modelling can be single-ANN, or from larger their numbers. As the example research of Ikeda and Hiyama (2005), in which one of ANN predicted the required diameter of casing of the induction motors, and second ANN among others based on received value conducted estimation of the production cost. The scheme of described model was presented in Figure 11.

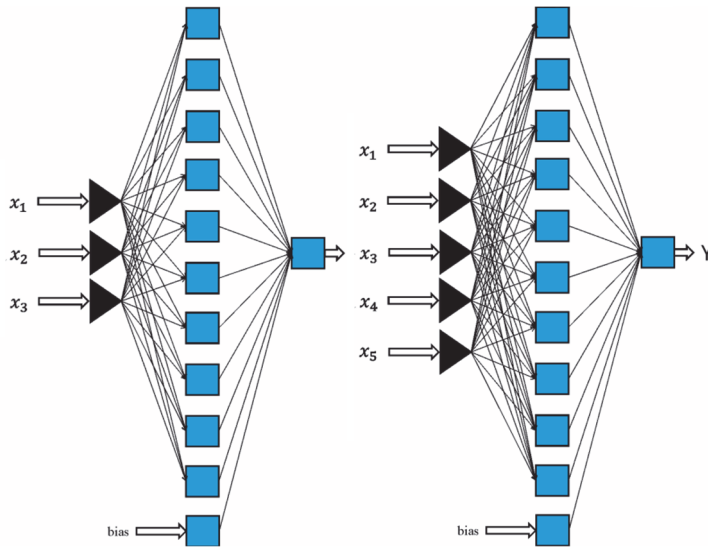


Figure 11. Cascade model consisting of two ANN

Source: own elaboration based on Ikeda, Hiyama, 2005, pp. 1597-1598.

5. Conclusions

In enterprises with advanced production technology and technologically complex products, the development of a parametric model is complicated because of a growing number of independent variables (cost drivers). The relationships between independent variables (cost drivers) and the dependent variable (cost) are very complex and difficult to describe mathematically. Cost engineers are not able to identify the relationship between a dependent variable (production costs) and the independent variables (technological parameters - cost drivers). The development of multi-dimensional cost function is extremely time-consuming, and sometimes impossible. Data sets which are necessary to build such sophisticated cost functions (multiplicity of independent variables, non-linear relationship) are in many cases inadequate for the use of the regression analysis. The advantage of parametric estimation of the production cost is the ability to use a reliable audit of specific procedures, working methods, mathematical equations (CER). ABB method is rather used for detailed budgeting costs. This method is based on the demand for cost drivers, necessary to implement production activities. The estimation of production costs with the use of ABB can be done when a product is well defined and understood. ABC methodology is not useful during the phase of a project development.

Neural networks do not eliminate all the difficulties associated with the use of parametric estimating of production costs. They provide the effective alternative to a traditional regression analysis, especially in situations of poor recognition of

technological and production relationships (CER) between cost and their drivers or in a situation of recognition of non-linear, multi-dimensional relationships between variables. This important advantage of neural networks is the reduction of the need to perform analyses of production technology. Neural networks eliminate the need to have deep technical knowledge of cost planners (cost engineers). From a practical point of view, the neural networks have the opportunity of analyzing a bigger number of cost drivers than the regression analysis.

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ECO-INDUSTRIAL PARKS AS A NEW APPROACH TO ENVIRONMENTAL PROTECTION

Witold Luciński*

1. Introduction

In recent years, the development of individual societies on a large scale is based on the assumption of realizing sustainable growth. Economic growth since dawn of history was the main objective of the communities stimulating their development. So narrow understanding of these issues, the only limited to economic issues led as a result to a number of negative phenomena. An example of this can be environmental degradation in many parts of the world, climate anomalies and so on. In recent decades almost worldwide, there are taken efforts to eliminate the consequences of past mistakes and to introduce new global rules of functioning of societies. The implementation of these ideas requires a parallel look at the issues of the development of societies, not only through the prism of economics. This is done by incorporating environmental issues into functioning of the industrial sector in the framework of industrial ecology. In this way, it realizes the modern approach to sustainable growth which allows to achieve the effects of the economic, social nature taking into account the requirements of the environment on a sustainable basis

One of the ways to implement these ideas is to create clusters called eco-industrial parks. This article aims at a brief introduction to the concept of the creation of these entities by considerations of a theoretical nature as well as by showing the four cases of the functioning such solutions.

The paper consists of five chapters. The first is an introduction defining the significance of the issues presented in the article for the contemporary world.

In the second one there are given various definitions of eco-industrial parks. Simultaneously the author described the place of eco-industrial park in sustainable development.

The chapter 3 focuses on issues related to the process of installation of a newly arising eco-industrial park. In general, two situations may occur. The first assumes the existence of a functioning (or excluded from functioning)

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post-industrial complex. Construction of the eco-industrial park will consist in making significant changes in working of the infrastructure, as required by industrial ecology. Great importance for development of the park will be the ownership of assets accumulated in a given area. In the second case we are dealing with a situation in which eco-industrial park is installed from the very beginning without having any infrastructure. In that case, the ownership of land intended for the construction of the park will be essential.

In the chapter 4, the author presents a brief description of the four selected eco-industrial parks differentiated in terms of size, range and scope of activity. One of them -Kalundborg- is very often presented in the literature, as a mature example of a successful experiment that inspired a lot of people and organizations to think in terms of combining the interests of environmental protection with economic success of the entire project. The others are rarely invoked, although there are also interesting from the point of view of the solutions on the cooperation of all stakeholders. Description is a result of a study trip of the author in the framework of the research team in the implementation of a research grant.

The last chapter gives a summary of the whole article with particular attention to the benefits that may arise after installing eco-industrial park.

2. The concept of an eco-industrial park

At the present time there is no uniform definition of industrial ecology. You can find many definitions that individual authors formulate appropriate to the needs of its publications. However, there are several basic features that the organization must meet to be able to define it as an entity following the requirements of industrial ecology. These include (Chertow, 2006; Chertow, 2012; Indigo, 2017; Worrell and others, 2009):

- the system is geared towards interactions between industrial and ecological subsystems,
- construction of eco-industrial park is accompanied by deep analyses of raw material flows between companies to create symbiotic chains,
- there appears a change from linear (open) processes to cyclical (closed) processes, so that the waste from one industry is used as an input for another,
- it is expected an effort to reduce industrial systems' environmental impact on ecological systems,
- the idea of making industrial systems should emulate more efficient and sustainable natural systems,

- it appears the engagement of traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water and by-products.

The ideas related to environmental protection existed in the consciousness of society for a long time. Their specific intensification was in the mid 90's. At that time it was decided to incorporate elements of ecology into issues related to modern management and organization of manufacturing processes. There has appeared even a definition of eco-industrial development in terms of protection against pollution, management that takes into account the influence of managerial decisions on the environment, promoting cleaner production and reducing resource use (Koenig, 2009, p. 6). In many countries the industry at a rapid pace undertook the work of rebuilding and restructuring of old industrial areas into new, differently structured zones. New approaches include inter alia adapting existing factory buildings to new tasks and installation of activities not poisoning the environment. The concept proved to be very attractive for the old industrial zones, as well as for organizers of new industrial areas. On this background began to appear more and more abundant eco-industrial parks (Koenig, 2009, p. 9).

One of the first definitions of eco-industrial park formulated by M.R. Chertow stated, inter alia, „(...) *The emerging field of industrial ecology demands resolute attention to the flow of materials and energy through local, regional, and global economies. The part of industrial ecology known as industrial symbiosis engages traditionally separate entities in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity. Eco-industrial parks are examined as concrete realizations of the industrial symbiosis concept (...)*” (Chertow, 2000, p. 314).

In relation to this definition, today's approach broadens the concept eco-industrial park by attaching to the issues of flow of goods problems of sustainable development including the resource-saving and environmental protection (Rehn, 2013, p. 8).

It seems that a fuller, more similar to today's realities of the functioning of eco-industrial parks definition brings another source. According to it eco-industrial park is a community of manufacturing and service companies focused on the common territory. The participants of such a system achieve enhanced environmental, economic and social benefits through cooperation in the field of environmental protection and resource management (Koenig, 2009, p. 4).

An additional aspect raises another definition. It is said in it that the necessary conditions for the proper functioning of the system, which is the eco-industrial park are primarily (Cavallo, 2013, pp. 266-267):

- feasibility in financial terms: the implementation of the eco-industrial park must be cost-effective, significant reduction of costs and expected revenue growth should be the result treated as a magnet for the others;
- local community and government should be interested in installing eco-industrial park in their area;
- there must be a common desire for cooperation between companies (tenants of assets gathered in a park).

In the above definition economic efficiency is thus elevated to a basic condition for the existence of the project, assuming (in default) that there exists consistent cooperation with the local community. It can be said that the concept of the eco-industrial park presupposes to mirror (in an industrial context) the inter-linkages and material flows observed between organisms in natural ecosystems.

Designers of such ventures must establish such a construction of an eco-industrial park, which to the utmost reflects in the economic and social life the perfection of solutions occurring in nature. So we can further assume that „(...) *Eco-Industrial park is a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues including energy, water, and materials. By working together, the community of businesses seeks a collective benefit that is greater than the sum of individual benefits each company would realize if it optimized its individual performance only*” (Lowe, 2000, p. 3). In a similar way eco-industrial parks are also defined in other contemporary literature sources (Heeres and others, 2004, p. 985; Lowitt, Côté, 2013, p. 343; Liwarska-Bizukojc and others, 2009, p. 733).

In summary, it can be stated that the primary purpose of eco-industrial parks is to improve the economic performance of companies participating in it while minimizing their impact on the environment. The main pillars of this approach are primarily an appropriate infrastructure (including flora), from the assumption cleaner production, protection against pollution, improving energy efficiency and cooperation between enterprises. In a broader sense, the participants and beneficiaries of such solutions are the communities adjacent to the park (Lowe, 2001, p. 1). It should therefore be further accepted that (Fleig, 2000, p. 3):

- there is extensive cooperation between companies, managing authority of the park and the local community (the participants of eco-industrial park);
- eco-industrial park participants are keen to realize the vision of this sustainable growth system, both in the economic, environmental and social dimensions.

It is often emphasized the requirement of geographical proximity of individual park participants. In many considerations, however, the existence of the so-called virtual park is also allowed (Agarwal, 2011, p. 16). In practice it means that the

participants may be geographically distant companies, but on a daily basis they actively cooperate with each other according to the rules in the aforementioned definitions (Cohen-Rosenthal and others, 1996).

3. Property ownership conditions vs. implementation of eco-industrial parks

Very often it happens that eco-industrial parks are formed in place of former brownfield sites. These areas have their history in the form of legacy resulting from the actions of previous owners, as well as entities operating in the vicinity of such facilities. Reuse of assets installed by previous generations often requires expansion or remodelling to adapt them to the needs of today. Particular attention should be paid to the risk of the existence of long-term contamination of the area. Their presence is highly likely, as in previous periods attention to these issues left much to be desired. On the other hand, infrastructure that is the legacy of past epochs has advantages in the form of more or less stylish architectural buildings, functioning traffic routes, energy sources, convenient transportation, other facilities and finally the local sentiment of society to object whose existence has often assured existence previous generations of region.

Separate issues in turn occur in a situation in which eco-industrial park will be built in the place where in the past was not conducted intensive industrial activity. According to the author shape of the evolution of brownfields towards eco-industrial park or new sites designated under its existence is largely dependent on the current ownership relations. From this point of view we can distinguish the following cases:

- installation of the park in an area where economic activity takes place in the present time on a regular basis;
- construction of the park in an area in which previously there was not significant industrial activity;
- transformation and revitalization of the existing complex of brownfields;
- limited revitalization of the industrial zone.

The criterion for distinguishing these cases is the ownership of the asset, based on which will be built and developed eco-industrial park. Contrary to appearances, the shape and success of this project will strongly depend on the ownership relations in the field of property intended for use as part of the park.

From this point of view, the first case is the most trivial. The owners of currently functioning industrial sites decide to reorganize the complex in the spirit of the implementation of the symbiotic chain having full domination over the functioning assets.

From this point of view, such a decision is no different than many other undertakings carrying short and long-term effects. Much more interesting are the three remaining cases, and they will be given attention in this chapter.

3.1. Construction eco-industrial park in a new location

The decision to build the park usually is an initiative of the local authorities. In principle there is no infrastructure, or it should be assumed that a site is poorly developed. The basis is the land paid as a contribution by the organizer eco-industrial park.

Newly-built park requires the identification of „core” of the system. In the next two models organizer of eco-industrial park meet the situation strongly defined by history. Some solutions are imposed in advance, while the others are excluded from the definition. In the discussed case, construction of such a system „in the middle of nowhere” means that we are dealing with a very creative project. The entity or institution around which you can start the construction of the park forms the core of the emerging system. For example, the kernel may be the existence or installation the entity that will be supplier of cheap, green energy. Such an object consequently becomes a „magnet” attracting or encouraging other potential participants of the park. The role of the organizer of the project would be their selection from the point of view of the analysis of the technological processes in order to create a symbiotic chains. Based on a network of technological links, the entire structure of eco-industrial park is being developed step by step, together with a network of organizational and financial links in the project.

The advantage of this approach is the ability to design eco-industrial park from the very beginning to the end. The choice of the „kernel of the system” determines, in some sense, the selection of the next participants selected in accordance with the pre-determined logic subordinated to the benefits of the whole project.

The advantage of this approach (the ability to work out the shape of the park according to one's own needs) is at the same time a source of problems. They arise from the fact that the organizer of the project will be forced to bear the organizational, investment and financial efforts alone. Starting from the proverbial „empty field” means that it is likely to belong to him:

- system design;
- finding or building a „kernel of the system”;
- seeking first potential participants and negotiations with them;
- carrying out the necessary investment works consisting in bringing to the area dedicated to the ecological industrial park the basic infrastructure in the

form of roads, power lines, water supply, not to mention the basic for starting the activity of buildings or other installations.

Such processes may last for a significant time contributing to organizational and financial tensions. Only after reaching a certain critical mass eco-industrial park has the chance to start automatically attracting new volunteers to participate in the venture, from which you can make a selection in terms of their suitability.

This approach is a long-term project that gives the organizer the effects over many years. The emergence of more participants and investors will allow him to fully realize the original intentions and it will be possible for him possible withdrawal from the investment.

3.2. Transformation and revitalization of the existing post-industrial complex

The leitmotif of this model is the fundamental transformation and revitalization of brownfield complex. It exists as a heritage after previous eras. It's a luggage that makes to the local authorities, or to the current owners problems with development or maintenance.

Frequently such brownfields belongs to the local authority. A thorough transformation and revitalization of the complex requires from organizer the total, or almost total ownership of land, buildings, constructions and installations. With this legal status organizer of eco-industrial park will be able to freely dispose of all elements of the property and make it available to entities interested in participating in the park on the basis of long-term lease within the symbiotic chain. In relation to the previous case, (i.e. the construction and organization of the park from the very beginning) situation is different. The time allowed for the installation of the park should be significantly shorter, and the process itself simpler. The owner of a post-industrial complex can use the existing (often quite considerable fortune) assets, and any possible work will consist in adaptations of old technologies to new needs. Furthermore, companies interested in participating in the park alone exhibit ingenuity in the use of the shared infrastructure. Therefore, the installation of tenants and bringing the complex to a state of the full operation should be significantly shorter than the previous model.

An additional advantage of this solution is related to the other arguments. One can imagine a situation in which the present owner (most often local authority) does not want to take the effort to maintain a post-industrial complex. Owner decides to close it, because there is no good idea to develop the object so far.

Apart from the cost of the demolition of construction, site remediation one should still have in mind the social impact of the liquidation of such facilities. Quite often they are associated with the history and traditions of the local community. Ignoring these facts in times of the promotion and creation of „small

homelands” it would be difficult to accept and implement such an idea. It should be assumed that especially in the case of one of the major stakeholders (local authority), which has inherited an unwanted complex, such thinking is dominant. What's more sensible re-launch of complex may reduce social problems (such as unemployment), economically activate the region, attract investors and tourists, and in the end help to increase local revenues in the long term.

Just as in the previously discussed case, the primary task is to plan system based on the „nucleus” of the system. In other words, it is necessary to have or create the leading value for the entire project such as a cheap source of energy, water mains, buildings, storage area networks, rail ramps etc. In accordance with a plan of creating a symbiotic chain to the already defined „kernel” you can gradually add new tenants with the obvious requirement to reorient their own processes focused on co-operation with already existing companies in the complex.

Such actions will only be possible if you have a full governance over infrastructure. Such a situation creates a very comfortable position to manage the plant, and this fact is a value in itself. An important advantage of this solution is the fact that this form of organization of the park does not require to have large liquid funds. In this model relatively early may arise income from rents for the use of infrastructure. The companies themselves quickly reach full production capacity, having at their disposal relatively easily achievable infrastructure.

You can imagine the situation of a lack of entities willing to participate in the symbiotic chain, or companies matching the profile of eco-industrial park. Even in such a case owner can provide for himself permanent access to cash. You can enable to the park tenants not related to the symbiotic chain, but obligatory satisfying a condition of doing business neutral for environment. Such a situation requires signing lease agreements for relatively short terms, optionally to conclude contracts which are easy to be cancelled.

3.3. Limited revitalization of the post-industrial zone

As in the previous case, the starting point is the already existing degraded, inactive industrial complex. The difference lies in the nature of ownership relations. The previous model assumed almost complete ownership of the properties belonging to the complex. In this case, the existing infrastructure, which is the basis for the park being created, is only to a small extent the property of the organizer of the idea.

Unfortunately, in Poland, this situation is very likely. Large industrial complexes have become a significant problem in the last decade of the twentieth century. Changing the model of functioning of the state from a centrally planned

economy to the market-oriented resulted in a gradual falls of large scale economic organisms (often employing thousands of people each) across the country. You could have met justification of this fact in mass media. Often it was used argument that in a developed capitalist economy there is no place for such large companies. As a result, in many places in Poland appeared inactive complexes of brownfields. Their owners, bankruptcy trustees or a local authorities were suddenly burdened by unwanted ballast and as a result they encountered big problems. In the absence of a developed vision of the further functioning of the immobilized complex they undertook numerous efforts to get rid of it as soon as possible. It is obvious that this was conducive to uncontrollable solutions. Possible buyers did not apply for large pieces of organized property. They, however, were only satisfied with small fragments of a dead infrastructure at the moment, meeting their small-scale needs.

Owners not seeing real opportunities for profitable sale of such a complex as a whole, resigned most frequently from long-term development plans concerning property for ad hoc solutions, however, resulting in the current inflow of cash. The result of this approach was a gradual and disorganized sale of assets to all appearing interested purchasers.

It is not difficult to guess that in relation to the previously presented cases described circumstances create the most problems. Taking as a starting point the possibility of a rational and efficient construction of eco-industrial park full ownership of its assets is crucial to the success of the whole project. While in the previous two cases, the organizer was an independent decision-maker as to the disposal of infrastructure, whereas in the present situation, the success of the project depends primarily on the quality and strength of persuasion in relation to the actual owners of fragmented parts of the assets of the former industrial complex. The current owners of individual parts of the complex some when undertook the decision to purchase them. And it was much earlier than they heard about the symbiotic chains. They certainly had their own vision of establishing and running their businesses. It is believed that they put a lot of energy and financial means in their projects. For these reasons, they are far less susceptible to environmental arguments. Additionally point of view of the organizer of the park is associated with the vision of a comprehensive restoration the entire complex for his own tasks.

As a result, the chances of successful construction of the park depend largely on the case, and happy coincidences. It is possible to imagine the situation when a symbiotic chain is created in a way that is not controlled by anyone. Companies operating within the industrial complex may spontaneously create a symbiotic chain i.e. production waste from subsequent companies can create the raw material for the following ones.

You can also expect that the change in the production profile suggested by the organizer of the park would meet the entrepreneur's needs. As a result, he would be interested in changing the current production profile, as under the changed circumstances he would find more favourable operating conditions for the future.

To consider is also the option of gradual repurchase the subsequent a part of assets from the current owners to return to the original ownership relations. Another solution would be to find attractive kernel by designers of eco-industrial park. The benefits for the individual entrepreneurs from accepting the organizer's proposal should, however, be significant for them. To achieve them, entrepreneurs might be willing to incur substantial inconveniences or they would be willing to revise their original objectives of their own functioning on a selected area.

Thinking realistically, however, in this model, the position of the organizer of the project is the weakest. Many decisions relating to organization and functioning of the park will depend upon the attitude of the current owners of individual parts of assets of the former manufacturing complex. Organizers of the whole undertaking will be often limited to perform advisory functions to promote only some of the ideas and solutions, but without the possibility of their effective enforcement.

4. Examples of functioning of eco-industrial parks

4.1. Kalundborg

Kalundborg city has 16,343 inhabitants (as of January 1, 2015). It is an industrial center located on the Danish Island of Zealand approx. 110 km west of Copenhagen. It works here seaport and numerous industrial companies. Symbiotic relationships were formed spontaneously (as opposed to most other parks today-functioning) for several decades solely on commercial terms. The first element of the system was a coal plant, which was established in 1959 (the core of eco-industrial park), and the second was refinery which was built two years later. It is estimated that the first works linked to the coordination of activities started in 1974 and ended in 1993. Our case is one of the most branded solutions, perhaps the most quoted and oldest implementations in the field of industrial symbiosis. Each of the companies located in the park is a tycoon in its sector in Denmark. Quite often, these entities have numerous international connections.

The focal point of the park is the coal plant Asnaes (1500 MW), which has a material and energy ties with the city. Surplus of thermal energy is transferred to heat 3,500 homes, in addition to the nearby fish farm, which, in turn, the biological sludge is processed into fertilizer. The water from the nearby lake is

used for cooling power. The water vapour produced in power plant is sold to the company Novo Nordisk, which is the manufacturer of medicines and enzymes and also to Statoil refinery. Reuse of heat energy reduces thermal pollution discharged into the nearby fjord. In addition, a by-product of the power plant is gypsum (FGD effect), which is sold to a nearby factory of plasterboard, which represents almost all of its needs. Definitely this reduces the demand for this raw material obtained by surface mining. What's more fly ashes and clinker from the power plant are used for road construction and cement production. A special role is played by the company Novoren, which not only collects waste from all the companies participating in symbiosis (these companies in return receive raw materials), but processes them or directed for further processing (paper, metals, glass). It also produces compost, biogas, fuel for power plant, electricity and aggregate. The role of the park in Kalundborg in industrial ecology was huge. Shortly after the announcement of the results of the implementation of the Kalundborg began searching symbiotic chains in 27 European and non-European countries (Rahman and others, 2016, p. 012). At the moment, we can distinguish 302 initiatives known as eco-innovations (Massard and others, 2014, p. 7). This number includes both eco-industrial parks, industrial parks with environmentally friendly initiatives in selected areas (but not meeting all requirements imposed on the symbiotic chain) and of the urban organisms called eco-cities (Massard and others, 2014, p. 7).

4.2. Hartberg¹

Hartberg is a small city (6.5 thousand, inhabitants) lying in the east of Styria (Austria). The organizer and manager of the entire project is one of the subsidiaries of the municipal company Stadtwerke Hartberg Verwaltungs GmbH, whose main task is the collection and disposal of municipal waste. Eco-industrial park called Oekopark Hartberg GmbH was founded in 1997 on the grounds of the abandoned brickworks previously owned by the city.

Park project is based on the local use of energy produced. The initiative also assumes the activity in several business areas such as cooperation between enterprises in the use of waste, entertainment activities for residents of the city (large format movies), popularizing and educational activities in the field of ecology, energy production mainly for the needs of the park by waste disposal and the use of renewable energy (wind and solar energy).

¹ The chapter is based on the author's own information coming from a study trip in the 2009 research theme and Liwarska-Bizukojc E., Bizukojc M., Marcinkowski A., Doniec A., *The conceptual model of an eco-industrial park based upon ecological relationships*, Journal of Cleaner Production 17, 2009, pp. 738-739.

The most important members of the eco-industrial park in Hartberg are three power plants which together form the centre of energy (Energiezentrale). Energy companies generate energy from renewable sources, including solar energy, biomass energy and heat generated from the combustion of biogas. This energy is supplied to companies of the park and the city of Hartberg at favorable prices.

Symbiotic relationships in the park revolve around the company manufacturing cellulose insulation.

It arises as a result of reuse of paper waste coming from the areas surrounding the park and from the town of Hartberg. Products of this company are in turn used by the manufacturer of wooden houses also located at the park. Wood dust generated during the production process of summer houses is in turn waste production passed back to the producer of insulation materials.

Subsequent enterprises belonging to Oekopark Hartberg operate mainly in the field of waste management. These include the Municipal Purification Plant and the company which specializes in the utilization of municipal waste. The first of the companies is engaged in the collection, segregation and disposal of waste from the city and the park. The organic part of municipal waste is the raw material for methane fermentation, by which biogas is obtained. Green waste from the city, among which a significant share of which are branches and grasses are processed into compost. It is enriched by sludge that remains after the methane fermentation. The compost is distributed in two ways. It is the subject of the commercial trade in goods, and sometimes the object of settlements with the citizens of the city. In the latter case it is part of the tied transaction. In return for the collection of municipal waste Hartberg's residents receive compost in a free.

The company specialized in the management of other municipal waste partially operates the park, and in part out of it. It is connected with segregation and recycling of construction waste, which are inert to the environment. Their landfill is located within the park. The company furthermore leads segregation of hazardous waste from households.

In addition to the above-mentioned companies operating in Oekopark Hartberg there are several service companies not directly related to any symbiotic and technological chain, such as the office of legal advice office, consulting firms, the editors of local newspapers.

Eco-industrial park has features of weakly centralized organization with a vision of the slow implementation more and more interesting ecological solutions in the future.

4.3. Valuepark®²

The next eco-industrial park is located in Germany in Schkopau near Merseburg (33.4 thousand inhabitants) in Saxony-Anhalt. Schkopau is a small city (3.5 thousand inhabitants). However, even before the war next to the town existed a huge industrial centre focused on the production of chemicals (built since 1933). After the war all the legacy was taken over by the GDR. They maintained and expanded the production profile of the entire chemical complex for several decades, without undue concern for the state of the natural environment. Privatization of the complex was made in the mid-90s of the last century. A company called DOW Olefinverbund GmbH in Schkopau was the acquiring company. This entity is 100% dependent on the US, a world leader in the chemical sector with the name DOW Chemical Company. Available data show that in 2008 the value of sales of the entire group reached 49 billion USD, of which „the German part” accounted about 4 billion USD.

In 1998, on the initiative of DOW Olefinverbund GmbH (hereinafter abbreviated DOW) was created eco-industrial park with the name Valuepark®, whose name was proprietary. It aims primarily to achieve good financial results, but also the development of cooperation between enterprises in conjunction with meticulous attention to the natural environment. Production complex taken from the German owners has undergone extensive modernization, for example:

- from the 3,500 factory and administrative buildings were left only 250;
- contaminated land has been rehabilitated (150 ha, in some cases up to several meters deep), and contaminated ground water is still purified. According to information from the company, this process is expected to last for the next 50 years;
- all technological connections with the „outside world” are carried out by a pipeline network (including connections to two ports in Rostock and Hamburg in about 500 km each). Economic and environmental considerations were behind these investments;
- well-equipped control centre has been installed in the field of environmental protection;
- outdated production technologies have been converted to healthier and more efficient. For example, as a result of the improvement of exhaust gas cleaning technology, the daily recovery of gypsum from CHP is 2300 tons;

² The chapter is based on the author's own information coming from a study trip in the 2009 research theme and from the web site. <http://www.dow.com/valuepark/about/index.htm>

- in the site it has appeared the scientific and research institution with the name Fraunhofer Institute (Merseburger Innovations- und Technologiezentrum Fraunhofer Pilotanlagezentrum) conducting research and design works, including pilot trials for partners of Valuepark®.

The concept of Valuepark® assumes that it is an entity which is to create new value for the plants DOW. On its grounds it is installed 15 companies legally and financially independent from the DOW. They have the status of investors in Valuepark®. They are mostly companies of the chemical industry. They deal with the processing of plastics, which are manufactured by DOW. DOW also establishes the principles of joining companies to the park. It therefore fulfils the role of centre of management. Enterprises most of the material supply (approximately 60%) obligatorily acquire from the DOW plants. Ultimately, about 25% of the products manufactured by DOW must be processed on the site, the remainder is transported by pipelines and further through the ports to customers all over the world. In addition, one of the tasks imposed on investors (tenants) is to work for DOW connected with the penetration of world markets. With these assumptions, typical in the world zero-one competition strategies turns into a win-win strategy.

DOW offers for current and future investors with Valuepark® the following benefits (available at cost price):

- effects of operation of industrial infrastructure, including electricity, steam with various parameters, natural gas, gases, water of different qualities, cooling water, compressed air and nitrogen;
- advice and support in obtaining permits from local authorities as well as bank loans and guarantees;
- services in the form of wastewater treatment, waste incineration, emergency services, security services work, health and the environment, fire services, quality control, rail transport and storage.

An important result of this cooperation is also shortening the supply chain between Dow and companies that convert their products. With a minimum distance from the primary producer co-operators are able to obtain a competitive advantage by reducing transport and storage costs. A huge role is given to the issues of environmental protection, health and safety at work. The program called „Vision Null” was introduced. Its implementation is a realization of the postulate of the total elimination of pollution and accidents. The result is a very low number of accidents at work, as well as compliance with all applicable environmental standards.

The company does not enter into retail operations. Its role is to manufacture various components used in the chemical industry and their mass sales. It was found that entering the retail business de facto boosts the cost of functioning of the company. This resulted in a cheap and flat organizational structure.

4.4. Port Rotterdam³

The port of Rotterdam is a huge organism which constitutes one of the largest ports in the world. It covers 10 thousand hectares, half of which is land managed by the company Rotterdam Municipal Port Management (RMPM). This is a port for ocean-going vessels stretching 50 km inland along the Rhine. The total tonnage of transhipped goods amounts about 370 million tones. Crude oil for five refineries processing 100 million tons of oil annually, chemicals (for over 30 plants) are the main handled goods. Together these companies occupy about 60% of the land and the port gives directly 14 thousand and indirectly 66 thousand jobs. The Port of Rotterdam creates good conditions for businesses to recycle waste, by-products and energy in their mutual relations. It has been implemented several projects including project called INES (Industrial Eco-System), which was implemented in the western part of the port. Its initiator was a business association called Europort/Botlek Interests Industry Association. It arranged implementation of Environmental Management Systems (Environmental Management System – EMS) with the participation of 69 member companies. The works involved the members of the board of the association mentioned above, the President of the institution which is the communication platform in environmental matters in Rotterdam and academic staff of the Erasmus University. INES was introduced in order to stimulate the development of the concept of „cleaner production”, the analysis of network links activities of enterprises and their flow of raw materials and energy. An important aim was also to create infrastructure for the information base in order to facilitate the functioning of eco-industrial park in the region. The works were multi-stage. The first project INES Project covered the years 1994-1997, and then INES Mainport Rotterdam implemented in 1999-2002. The last project was the Rotterdam Harbour and Industry Complex (HIC) implemented in 2003-2007. The following sequence of involvement of stakeholders took place within INES:



The process was not structured and depended largely on the human consciousness. The work was conducted by leaps and bounds, which resulted from revealing the difficulties of political and jurisdictional nature. Stakeholder participation when installing eco-industrial park is presented in Table 1.

³ The chapter is based on the author's own information coming from a study trip within the research theme in 2009.

Table 1. Roles of stakeholders in the formation of eco-industrial park INES in Rotterdam

INES	Initiator	Managers	Consultants	Activity executors (non-financial))	Financial Participant s in the Project
Local Government					+
Regional Authorities					+
Central Authorities			+		+
Chamber of Commerce			+		
Enterprises				+	+
Business Associations	+	+		+	
Educational Institutions			+		
Consulting Agencies			+		

Source: own study based on: (Agarwal, Strachan, 2006).

More than \$100 million has been spent on the project INES, the annual financial effect is estimated at more than EUR 16 million (2008). On an annual basis the environmental benefits are the following savings:

- 157.6 MW of energy,
- 151.2 M Nm³ of gas per year,
- 272.5 kilotons CO₂,
- 225.6 tons of NO_x,
- 158 MW of hot water,
- other additional savings in the use of resources.

5. Conclusions

Eco-industrial park is an organization that assumes compliance with Industrial Ecology guidelines. It should be a dynamic system in which human activities are carried out in a sustainable way. By installing eco-industrial park in parallel you can achieve many advantages, such as (Huber, 2012, p. 3):

- the ability to achieve savings and generate new revenue through access to cheap services (eg. energy sources), regulatory facilities (within the decision policy of local authorities interested in the existence and operation of such organizations in its area), increased competitiveness in relation to the

outside world (access to cheap sources of supply based on the use of by-products);

- in the area local authority obtains cleaner production and as a result a healthier environment, installation in the park new businesses, reduction of an unemployment and social problems, and finally liquidation of the eternal conflict between industrial development and environmental protection;
- local authorities have the possibility of obtaining increased tax revenues, the development of eco-industrial park favours the elimination of pressure on the development of infrastructure that otherwise would have to be generated by own local government activities, in many cases disappearing costs of environmental protection and health of citizens;
- the environmental benefit consists in reduced demand for non-renewable resources, reduction of local and global pollution, increased use of renewable energies and materials, and overall reduction in the devastation of natural systems.

Thus, the eco-industrial park assumes the co-operation of three stakeholder groups (companies, local authorities and environmental institutions) in the area of refining the raw material-process-product chain. The former, developed over the centuries model of human activities was very wasteful, because it was assuming unlimited access to factors of production. Hence the multiplicity and great scale of the accumulated and still produced by-products.

The eco-industrial concept that implements institutional and legal requirements, based on credible environmental performance measurements, together with the positive financial results of the project, will certainly meet the requirements of a new environmental approach in the future.

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SPECIFICS IN DETERMINING THE INITIAL MEASUREMENT OF PUBLIC WORKS CONCESSION ACCORDING TO THE NATIONAL ACCOUNTING STANDARDS IN THE REPUBLIC OF BULGARIA

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1. Introduction

As of 18 April 2014, the Directive 2014/23/EC of the European Parliament and of the Council on the award of concession contracts [1] has become effective. The Directive is part of the package of legislative changes associated with the reformation of Community Law in the field of public procurement and concessions. In this connection, a new Law on Concessions [2] was presented to the Parliament of the Republic of Bulgaria, which was adopted at second reading on 24.01.2017. The diverging comments on whether the Law is consistent with the Directive and the national interests provoked the imposition of a veto on the Law by the President Rumen Radev on 02.02.2017. The major concerns connected with the adoption of the new law are associated with a change in the duration of concessions – the draft introduces an opportunity for „eternal“ concessions and the privilege of obtaining „reserved concessions“, provided that they are connected with the implementation of programs for creating sheltered employment to people with disabilities or disadvantaged people. President's arguments are the „wide margins of subjectivity, opportunities for corrupt practices and decision-making causing injury to the public interest“ [3]. Public works concessions, from an accounting perspective, create opportunities for design and building on public territories. The right to exploit/operate obtained by the concessionaire (operator) should be reported as an intangible asset. As a result of this right, the concessionaire generates revenue from provision of services through the construction or performance of other business activities with the construction.

According to *AS 38 Intangible Assets* [4], intangible assets are initially measured at cost. The cost comprises the purchase price, import duties, non-refundable purchase taxes, and any directly attributable costs of preparing an asset for its intended use. The latter include legal professional and other fees. The initial

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measurement of concessions as externally acquired assets should involve the amount paid for the acquisition of rights, the non-refundable taxes for the rights transferred, and any fees for legal, marketing and other professional services. The acquisition cost so determined is deemed to be a reliable evaluation of a concession. Another aspect inherent in the definition of an asset is the control over the resource. An entity exercises control over a resource if it has the right to obtain the future economic benefits flowing from that resource and to be able to restrict the access of others to those benefits. Entity's control over a concession comes from the awarded sole beneficial right to maintain and exploit/operate the subject of the concession by the state or municipal authority, which has organized and conducted the concession granting procedure. For the right to exploit/operate the subject of the concession awarded to an entity, the contract may provide an obligation for the concessionaire to effect minimum annual concession payments for the period of concession according to procedures and arrangements and time limits specified in such a contract.

The recognition of a concession for the purposes of accounting requires that it should meet the following threshold criteria:

- It should be an identifiable non-monetary asset acquired and controlled by the entity,
- It should not have physical substance (although the medium of the asset might have a physical substance),
- It should be measured reliably on acquisition,
- It should be of substantial significance in its use,
- Future economic benefits should be expected from its use.

The recognition of a concession for accounting purposes requires that it should correspond to the definition of non-current intangible assets in line with the applicable accounting standards, as well as with the recognition criteria, that is to say:

- Identifiability of the asset,
- Control on behalf of the entity,
- To receive future economic benefits,
- To be able to reliably measure (evaluate) the cost of the asset.

An entity may recognize a concession contract as a separate intangible asset if it meets the requirements of *AS 38 Intangible Assets* [4] as an identifiable non-monetary resource without physical substance, acquired and controlled by an entity, which originates from contractual rights. The standard offers a classification of intangible assets in a separate group „concession rights acquired according to the respective statutory arrangements”. In contrast to the international accounting standards [5], where the notion of *identifiability* is used, the national legislation uses another notion – *determinability*. *Determinability* makes it possible to

determine the relationship between a distinct intangible asset and the inflow of economic benefits from this asset. If the expected economic benefits originate from a group of assets and can not be differentiated, then the identification of an asset becomes possible on the grounds of:

- The rights held by an entity over an intangible asset as distinct from other assets,
- The possibility for an intangible asset to be taken out of the entity separately from the remaining assets.

Unlike identifiability, determinability [5], as a characteristic of intangible assets, is the possibility to distinguish an intangible asset from goodwill. This differentiation is possible when an asset is separable. In other words, the entity may rent it out, sell it, exchange it or distribute it individually and not in combination with other assets. However, separability is not an obligatory condition for identifiability. Future economic benefits may arise from the synergy between the identifiable assets acquired or from assets that do not individually qualify for the recognition in the financial statements. An asset can be identifiable also when it generates economic benefits only in combination with other assets, provided that the entity is able to identify the inflow of the future economic benefits from it. The identifiability criterion is met when an asset [5]:

- Is separable, i.e. can be separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, identifiable asset or liability, regardless of whether the entity intends to do so; or
- Arises from contractual or other legal rights, regardless of whether those rights are transferrable or separable from the entity or from other rights and obligations.

The determinability is at hand with regard to concessions because the future economic benefits from them arise from the immediate exploitation/operation of the subject of concession.

Control on behalf of the entity. The concession holding entity ensures its control through conclusion of a concession contract for the purpose of obtaining the right to operate the respective subject of concession. The right to exploit/operate is held by the concessionaire and the concessionaire obtains the economic benefits during the period of use.

Obtaining future economic benefits. The economic benefits flowing from the concession held is the consideration consisting in the right to exploit its subject or in that right and compensation on the part of the concession granting authority. The nature of consideration depends on the type of concession – public works, service or extraction.

Ability to reliably measure (evaluate) asset's cost of acquisition. Depending on the terms of acquisition, concessions, as intangible assets, are referred to the group of externally generated fixed intangible assets and their initial measurement shall include the purchase price (including taxes) and all directly attributable costs of preparing the asset for its intended use (for example, building a laboratory for examining extraction material, preparation of the terrain, etc.). There are specific guidelines in the national standard concerning the accounting treatment of the initial measurement of intangible assets under the conditions of deferred payments on a variable basis. An example of concession acquisition is presented, which serves as an applicable example of reporting the variable basis component in the acquisition price of an intangible asset. In this case, the variable basis may be associated with a forecasted quantity of output, inflation-indexed estimated revenues, minimum employment wages for the region, etc. The difference between distinct payments and the initial (estimated) evaluation, according to the national standard, should be booked as current financial expense or revenue in the period in which incurred. A similar specific text concerning deferred payments on a variable basis does not exist in IAS 38 Intangible Assets [5].

From the standpoint of accounting, a concession (concession right) is regarded as an intangible asset acquired and controlled by a concessionaire for the purpose of obtaining future economic benefits. It is assumed that the concessionaire holds the right to exploit/operate assets owned by the state, a municipality or a public partner. A concessionaire does not possess material assets subject of public-private partnership, such as mines, quarries, roads, airports, parks and others, but it owns a specific type of rights over them, which allow obtaining economic benefits. These particular benefits should be presented as an intangible resource, which increases entity's property.

In Bulgaria, concession rights have been arranged in a special law – the Law on Concessions [6]. The currently effective law has not been made consistent with Directive 2014/23/EU yet. As provided in the law, ***a concession is a right to exploit an object and/or a service of general interest, conceded by a concession granting authority to a capital company concessionaire, against concessionaire's obligation to construct and to manage and maintain the subject of concession or to manage the service at concessionaire's own risk.*** [6]. A concession is granted on the basis of a long-term agreement in writing involving a particular material interest, concluded between the concession granting authority and the concessionaire.

The subjects of a concession right are the concession granting authority on the one hand and the concessionaire on the other hand.

The concession granting authority is the body awarding the concession right. It can be: the Council of Ministers – in respect of state concessions;

Municipal Council – in respect of municipal concessions; public organization – for public concessions; the Council of Ministers, the respective municipal council and/or the body of the public organization – for joint concessions. The concession granting authority for the subjects owned by a public organization, where the state and/or a municipality own one hundred per cent of the equity, is the respective minister and/or municipal council. The accounting information of the concession granting authority is generated in conformity with the requirements on the generation and presentation of information in the public sector. Fixed assets that are built, reconstructed or modernized (roads, airports, playgrounds), as well as the revenues from services obtained, concession fees (royalties) and cash equivalents obtained, are reported by the concession granting authority.

Concessionaire is an entity, which has been awarded the concession rights. Such an entity can be a *capital company*, *project company* (a group set up for the purpose of applying for award of concession rights) or a *public private company* (newly established capital company in which partners or shareholders are the tenderer appointed to be the concessionaire (private partner) and the state, the municipality, the public organization and/or a public enterprise (public partner) [6]. The concessionaire shall account for an intangible asset – the concession rights, current revenues and expenses, as well as cash and cash equivalents associated with the implementation of concession activities. Each one of the parties generates accounting information. Concession rights, being an intangible asset, shall be recognized and accounted for by the concessionaire, who derives the long-term economic benefit from the right to exploit/operate the subject granted to it.

The word „operator” is used in the accounting standards [5] instead of „concessionaire”. A financial or an intangible asset can arise for the operator, (see Fig. 1).

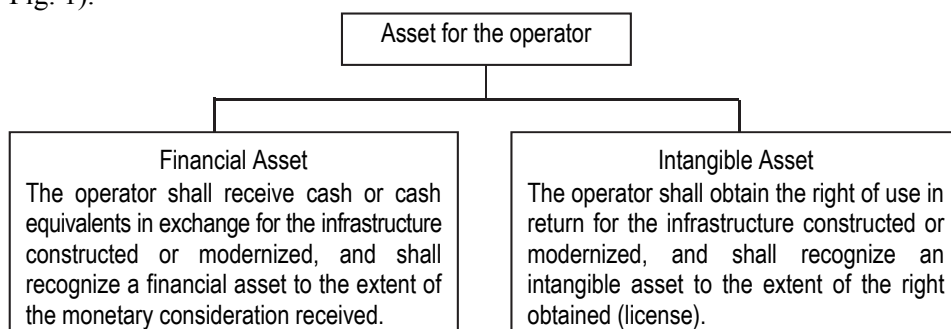


Figure 1. Types of assets that can be recognized with regard to operators¹

Source: prepared by author.

¹ The concession rights in Great Britain are regarded as licensing rights.

The effect of the recognition of an intangible or financial asset is reflected in the accounting system of the operator in different correlation (see Table 1).

Table 1. Consequences of assets recognition by the operator as a result of a concession contract

Model	Financial asset		Intangible asset	
	Construction phase	Exploitation phase	Construction phase	Exploitation phase
Effect in the separate phases				
Revenues	Large	Small	Large	No revenues from the service
General costs	Large	Small	Large	Large
Net revenues	Large	Small	Large	Large
Non-current assets /intangible assets	Small	Small	Large	Large
Capitalization of borrowing costs	Small	Not applicable	No changes	Not applicable

Source: Khatri, J., A. Master, *Bombay Chartered Accounting Journal*, December 2010.

2. Nature of public works concessions from the standpoint of accounting

The main spheres in which concession rights are granted in Bulgaria are the spheres of construction, services and extraction. Thus, the three subjects of concession rights have been differentiated:

- Public works (construction) concession,
- Service concession,
- Extraction concession.

Public Works Concession has as its object the building of the subject of a concession, management/operation and maintenance of the said subject after its commissioning. As of the commissioning date, the subject that has been built becomes property of the concession granting authority, while the right to exploit/operate it and receive a consideration for that right is reserved for the concessionaire. The construction and/or expansion and/or reconstruction and/or rehabilitation of the subject of a concession at concessionaire's risk is a condition for its implementation in this type of concession. Public works concessions in Bulgaria are differentiated from services concessions. According to the author, public works concessions in Bulgaria represent those described in *IFRIC Interpretation 12 Service Concession Arrangements*. The Bulgarian legislator has introduced a different meaning in the notion of „service concession“ (servicing) – management of a service of public interest at concessionaire's risk. Construction (public works) is not included in service concessions.

When speaking of public works concessions, it should be explained that the intangible asset booked by the concessionaire makes up its price of the costs for building the infrastructure item. These are the actual investment expenses made by the concessionaire. Any associated expenses – monthly fees and others, which the concessionaire is liable to pay to the concession granting authority, are treated as current expenses.

A typical aspect of public works concessions is that the concessionaire carries the concession right, only the construction completed, as an intangible asset. The remaining concession payments specified in the contract are accounted for as current expenses of the operator.

The accounting treatment of the relationships between the two parties (the grantor and the operator) reflects two phases – a **construction phase**, which involves design, building/reconstruction and modernization, and an **exploitation/operation phase**, which implies the provision of services or other business activities with the asset, which is the subject of construction.

In the first phase, the operators face the question what kind of asset they should recognize in their statements – an intangible or a financial one, while in the second phase – what kind of revenues or expenses, respectively, associated with the services provided they should recognize, and what kind of basis they should use. In the general case, in terms of accounting, a building, a highway, a rehabilitation center, an airport, or another object should be accounted for in the entity, which controls the asset and derives the benefits from such an asset as a fixed assets, but in a public private partnership the control, the risks and the benefits of a given asset are often allocated between the public entity and the private partner. The complex relationships also give rise to problems associated with the recognition of an asset held by the private partner. The guidance provided in *IFRIC Interpretation 12 Service Concession Arrangements* concerns only the part of the relationships in which the infrastructure remains property of the public entity. Regarding the forms of public private partnership where the private partner becomes owner of the subject, it recognizes an asset according to the provisions of *IAS 16 Property, Plant and Equipment*.

The public works concession, in the second phase of the contractual period, actually constitutes a service concession. In this phase, the operator should record revenues, as a result of rendering a service with the asset built or other business activities performed. The accounting should also be consistent with *IFRIC Interpretation 12 Service Concessions Arrangements*. Most frequently, limited property rights ceded for the usage of state and municipal facilities are classified as public works (construction) concessions in Bulgaria.

3. Approaches used to determine the consideration under public works concessions

There are different approaches used in the practice to determine the concession consideration in public works concessions. The definition of a concession consideration is a component of utmost importance, because it exactly is the equivalent of the amount of the initial price of an intangible asset of the type “Public works concession rights”.

- ***First approach***

The initial measurement of a public works concession most frequently consists of two components: initial fee (usually it is a fixed amount) and an abstract component of an annual consideration calculated as a percentage of concessionaire’s gross revenues from the operation of the subject of the concession. It is typical for public works contracts that usually a grace period is provided, during which the concessionaire is exempt from paying a consideration, since the amount of the investments the concessionaire makes during that period is quite substantial, while the returns could be expected only in the reporting periods to come. Nevertheless, when the concession granting authority defines the consideration conditions, it often takes a cautious approach by including also a clause on the minimum amount of the annual consideration not linked to the revenues. The annual consideration is associated with a certain percent of deductions from the revenues in favour of the concession granting authority, however not less than a specified fixed amount. In the situation as the one herein laid out, it is a common practice for the enterprises to include the component of the intangible asset’s price only to the extent of the initially fixed contractual price.

- ***Second approach***

The concession consideration is equivalent to the right to exploit/operate the facility after its construction.

The construction and exploitation of a sports complex on a municipal land in Varna Municipality could serve as an example of a concession consideration equivalent to the right to exploit/operate a facility. [7].

A question arises in this case as to how the value of the right to exploit the facility will be measured. The author considers that, after the completion of the construction works of the sports complex, the accumulated amount for the construction of the facility should be booked by the concessionaire as an intangible asset with an amortization period equal to the period of exploitation of the contractual right. Naturally, the concession granting authority will book the respective sports complex as a affixed asset as soon as it obtains the completed asset. There is a variation of this approach – the asset constructed at concessionaire’s

expense becomes its property upon completion. In this case, first an intangible asset would be recorded, which will be accepted and approved by the concession granting authority and after that this asset will be transformed into a fixed asset in the concessionaire entity. (South Africa does not allow any ownership transfer of public interest assets to concessionaires. Thus, the strategic infrastructure facilities always remain property of the state. In our country, there are many examples of privatization of strategic facilities that have consequently been plundered and destroyed.) This case is rather theoretical, since facilities that are public state/municipal property are designated for concession.

- ***Third approach***

The concession consideration is equal to the fixed monthly consideration with right of use.

An example of a concession consideration equal to a fixed monthly consideration with right of use is the construction of public transport bus stops on municipal terrain in Sliven Municipality. [7]. With a determined fixed monthly consideration, the initial price of the intangible asset has to be equal to the sum of the fixed annual fees, and the term of the concession contract should also be the intangible asset's amortization period. In this case, there is no significant difference with regard to the amount of the costs recognized in the current financial result for the corresponding year, because the amount of intangible asset's amortization costs will be equal to the amount of the concession costs recognized as current expenditure. Even so, the author recommends that an intangible asset "concession right for construction" is booked, because in this way, the information will be presented not only in the Statement of Comprehensive Income, but also in the Statement of Financial Position (Balance Sheet) of the respective concessionaire entity. The users would obtain a more precise information as to what the value of the concession as an intangible asset is, as well as explanatory notes on the residual value of the concession right.

As in the second approach, a compilation between a public works concession and services concession can be observed here as well. Often concession facilities are presented by upgrading, developing the initial effect of the concession in the subsequent service contract. It is exactly in this later stage that the concessionaire might derive more substantial economic benefits, because it offers services on the grounds of an infrastructure that has already been built.

Interesting is the question as to how the subsequent right of use would be measured in the third approach. The value of the right of use is covered by the initially formed price of the intangible asset „Concession right for construction”. The arguments in support of the statement are mostly associated with the time span. In this particular example, the construction of bus stops can be accomplished within a month. After that, it is more likely that an ongoing maintenance of the

bus stops is performed as well as payment of the concession consideration, i.e. the right of use continues longer than the right to build, and this is the reason why it is at the bottom of determining the initial evaluation.

- **Fourth approach**

The concession consideration is equal to the fixed one-off consideration.

The initial price of such a right is equal to the one-off consideration. The amortization period of the concession right in this case will be equal to the concession contract term as well. A practical example of this type of consideration is the construction of a sports tennis complex on a municipal terrain in Gotse Delchev Municipality. [7].

Some actually concluded concession contracts applying the approaches specified above are indicated in Table 2.

Table 2. Concession contract concluded by applying the respective approach

Subject of the public works concession	Methodology chosen for the concession consideration	Time limit	Chosen approach
1	2	3	4
Construction and operation of a ski zone, Bansko	One-off sum – 10 thousand BGN.; 3 years grace period; annually – percentage of the profit according to a methodology between 2 and 3,5%. Environmental obligations – 5% of the annual concession consideration for the National Fund of Environmental Protection at the Ministry of Environment and Water	30 years	First approach
Construction of “St. George” City Park , Dobrich Municipality	One-off payment – none, 1 year grace period; annually – an inflation-indexed amount of 500 BGN is added	20 years	Third approach
Construction of Mladost Sports Complex, Varna Municipality	The concessionaire is not bound to pay a concession consideration to the concession granting authority. The concession consideration consists in concessionaire’s right to operate the subject of the concession after its construction and commissioning.	30 years	Second approach
Right of use over Druzha Cinema Complex, Haskovo Municipality	The annual concession consideration is to the amount of 12 000 BGN.	25 years	Third approach
Right of use over the urban velodrome and tennis courts in the public garden of the town of Sliven	Annual concession consideration to the amount of 8770 BGN, VAT exclusive, with one year’s grace period.	25 years	Third approach
Right of use over "Svishtov Port Terminal" from the	One-off concession payment to the amount of 600 000 BGN, payable prior to concession agreement becoming effective; annual concession	31 years	First approach

"Port for Public Transport of National Significance - Ruse"	payment consisting of two portions as follows: a) a fixed portion of the annual concession payment to the amount of 207 000 euro; b) a variable portion of the annual concession payment to the amount of 25 % of the increase of the total amount of gross revenue for the current year from the port services compared to the approved basic gross revenue to the amount of 1 140 000 (one million one hundred forty thousand) euro. The fixed portion amount of the annual concession payment is indexed every five years of the concession's period according to the consumer price index cumulatively for the five-year period.		
Partial construction, operation and maintenance of Plovdiv Central Railway Station, concession granting authority – the then Ministry of Transport, Information Technologies and Communications	For a period of 4 years during which the concessionaire will accomplish the activities concerning the partial construction of the subject of concession, the realization of investments and commissioning of the buildings. The fixed concession payment is to the amount of 290 000 BGN, VAT exclusive. After completion of the activities concerning the partial construction of the facility for the entire period of concession, the annual concession payment consists of two portions: a) a fixed portion of the annual concession payment to the amount of 412 000 BGN VAT exclusive and b) a variable portion of the annual concession payment – to the amount of 16 per cent of the increase of the total amount of gross revenue from all activities for the current year and exceeding the basic revenues of 1 812 000 BGN, VAT exclusive, associated with the management, operation and maintenance of the subject of concession following the commissioning of constructions.	35 years	First approach

Source: prepared by author.

Various approaches have gained ground in the practice concerning the measurement of concession consideration for construction. Each of them has its reasonable grounds and is suitable for a certain infrastructure, certain geographical region, respectively.

It is notable that no significant infrastructural facilities have been implemented by means of public works concessions in Bulgaria. Politicians should direct the investment policy of the country to broader application of the various forms of public private partnerships for the purpose of more successful implementation of projects connected with the construction and operation of strategic infrastructural facilities such as ports, airports, highways, sports complexes, care homes for disadvantaged people, etc. Apart from the Law of Concessions,

there was another law adopted in the year 2012, namely the Law on Public Private Partnership [8]. Different models of PPP might successfully be applied, but this requires good planning, good estimation of the value of investments and clearly defined accounting treatment rules in the implementation of partnerships between the public sector and business.

4. Conclusions

✓ The recognition of concession rights has to be accomplished with adherence to the recognition criteria for intangible assets – identifiability, control, expected future economic benefits.

✓ When accounting for concession, it is necessary to observe the applicable legislation and to think about a systematization of the legal regulation of accounting treatment in a single regulatory act. No national accounting standards regulating the accounting treatment of concession transactions are available in Bulgaria.

✓ Different methods and approaches are applied upon initial measurement of concession rights, which is subordinated to the subject of the public works concession contract.

✓ There is such a malpractice in Bulgaria to regulate financial relationships by special laws – no accounting standard has been issued, but there is a regulation in the Law on Concessions [6] and the Law on the Public Private Partnership [8].

✓ In author's point of view, concession relationships are part of public private partnerships and should not be arranged in a separate law, but they should rather be part of the rules set out in the Law on Public Private Partnership.

✓ The contracts for public works concessions and service concessions should be integrated instead of being regarded as a distinct type of concession agreement, because usually construction precedes the provision of services, or the contract concerns only provision of services.

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MANAGEMENT OF TECHNOLOGY IN THE PROCESS OF BUILDING COMPETITIVE ADVANTAGE OF THE FIRM

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1. Introduction

Technologies and advanced technologies in particular are becoming more important factors that shape competitiveness, effectiveness and efficiency of private and public enterprises, government institutions and economy in general. Successful development and implementation of advanced technologies require careful consideration not only to scientific and engineering advances and resulting capabilities, but also to human resources, raw materials, financial feasibility, and a competitive environment. Appropriate consideration of each of these factors requires conscious choices and actions. Achieving an appropriate balance among these factors is an increasingly important problem for modern managers, it is a issue of technology management that address this issue. The common understanding is that there is a substantial room for improvement for the techniques and expertise in the field of technology management, that are being utilised by business units and public institutions.

Competences in the field of technology do not come by itself, nor can it be simply bought as goods out of the stock, acquired through a new business, or a prominent scientist or a skilled engineer. This unique knowhow and expertise is acquired through tedious process of information gathering that takes place over time, accompanied by successes as well as mistakes and wandering in blind alleys. And knowledge acquired with such difficulty must be collected and systematized so that it can also be used by other employees in the enterprise – in the form of procedures, patents, databases, etc. (Pavitt, 1991).

The concept of technology management, by all means, should not be limited to research and development activities regardless the level of economy (public or private), it embraces the coherent set of activities starting from understanding the technological challenge and ending with appropriate implementation of the particular technology.

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The main purpose of this paper, alongside bringing up the issue of technology management, is to identify various aspects of the technology management process and identification of the drivers for the increasing importance of technology management in the modern world associated with the development of technologies and elements of artificial intelligence.

2. Management of technology, definition and identification of key elements

The term management of technology comprises the process of technology development, implementation, and diffusion in various types of organisations. The U.S. National Research Council in Washington, D.C., defined management of technology (MOT) as linking „engineering, science, and management disciplines to plan, develop, and implement technological capabilities to shape and accomplish the strategic and operational objectives of an organization” (National Research Council, 1987). The crucial element of successful MOT is related to the optimum decisions making and their implementation in various types of public and private institutions. Technology management process is vitally important to firm competitiveness. MOT process in order to be most effective and efficient ought to complement the overall strategic framework adopted by the firm. The strategic management of technology aims to create competitive advantage by merging technological opportunities with the general business strategy. Management of technology is also defined as a set of concepts, skills, techniques and practices resulting in decision-making and implementation in relation to the development and use of technology by firms and ultimately aimed at succeeding in innovation and increasing firm’s competitiveness.

The proper understanding of technology management function requires adequate distinction between MOT and research and development function of the firm and management of R&D in particular. Management of research and development activities is, in the first place, concerned with organization of company’s research facilities and with the process of new technology creation. Management of technology is more related to the connection of technology and business, it embraces technology creation together with technology acquisition, application and the overall impact of the new technology on the firm. Michael Bigwood suggests that New Technology Exploitation (NTE), conceptually rather close to MOT paradigm, is located somewhere between R&D and New Product Development, with emphasis on the cyclical learning process of scientific discovery and the more defined and linear process of product development (Bigwood, 2004).

It is recognized that further to the constitution of technology management concept, a new profession, known as the technology manager, emerged. A person who combines unique skills in technology and management, technology manager is well familiar with company strategy and how technology should be used to achieved company goals.

2.1. The phases of technology management process

The technology management process consists of several successive phases. The relatively comprehensive concept of management of technology comprises several mutually interconnected set of activities, that include (UNIDO&ICS, 2002):

- Sensing and understanding signals to change. The essence of this stage is about understanding the upcoming changes in the marketplace and technological challenges that are taking place in the environment. The key element of this stage include: the necessity of innovation, understanding the change, problems related to technology, building and utilising appropriate set of tools
- Development of technology strategy. That focuses on how to develop the appropriate technology strategy thought proper strategic analysis and strategic choices and planning in relation to technology. The key elements of technology strategy include analysis and understanding of signals and potential threats and opportunities related to the technological change, the knowledge and expertise on how to choose between deferent potentially available options, how to plan, acquire and implement selected technologies.
- Acquisition of technology. This stage tackles and emphasises the identification and assessment of deferent routes of technology acquisition in association with is need for the implementation of technology strategy. The important element of technology acquisition is related to identification of benefits and potential traps and problems related to deferent technological options. The key elements include identification and selection of appropriate option of technology acquisition (internal, external and mixed) in conjunction with proper understanding of company potential, its development plans, key cost and profit issues. On top of this risk factors are also important at this stage.
- Implementation of technology. This module stresses the difference between technology acquisition and implementation. Technology acquisition is related to formal transfer of ownership rights whereas its implementation is concerned with proper utilisation and profits (benefits) generation on the basis of the given technology. The key elements of this module include: design and concept of technology implementation, identification

of problems and obstacles related to implementation process, proper utilisation and management of work force and team work, parallel implementation, management of change and project launching. The technology implementation is, in contrast to previous phases, relatively less theoretical and more practically oriented on the technology initiation process.

- Learning how to improve management of technology is mainly devoted to a review of the ways of acquiring knowledge about the technology management process. Learning how to enrich knowledge and capacity in this area is twofold: (1) increasing and improving technological potential, (2) developing more effective management of the process of technological change. This module concentrates on three main learning topics: (1) general learning process and the need to shape and develop a comprehensive learning cycle, (2) specific tools and techniques to facilitate learning based on technology management projects, (3) mechanisms enabling the realization of the project.

Successful implementation of technology management process within a company requires careful appreciation and understanding of managerial and technological function from the point of view of firm's main strategic objectives. Process and product innovations comprehended within the MOT function of a company should result with its increased competitiveness in the market place.

The term management of technology is closely related to two concepts, that is the issue of management and technology. The understanding and definition of the term technology varies from more science oriented, to more intangible and socially oriented aspects. Technology is often interpreted as the purposeful application of information in the design, production, and utilization of goods and services, and in the organization of human activities. Technology might also be defined as „a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome”. Technology embraces tangible products, such as the computer, and knowledge about processes and methods, such as the technology of mass production (Rogers, 1995). According to another definition that was put forward by J. Paap, technology as „the use of science-based knowledge to meet a need”, M.P. Bigwood proposes the definition of technology as „a bridge between science and new products" (M.P. Bigwood 2004). Technology draws heavily on scientific advances and the understanding gained through research and development. It then leverages this information to improve both the performance and overall usefulness of products, systems, and services.

The basic understanding of the term management is the organization and coordination of the activities of a business in order to achieve defined objectives.

In the more sophisticated way management is defined as “a vulnerable force, under pressure to achieve results and endowed with the triple power of constraint, imitation and imagination, operating on subjective, interpersonal, institutional and environmental levels” (Deslandes, 2014).

The term technology is often closely related to the issue of competition and competitiveness. Michael Porter is one of business analysts who argues that technology is one of the most significant factors influencing business competition and competitiveness. M. Porter argues that technology has the potential to change the structure of existing industries and to create new industries. Technology often changes the rules of game, questioning the competitive advantages of market leaders and enabling new companies to take leadership away from existing firms (Porter, 1985).

The growing importance and changing notion of technology is closely related to growing pace of technological change. The changing paradigm in the field of technology is often referred to as industrial revolution. Technological revolution might be defined as a „dramatic change brought about relatively quickly by the introduction of some new technology” (Bostrom, 2007). It is an era of an accelerated technological progress characterized not only by new innovations but also their application and diffusion. In the process of social and economic development humanity have experienced four industrial revolutions so far.

First Industrial Revolution was mainly about changing mostly agrarian, rural societies became industrial and urban. It took place between 18th and 19th century mainly in Europe and North America. The most critical technologies that played its role during the first industrial include the development of steam engine, mechanical production of equipment, textile industry.

Second Industrial Revolution, also referred to as the technological revolution, started 1870 and lasted until the beginning if the World War the Ist (1914). It was concerned with the process of rapid industrialisation, the establishment of machine tool industry and the development of methods for manufacturing interchangeable parts. Tan acknowledgment of important element of the second industrial revolution is the Bessemer process, the first inexpensive industrial process for the mass-production of steel. Development of new production technologies streamlined the adoption of already existing innovations, including electricity and electric lighting, telegraph and railroad networks, gas and water supply, and sewage systems.

Third Industrial Revolution also known as digital revolution started in the early 1980's and continues today. The key technologies related to the third industrial revolution include wide spared application of digital systems and interest in renewable energy. The digitisation of manufacturing transformed the way goods are made. The digital revolution affect not only how things are made,

but also where. As the effect of digital revolution factories are being moved to low-wage countries to lower labour costs.

Fourth Industrial Revolution is strongly related to cyber-physical systems. The Fourth Industrial Revolution builds on the digital revolution, representing new ways in which technology becomes embedded within societies and even the human body. The Fourth Industrial Revolution is defined by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, biotechnology, the internet of things, 3D printing and autonomous vehicles. „The fourth industrial revolution is about bringing together digital, physical and biological systems. The unique future of fourth industrial revolution is that it doesn't change what and how individuals are doing things but it actually changes these individuals, that means us. Within the concept of fourth industrial revolution the importance of economic growth per se is going to be less important than the improvement of the quality of life of individuals” (Schwab, 2016).

3. Technology, innovation and competitiveness

Innovations should be considered broadly as improved products, processes and business or organizational models. Technology and innovation development strategists should not only focus on R&D and the creation of new knowledge, but also take under consideration the specific details of acquisition, adaptation, dissemination, and use of technology in diversified local environments. Innovation in relation to the less developed countries is not so much a matter of shifting to the right the production frontier of available knowledge base, but more the challenge of facilitating the first commercial use of new technology in the domestic context. Therefore, in many cases, it is more related to small incremental changes in the field of manufactured products or utilised processes, that the case of radical innovations that to the large extent change the techno-economic paradigm.

In the past, issue of competitiveness used to be based on other premises, it was mainly relayed to greater extent to static comparative advantage. The elements of which included relative and rather stable manufacturing cost factors and specific technological advantage. The changing notion of competitiveness is to gradually greater extent related to continuous improvement, including continuous improvement in the field of technology and innovation, continuous learning and development of skills, efficient communication and transport infrastructure and environment supporting business activities. The key elements of the changing competitiveness paradigm include (Dahlman, 2007):

Innovation is becoming a crucial element of company competitiveness. Dynamic development and proliferation of knowledge sets a constant innovation challenge. Not all business units have to be radical innovators and be involved in

the process of shifting technological frontier forward, only the limited number of firms represent that kind of technological and innovative excellence. Firms in general, in order to stay in the market, have to be efficient adopters and imitators and be capable of using, upgrading existing and improving new technologies. Firm's innovative activity manifests itself not only in the field of new product and process development but also in the development and implementation of new organisation and management technique and improved business models.

Technology, Globalization and International Competitiveness requires companies to increase their efforts to follow new technologies and new professional knowledge related to organisation and management. In order to keep up with these challenges companies ought to invest in search and adoption of related new advanced knowledge. This challenge is of special importance for dedicated innovators that are operating in close proximity to the technological frontier and those business units that are trying to push this frontier forward.

Education and skills as fundamental enablers. Technological progress requires constantly more educated work force. New skills and capabilities of the work force to growing extent define the level international competitiveness and help to attract foreign direct investment. In international terms one can notice significant increase in average level of obtained education, educational attainment and increased number of persons representing higher level of education. Since multinational corporations make their investment to significant extent on the basis the level of education of the work force, education has become important element determining the level of foreign investment and the general development of the local economy.

Logistics, transportation and distribution becoming more important. Intensifying globalisation processes combined with the accelerating technical change result with the need to quickly and efficiently shift goods often from over long distances. This results with growing importance of IT coordinated logistics and transport infrastructure. The growing importance of, broadly speaking, distribution infrastructure put less developed countries in relatively weaker competitive position in globalised economy. Establishment of direct links with key global markets is vitally important for keeping under control transportation and inventory costs of goods in transit.

Efficient IT becoming new critical infrastructure for contemporary market challenges. Information and communication technologies enable flexible business communication and coordination of often globally integrated supply chains and production networks. ICT facilitates and speeds up internal (i.e. inter-department) and external (i.e. buyer-seller) relations. The real time communication between consumer and manufacturer, the new important element of contemporary

global economy, vastly improves competitiveness and marketing function of the firm via enabling quicker response to changing market needs.

As far as the implications for the less developed countries are concerned, one can identify various implications of changing competitiveness paradigm in relation to innovation. At the national level the modern and low cost communication systems, as well appropriate training ought to be provided. The fast development of ICT systems and e-business requires implementation of adequate legal and regulatory framework, including e-signature and safe digital communication and payment systems. At the firm's level, adequate investments in training, hardware and restructuring business processes are also necessary in order to take advantage of these new ICT and e-business technologies. So called enabling environment is a critical issue, it consists of the government regulations and institutions that support and facilitate the operation of business and the economy (Dahlman, 2007).

4. Conclusion

In the contemporary world we are facing the problem of growing importance and dependence on various forms of technology (technology is gradually becoming more and more comprehensively integrated with humans) and constantly more complicated patterns and factors that determine competitiveness related to technological change. Management of technology is important and relatively new function of the company. MOT in essence is about increasing firm's competitiveness as the result of efficient innovation. Successful MOT depends on proper utilisation of knowledge, expertise and beneficial synergy in the field of science, engineering, economics and management. The growing importance of the management of technologies in the contemporary world depends, among others, on the following main elements, the growing pace of technological progress, the changing notion of competitiveness and unique characteristics related to the, already started, fourth industrial revolution. Technology is becoming not only more advanced and complicated and sometimes hard to comprehend (i.e. artificial intelligence), but as the result of the fourth industrial revolution, technology is becoming more integrated with society and even with individuals. Contemporary management of technology should take under consideration the increasing pace of technological change and the changing notion of competitiveness represented mainly by transition from static to dynamic competitiveness. Management of technology in relation to transition and less developed economies should reflect the specific factors determining innovation and technological in relation to this type of economies.

It seems to be inevitable, that gradually more advanced technologies and more sophisticated technology oriented environment will become part of our daily

routine, therefore the proper understanding and implementation of technology management is becoming gradually more important, both from the point of view of private and professional perspective.

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TIME-DRIVEN ACTIVITY-BASED COSTING: POTENTIAL FOR APPLICATION AT THE SMES IN POLAND AND BULGARIA

Michael Musov*

1. Introduction

Activity-Based Costing (ABC) is the most significant contribution of management accounting for the last 30 years. In a traditional ABC model indirect costs of resources are first accumulated by activities (based on the resources consumed by each activity) and then allocated to cost objects – products, services, customer orders and/or customers (based on the activities consumed by the respective product, service, order and/or customer). Although the ABC approach became widely popular with the well-known publications by Johnson & Kaplan (1991, [1987], pp. 237-244) and Cooper & Kaplan (1988) it should be emphasized that there are evidences for applying ABC since at least 1950s. Moss & Haseman (1957, p. 184), for example, commenting on how the cost allocation methods evolved, pointed out:

Under more refined methods the redistribution takes place by first distributing depreciation as well as other burden to activities (often set up on a departmental basis) and then redistributing to the products which were processed *at each activity point*, usually by working with separate departmental or *activity burden rates*. [emphasis added]

As the allocation of indirect costs reflects relatively more accurately the cause-and-effect relationship „cost objects – activities implemented – resources consumed (i.e. costs)”, ABC models ensure more accurate information about the costs of the cost objects compared to any other conventional costing approach. This information in turn enables a more detailed customer- and product-profitability analysis that supports making more informed decisions about process management, pricing, identifying profit areas of the business, among others. Various empirical studies (Kennedy & Affleck-Graves, 2001; Cagwin & Bouwman, 2002, among others) have indicated that all these features could reduce costs and

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increase revenue (because of newly identified market niches), which improves some of the key performance indicators.

Despite the well-known benefits of the traditional ABC approach, there are also some problems. In general, ABC models are expensive and time-consuming to implement, maintain and modify, as well as inflexible to account for the complexity of the activities and the differences in their costs (Kaplan & Anderson, 2004; Stout & Propri, 2011, among others). These are the main reasons ABC systems to be partially implemented and/or further abandoned.

To overcome the imperfections of traditional ABC models Kaplan & Anderson (2004) suggest a new approach which they call Time-Driven Activity-Based Costing (TDABC). While the conventional ABC approach is well-known in Poland (see, for example, Leszczyński, 2007; 2014, among others) and in Bulgaria (see, for example, Trifonov, 2003, pp. 225-266; Yonkova, 2008, pp. 184-196, 207-222, among others), this refined costing approach, though being a subject of interest to many Anglo-American researchers (see Hoozée, 2013, pp. 133-134 for details), remains largely unknown for the economic science and business practice in the two counties. As the extant literature suggests that TDABC approach has the potential to eliminate the main barriers to implementing, maintaining and modifying an ABC model at most organizations, especially at the small and medium-sized enterprises (SMEs), this omission seems to be a grave shortcoming.

The paper addresses this gap and aims to give some insight about the new TDABC approach which to enable its further theoretical development, as well as its practical implementation at the Polish and Bulgarian enterprises, SMEs included. The broad goal of the paper is to spark a renewed interest and debate about the issues of strategic cost management at large.

The remainder of the work is organized as follows. The next section presents the ABC and the TDABC and examines the relationship between the traditional and the new costing approach. The second section discusses the strengths and weaknesses of the TDABC. The third section explores the possible application of the TDABC approach at the SMEs in Poland and in Bulgaria.

2. ABC and TDABC: a comparative analysis

2.1. ABC methodology

The traditional ABC methodology includes two stages of assigning resource costs – to activities and to cost objects. To accumulate costs by activities (i.e. to form the so-called activity cost pools) employee surveys of the percentage of time spent on the activities are used traditionally. To allocate costs to cost objects for each separate activity a cost driver is defined and a respective cost-driver rate is

computed. These rates are then used for calculating the costs of the cost objects – products, services, customer orders, customers etc. – based on the activities consumed.

Let's consider an illustrative example of doing ABC traditional way. Suppose that "Marketing" process is composed of four activities: (1) maintaining customer relations, (2) managing customer orders, (3) processing cash payments, and (4) processing payments on account. This process engages resources from two departments: „Marketing” and “Accounting”. Total indirect costs of these resources (indirect materials, indirect labor, and other overhead costs) amount to €200,000. During the last year, the following quantities of work in the four activities are performed: 100,000 calls and 40,000 orders (including 30 000 cash orders and 10,000 orders on account). Employee surveys of time spent on the four specified activities indicate that they spend about 55% of their time on implementing initial customer relations, 30% on managing customer orders received, and 15% on processing all the payments. Table 1 and Figure 1 summarize and illustrate the initial accumulation of indirect costs by activities and the subsequent computation of cost-driver rates.

Table 1. ABC methodology

Activity A	Indirect Cost – Assigned B	Activity Quantity C	Cost-Driver Rate D [B ÷ C]
Activity 1 Customer Relations	€ 110,000	100,000 calls	€ 1.10 per call
Activity 2 Customer Orders	€ 60,000	40,000 orders	€ 1.50 per order
Activity 3 Invoices – Cash Sales	€ 16,000	30,000 cash orders	€ 0.53 per cash order
Activity 4 Invoices – Sales on Account	€ 14,000	10,000 orders on account	€ 1.40 per order on account
Total	€ 200,000		

Source: prepared by the author.

There are three serious problems with the traditional ABC models (Kaplan & Anderson, 2004). First, when interviewed and surveyed employees intuitively allocate all their working time to the specified activities (reported percentages add up to 100, i.e. no idle time). What this implies is that cost-driver rates are

inaccurate, because they assume utilization of resources at full capacity (which rarely occurs in practice). Second, traditional ABC uses a single cost-driver rate for each one activity. This requires each activity with a significant variation in resources consumed to be included as a separate activity in the model – with its separate cost pool, a separate cost driver and associated cost-driver rate. Returning to our illustrative example, to account for the difference in the costs of cash orders and of orders on account (which require monitoring of payments over time) it includes two separate activities: Activity 3 and Activity 4. Adding too many separate activities, however, expands the complexity of the costing system implemented. Third, conventional ABC models to be up to date require continuous resurveys and reinterviews with employees. They increase the costs of the model and lead to employee irritation.

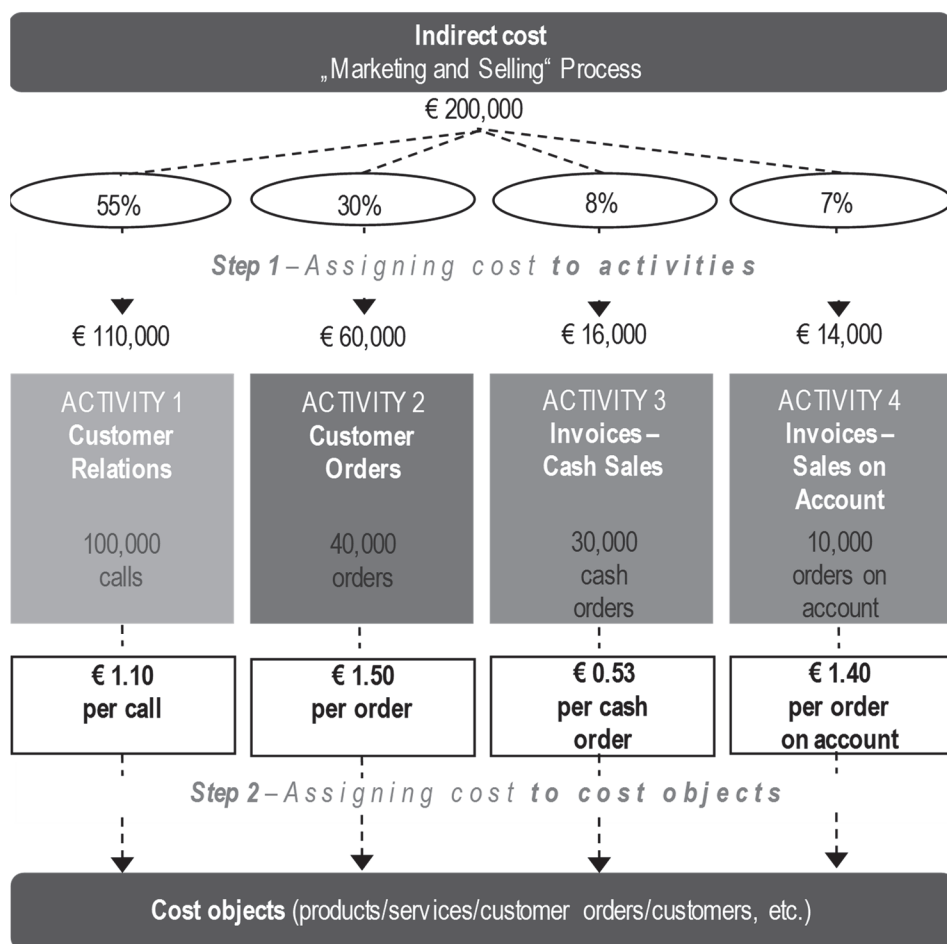


Figure 1. ABC cost flow
 Source: prepared by the author.

2.2. TDABC methodology

The new TDABC methodology, proposed by Kaplan & Anderson (2004), assigns resource costs to cost objects in a single step. It requires estimates of two basic parameters: (1) the cost per time unit of capacity and (2) the unit times of activities.

First, *the cost per time unit of capacity* is the ratio of the indirect cost of practical capacity (in currency units) to the practical capacity (mostly in time units) supplied to the process. Practical capacity – the time available for productive use (excluding any time for breaks, for communication, for arrival and departure, etc.) – is estimated by managers as a percentage of the theoretical full capacity. In the case of our example, let's suppose that „Marketing” and „Accounting” departments operate at 80% of their annual full theoretical capacity. In theory, therefore, of the total working hours of the nine workers employed in the process – 1,140,480 minutes in total [9 employees × 60 min/hour × 8 hours/day × 22 days/month × 12 months], the organization utilizes only 912,384 minutes [1,140,480 minutes × 80%], which are its practical capacity. The cost per time unit of capacity is then €0.22 per minute [€200,000 ÷ 912,384 minutes].

Second, *the unit times of activities* are estimated on the basis of the time needed to implement one unit of each kind of activity. They are measured in absolute time units (e.g., minutes, hours, days, etc.) by direct observations or through interviews with employees. To continue our example, let's suppose that managers determine that it takes 4.25 minutes to make a phone call, 5.75 minutes to handle an order, 2 minutes to process a cash payment and 5.25 minutes to process a payment on account.

While in a traditional ABC model all similar activities with differences in resource demands should be included as separate activities, under the new TDABC approach this is not necessary. To this end, Kaplan & Anderson (2004) suggest incorporating *time equations* “that enables the model to reflect how order and activity characteristics cause processing time to vary”. These equations convey the time of an activity as a function of various time drivers (e.g., number of production lines, new/existing customers, weight, distance etc.) through the following general mathematical expression (Hoozée, 2013):

$$T_i = t_0 + t_1X_1 + \dots + t_nX_n \quad (1)$$

where: T_i – time for the particular activity,

t_0 – basic time for the activity,

t_i – additional time for one unit of time driver I ,

X – volume of time driver i [$i = 1, \dots, n$].

Returning to our example, Activity 3 and Activity 4 under the traditional ABC system are similar, but require different resources to be implemented. While managing cash payments takes 3 minutes, managing payments on account takes 3.25 minutes more (because of the need to process future payments). Under TDABC the two activities could be combined in a single activity using the following time equation: *Payment processing (minutes per order) = 2 + [3.25 (if payment is on account)]*.

Multiplying both estimates – the cost per time unit of capacity and the unit time of activities – gives the cost-driver rates for the activities. Table 2 and Figure 2 summarize and illustrate the calculations required. As the time consumption of the new Activity 3 “Invoices” ranges from 2 to 5.25 minutes per order, the cost-driver rate also ranges from €0.44 to €1.15 per order, depending on the method of payment.

Table 2. TDABC methodology

Activity A	Unit Time B	Cost-Driver Rate C [B × €0.22 per min*]	Activity Quantity D	Indirect Cost – Assigned E [C × D]	Total Time Used F [B × D]
Activity 1 Customer Relations	4.25 min	€ 0.93 per call	100,000 calls	€ 93,163	425,000 min
Activity 2 Customer Orders	5.75 min	€ 1.26 per call	40,000 orders	€ 50,417	230,000 min
Activity 3 Invoices					
<i>Invoices – Basic</i>	<i>2.00 min</i>	€ 0.44 per order	<i>40,000 orders</i>	<i>€ 17,536</i>	<i>80,000 min</i>
<i>Invoices – Sales on Account (+3.25 min)</i>	<i>3.25 min</i>	€ 0.71 per order on account	<i>10,000 orders on account</i>	<i>€ 7,124</i>	<i>32,500 min</i>
Total – Used Capacity				€ 168,241	767,500 min
Total – Supplied Capacity				€ 200,000	912,384 min
UNUSED CAPACITY (16%)				€ 31,759	144,884 min

* Cost per time unit of capacity.

Source: prepared by the author.

It should be borne in mind that TDABC methodology unlike the traditional ABC methodology allows for a more accurate identification of the difference between the practical capacity supplied to the process (912,384 minutes at €200,000 indirect costs) and the actual capacity used (767,500 minutes at €168,241 indirect

costs). Table 2 reveals that 16% [144,884 minutes÷912,384 minutes] of the practical capacity supplied remained unused. This unused capacity (€31,759 worth) should be analyzed within the enterprise's strategic framework in order managers to be able to decide whether to eliminate it or to redirect it to other processes aimed at more effective cost management.

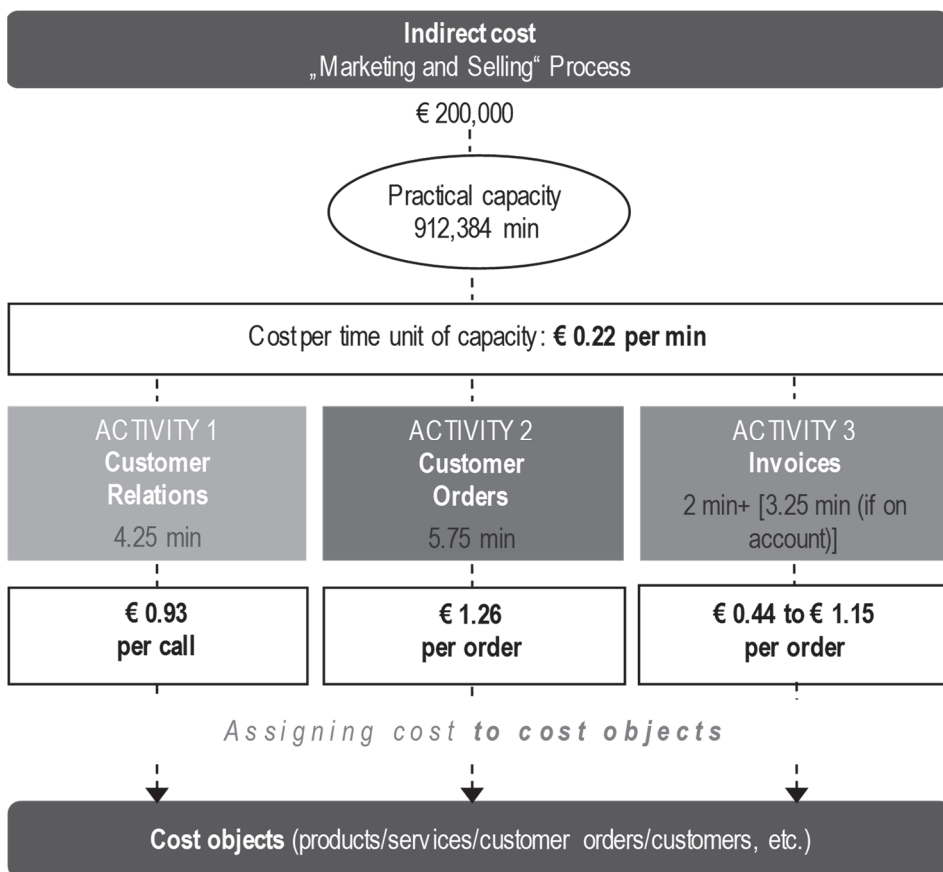


Figure 2. TDABC cost flow
Source: prepared by the author.

3. Advantages and disadvantages of TDABC

TDABC approach seems to be a return to the traditional normal costing with a single (plantwide) overhead rate (based on direct labor-hours). More specifically, TDABC is a combination of the normal cost system (in terms of the cost per time unit of capacity) and of the traditional ABC approach (in terms of the cost-driver rates computation). This combination, however, has a synergistic effect which

results in the relative advantages of the TDABC approach compared to the traditional ABC (Kaplan & Anderson, 2004; Stout & Propri, 2011; Hoozée, 2013):

- more straightforward representation of the unused capacity. Measuring capacity in time units enables identification of the excess capacity, which gives rise to further optimizations. These optimizations, if properly implemented, result in lower costs and improved profitability;
- easier implementation, maintenance and modification of the costing model. They are a result of how the capacity usage is estimated – managers' professional judgement and direct observations of processes replace the subjective employee beliefs about where and how they spend their working time;
- greater flexibility of the model. It stems from the introduction of time equations that eliminate the need of having multiple similar activities to account for any variation in the resources required by a single activity;
- more accurate cost estimates. This is because cost-driver rates are computed based on the capacity used rather than on the total capacity supplied, which leads to a better estimation of the resource demands by the cost objectives. This in turn contributes to improving the processes of decision making and performance evaluation, as well as the profitability of the operations.

Critics point out the following disadvantages of the TDABC:

- difficult for application in manufacturing enterprises (Öker & Adigüzel, 2010);
- difficult for application in sectors where the unit times of activities cannot be effectively estimated because of their heterogeneity (e.g. consulting) (Max, 2007);
- using a single (uniform) cost per time unit of capacity for the whole process (Barrett, 2005).

All these and other similar imperfections – in one degree or another – are typical for each one costing approach. The comparative advantages of the TDABC, however, give rise to the benefits of its implementation, especially when it comes to the strategic cost management at the SMEs.

4. Potential for application of TDABC at the SMEs

Much practical experience has shown that traditional ABC systems are an expensive endeavor without any guarantee on a positive effect on the profitability. By way of illustration, Kaplan & Anderson (2004) show that an ABC model of a manufacturing enterprise from the SME sector takes three days to automatically calculate costs for its 40 departments, 150 activities, 10 000 orders, and 45 000 line items. While large corporations may relatively easily maintain a costing

system that requires additional human resources and powerful hardware/software components for data processing and information storage, SMEs no doubt face serious challenges here. To explore the way TDABC could help SMEs overcome these challenges, two issues must be addressed.

The first question is *why the SME sector matters when discussing cost management issues*. SMEs play a relatively more important role in Central and Eastern Europe (Poland and Bulgaria included) than large enterprises do and any improvements in this sector would have a greater impact on the socioeconomic development of these countries. For example, while SMEs as a group accounted in 2015 for 67% of total employment in the EU-28 non-financial business, the relative contribution of SMEs to total employment in Poland (76%) and in Bulgaria (69%) is above the EU-28 average (see Figure 3). Hence, implementing advanced costing systems such as TDABC in these enterprises could have a greater contribution to saving and/or creating employment at the national level than any improvements in managing costs of the large enterprises.

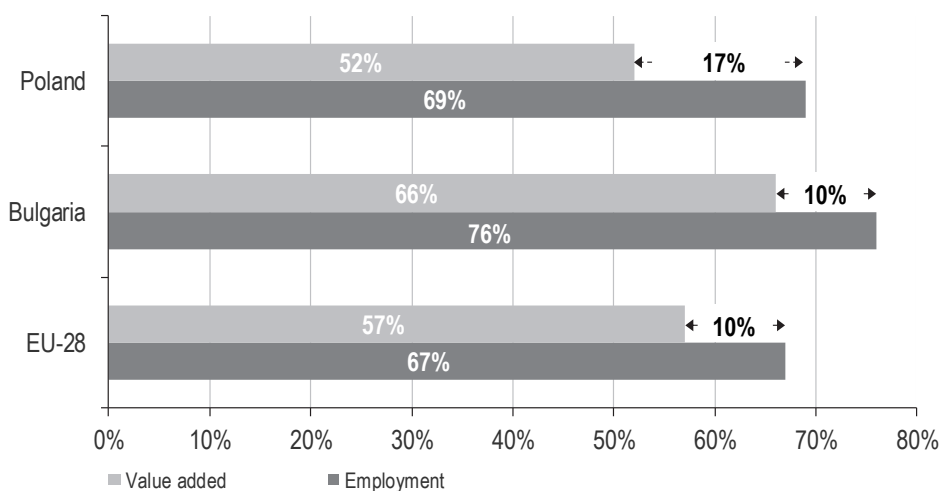


Figure 3. Relative contribution of SMEs to total non-financial business sector employment and value added in EU-28 Member States, Poland and Bulgaria, in 2015
Source: prepared by the author using data from European Union, 2016, pp. 79-80.

The other question is *why TDABC is an appropriate costing approach for the SME sector*. On the first hand, SMEs undertake relatively more labor-intensive activities, which makes costing approaches that rely – in one degree or another – on time units (as TDABC does) more appropriate for these enterprises. For example, the share of value added in the EU-28 generated by SMEs in the non-financial business sector is 57% and is smaller than their employment share (see Figure 3), which indicates that processes undertaken by SMEs are more labor-intensive than those

implemented in large enterprises. Yet this is not the whole story. While in Bulgaria SMEs generate 66% of non-financial sector business value added, in Poland this share is only 52% of total value added generated by the non-financial business sector. The greater difference between SME employment and value added shares in Poland (17 percentage points) compared to Bulgaria and the EU-28 average (10 percentage points) indicates that Polish SMEs are relatively more labor-intensive than the SMEs in Bulgarian and in the EU-28. It is therefore likely that TDABC is more appropriate to them.

On the second hand, TDABC has the potential to contribute to solving some of the most pressing problems of the SMEs in Poland and Bulgaria. These problems include, but are not limited to, „finding customers”, „availability of skilled staff or experienced managers”, „competition”, „regulation”, „cost of production or labor” and „access to finance” (see Figure 4). The improved profitability analysis under TDABC could also improve the focus on growing, profitable areas of the business and hence on new market niches. The refined cost estimates under the TDABC approach allow for better management of the cost of production (labor cost included) and creates a competitive advantage for the enterprise under consideration. Finally, all other things being equal, the better opportunities for cost analysis, the greater are the chances for receiving funds from lenders and other creditors, hence, the better is the access to finance.

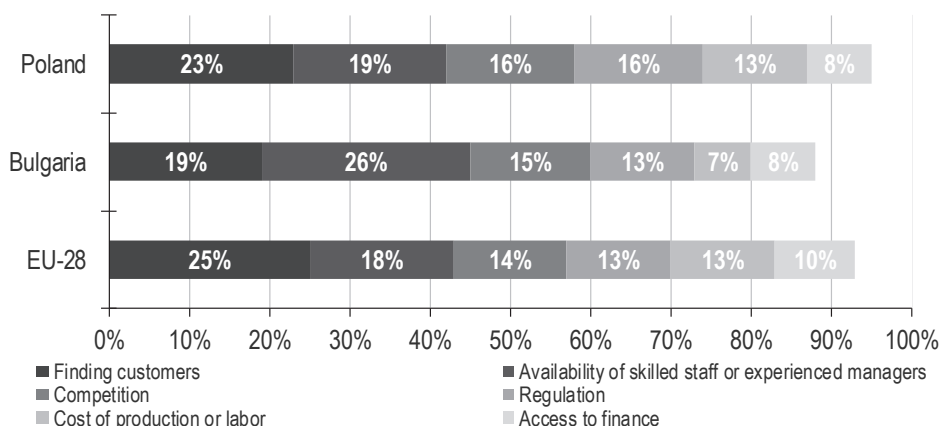


Figure 4. SMEs' most pressing problems in EU-28 Member States, Poland and Bulgaria, in 2015

Source: prepared by the author using data from European Union (2016, p. 20).

On the third hand, TDABC models seem to be preferable for SMEs than the traditional ABC models in terms of the factors affecting the decision to implement an activity-based costing system. Not surprisingly, the decision drivers here are multifaceted. Key among them are the available financial and human resources,

which to be engaged in implementing and maintaining the costing system. Another important determinant is the availability of quantitative (financial and non-financial) data necessary to operate the system. A third factor is the attitudes of managers and employees determining how they perceive their participation in the costing system. Other determinants influencing the choice to implement a costing system could also be provided, but the general implication is that the TDABC approach – that engages relatively few resources, needs data about a relatively small pool of activities, and does not require continuous employee interviews and resurveys – seems to have greater potential for implementation at the SMEs than the traditional ABC approach has.

Despite the potential power of TDABC and its relative advantages, yet some difficulties could face SMEs when implementing, maintaining and modifying this approach. All these processes, however, could be significantly facilitated by the contemporary innovative management systems. Stout & Propri (2011), for example, reasonably point out that effective enterprise resource planning (ERP) systems underpin the successful implementation of a TDABC model. Of course, there is no need the ERP system to be in the category of SAP or PeopleSoft which many SMEs cannot afford. However, this management system should at least provide information needed for the initial development and subsequent updates of all time equations that are at the heart of TDABC.

5. Conclusion

Comparisons of the innovative TDABC approach with the traditional ABC models point out its relative advantages as well as disadvantages. While all weaknesses indicate options and directions for the further theoretical development of TDABC, its strengths show that this approach could increase the enterprise's value, especially at the SMEs in Central and Eastern Europe (Poland and Bulgaria included). The contribution TDABC to the enterprise's value added is a result of the SMEs' more labor-intensive nature (where any rates based on time units could work well), of the problems they face (which could be positively affected by an advanced cost management) and of the preference of SMEs' managers for a costing approach that engages relatively few resources, needs data about a relatively small pool of activities, and does not require employee interviews and resurveys (such as TDABC). This finding is especially important for Poland and Bulgaria, where the SME sector plays a relatively more important role in the general socioeconomic development than large enterprises do.

When making the important strategic decision to implement a TDABC system, two key management accounting guidelines should be borne in mind. First, the expected benefits should exceed the expected costs. They both, however,

go well beyond the monetary considerations – into the multifaceted and complex dimensions of human behavior. A special focus is needed on some behavioral considerations in terms of decision making and performance evaluation. Second, different costing approaches may and should be used for different purposes. While traditional ABC is especially relevant when analyzing the costs and effectiveness of a cost object, the new TDABC approach is extremely useful when optimizing enterprise's resource capacity. Thus, ABC and TDABC seems to be not mutually exclusive, but complementary models that to contribute to the enterprises' value creation and societal prosperity.

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RATIO ANALYSIS & BENCHMARKING

Przemysław Pomykański*

1. Introduction

Financial analysis of business results is essential to plan, execute and control its operations. Managers have to assess the effectiveness of business operations, compare the results with prior periods and results of competitors. Thorough analysis of current strengths and weaknesses enables planning and control. Results should also be compared to economic entities operating in different areas as businesses need to monitor their effectiveness in order to attract investors and other stakeholders.

This chapter provides for an overview of the average values of financial ratios in companies monitored by the Central Statistical Office of Poland. This analysis provides for the largest available dataset for calculating financial ratios for companies operating in Poland and can be used as a benchmark in further analysis of individual companies, groups of companies and branches of industry. Recent changes change the perspective on many ratios and benchmarking.

2. Data Description

Dataset used in this chapter is based on survey data published by the Central Statistical Office of Poland (GUS). The survey covers non-financial economic entities with 10 and more people employed (Table 1). The number of entities covered increased steadily from 2006 until 2014 and decreased in 2015.

Table 1. Number of entities covered by the dataset

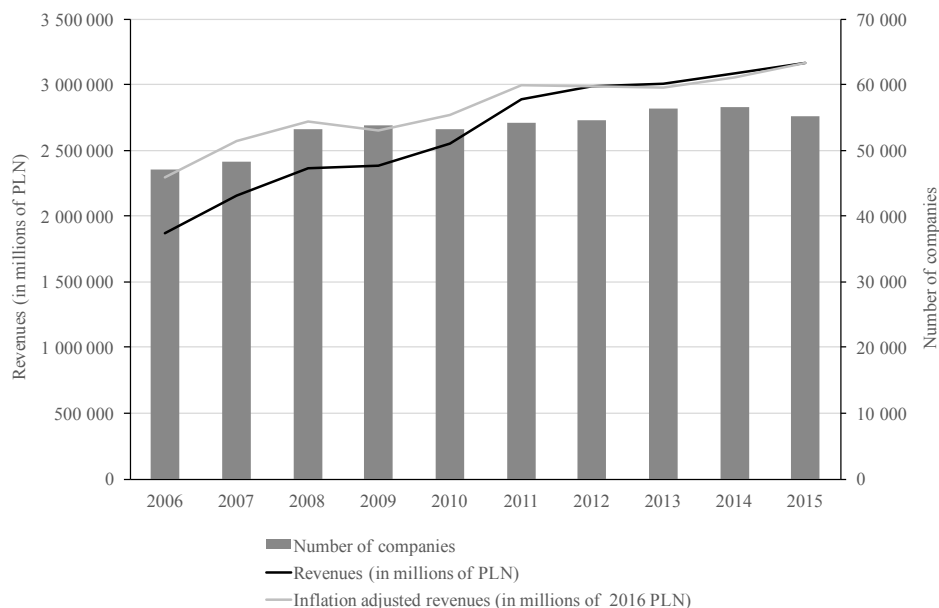
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of companies	47 048	48 165	53 148	53 847	53 220	54 189	54 587	56 432	56 628	55 092

Source: own, data Central Statistical Office.

Revenues increased from 1.9 trillion PLN in 2006 to over 3.1 trillion PLN in 2015. Growth is steady and impact of the global economic crisis that started in 2008 was not as substantial as in some other European economies.

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In the period 2006-2011 inflation was still visible (ranging from 2.5 to 4.3% per annum). The value of revenues adjusted for inflation (recalculated to 2016 PLN) dropped in 2009 and remained unchanged in 2011-2013 (Graph 1).



Graph 1. Dataset. Number of companies, revenues and inflation adjusted revenues
Source: own, data Central Statistical Office of Poland.

The terminology used in this chapter is in accordance to International Financial Reporting Standards (IFRS).

3. Ratio Analysis

Financial ratios are not defined by IFRS and methods of their calculations differ (Pomykalska, Pomykalski, 2008). It is therefore necessary to provide for an overview of calculation methods used in this chapter. To improve the clarity this chapter results are provided after each group of ratios.

Ratio usually grouped into:

- Capital structure ratios,
- Liquidity ratios,
- Activity ratios,
- Profitability ratios and
- Other (including capital market ratios).

3.1. Capital structure ratios

Modern Capital structure studies began with a theory first proposed in 1958 by (Modigliani and Miller, 1958). Subsequent studies proposed several important theories, such as: the Signaling theory proposed by (Ross, 1977), the Pecking Order theory by (Myers, 1984) and (Myers and Majluf, 1984), and Control Rights, proposed by (Harris and Raviv, 1991). The core question of what determines companies' capital structure has not reached a consensus amongst theorists (Myers, 2001).

Most popular capital structure ratio is the debt ratio. Recently, as some public corporations accumulate cash and cash equivalents in their balance sheets gearing ratio is gaining popularity.

Debt Ratio

Debt ratio is the share of total liabilities in total assets.

$$\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}} \times 100\%$$

In business liabilities are regarded as a potential source of financing of operations and investments. In some way, all companies are indebted (phone and electricity bills). Some, mainly private, companies prefer not to use interest bearing debt. Publicly held corporations use it extensively. Debt is by definition cheaper than equity therefore using debt increases the returns of investors provided the company is able to generate returns higher than the cost of debt. If a company is not able to generate sufficient returns interest bearing liabilities will increase losses, as interest has to be paid to lenders. Lenders and investors will perceive investments in indebted companies as riskier and expect higher return.

Gearing ratio

$$\begin{aligned} \text{Gearing} &= \frac{\text{Net Debt}}{\text{Total Assets}} \times 100\% \\ &= \frac{\text{Total Liabilities} - \text{Cash and cash equivalents}}{\text{Total Assets}} \times 100\% \end{aligned}$$

In gearing ratio, total cash and cash equivalents are subtracted from total liabilities.

Liabilities are divided into current and long-term. Long-term liabilities (due in over 12 months) are regarded as more stable source of financing. As they are also more expensive (due to the premium) companies use them to finance long-term projects.

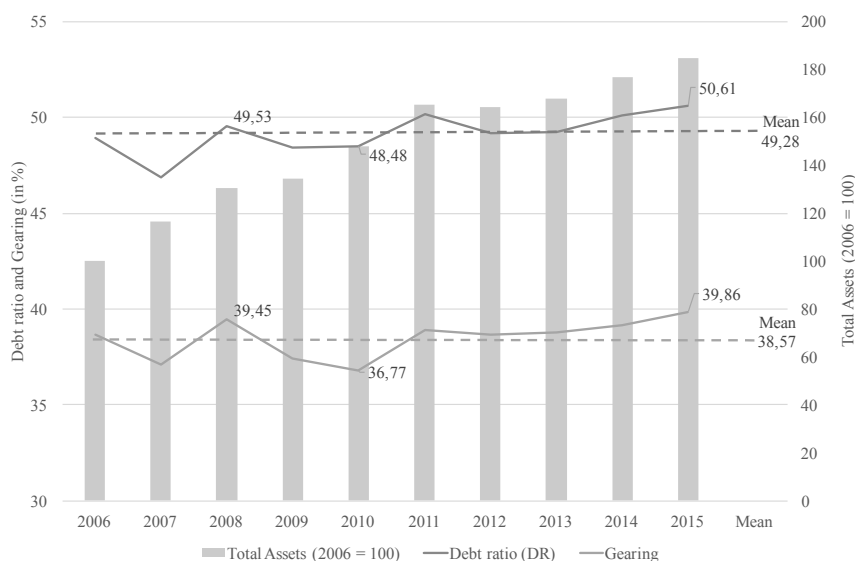
Long term debt ratio

$$\text{Debt Ratio} = \frac{\text{LT Liabilities}}{\text{Total Assets}} \times 100\%$$

LT – long-term liabilities

3.1.1. Benchmarking debt ratios

Following the outbreak of the crisis in 2008 debt ratio and gearing ratios dropped (Graph 2). Debt ratio dropped from 49.53% in 2008 to 48.48% in 2010. Gearing fell from 39.45% to 36.77%. The mean of the debt ratio was 49.28% with a standard deviation of 1.08. The mean of gearing ratio was 38.57% with a standard deviation of 1.03. Total assets increased during the period except for 2012, when 0.5% decrease was recorded. During the period assets grew by 84% in nominal terms and 50% when adjusted for inflation.

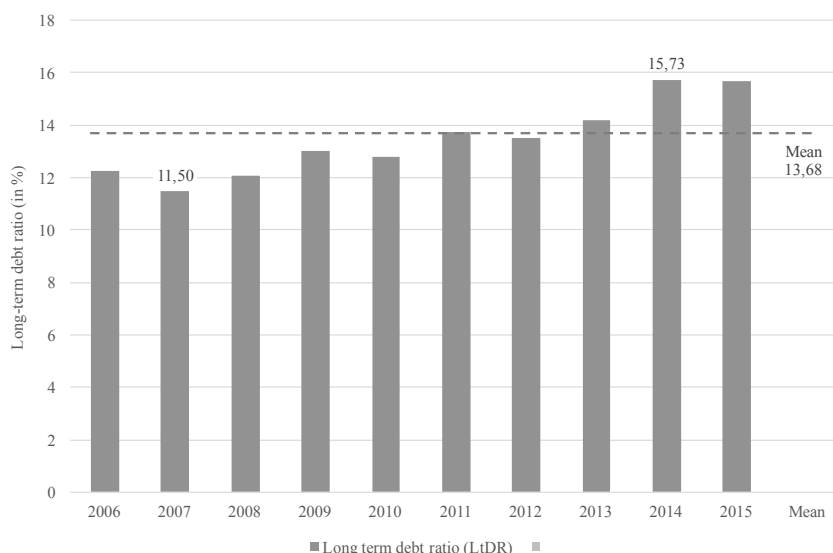


Graph 2. Debt ratios and gearing ratios; 2006-2015

Source: own, data Central Statistical Office of Poland.

Debt ratio and gearing change simultaneously as in most years companies held cash and cash equivalents amounted to 0.21% of total assets. In response to the crisis companies increased the share of cash and cash equivalent in total assets (both in 2009 and 2010).

The share of long-term liabilities in financing is growing. After 2008, the share of long-term financing is growing from 11.5% to 15.73% in 2014. The mean is 13.68% with standard deviation of 1.44.



Graph 3. Long-term debt ratio 2011-2015

Source: own, data Central Statistical Office of Poland.

3.2. Liquidity ratios

One of the meanings of Liquidity is the ability to pay liabilities in time (Pluta, Michalski, 2013). Current ratio compares current assets to current liabilities. The significant current assets are inventories, receivables and cash and cash equivalents. Significant current liabilities usually include trade payables and short term loans from banks.

Current ratio

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Some lenders prefer to compare current assets excluding inventories as those may be difficult to sell if the borrower was to go bankrupt.

Quick ratio (Acid test)

$$\text{Quick Ratio} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$$

The perfect collateral for debt is cash and cash equivalents.

Cash ratio

$$\text{Cash Ratio} = \frac{\text{Cash and cash equivalents}}{\text{Current Liabilities}}$$

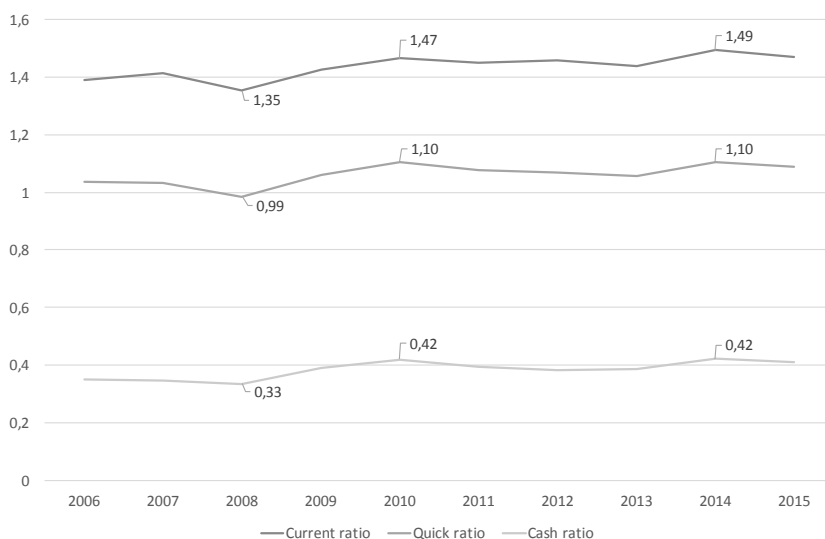
There are two contradictory interpretations of liquidity ratios. Lenders prefer companies with high liquidity ratios. Most businesses try to decrease liquidity

ratios, as excessive inventories and increasing receivables are not generating returns. Inventories are necessary to satisfy customers who prefer immediate availability and to secure the continuity of production. Many companies try to reduce inventories by implementing strategies such as „just-in-time”. Trade receivables are non-interest bearing loans to customers (in B2B transactions). All companies try to avoid and reduce them. Cash and cash equivalents are reduced (by investing or paying out to owners), as investors would like to see their money invested rather than idle on company's bank accounts. Current liabilities comprise interest bearing liabilities (short-term loans) and non-interest bearing liabilities (trade liabilities). Managers will be interested in increasing the later.

3.2.1. Benchmarking liquidity ratios

Liquidity ratios improved as companies hold more cash following the outbreak of the crisis in 2008. Higher cash ratio impacts all liquidity ratios and explains most of the changes. Taking into consideration growing share of liabilities in financing (see conclusions from capital structure ratios) growing cash ratio indicates that companies are willing to increase the use debt but at the same time prefer to hold higher cash reserves.

The conclusion is similar to gearing ratio but in this case current liabilities are used in the denominator. Increasing cash and cash equivalents while increasing long-term liabilities may have little impact on gearing ratio but will change the cash ratio and other liquidity ratios.



Graph 4. Liquidity ratios 2011-2015

Source: own, data Central Statistical Office of Poland.

3.3. Activity ratios

Activity ratios are used to assess the efficiency of business practices.

Asset Turnover (AT) is used to gauge the company's ability to generate revenues using the assets at its disposal.

$$AT = \frac{\text{Revenues}}{\text{Total Assets}}$$

Generally an increase in the value of this ratio is interpreted as improvement in business' efficiency. Business to business comparison in value of this ratio should be treated with caution.

Days of sales outstanding (DSO)

$$DSO = \frac{\text{Receivables} \times 365}{\text{Revenues}}$$

DSO indicates how many days (on average) it takes the company to collect the money from its clients.

Managers try to decrease this ratio by negotiating shorter terms of payment with clients. Increasing DSO means decreasing negotiating power of sales representatives or difficulties in debt collection (this may be caused by deteriorating financial standing of clients).

Days of Inventory outstanding (DIO)

$$DIO = \frac{\text{Inventories} \times 365}{\text{COGS}}$$

COGS – Cost of Goods Sold

This ratio indicates how many days (on average) the company keeps its inventory. In a production company this means raw materials, work in progress and finished goods. Increasing DIO means that the company is either accumulating raw materials (may represent excessive purchases), increasing work-in progress (increasing number of orders in production) or increasing finished goods (may pose a problem if goods are fashion sensitive). In a trading company inventories represent merchandise. Increasing DIO means that the company is accumulating merchandise without corresponding increase in sales.

Days of purchases outstanding (DPO)

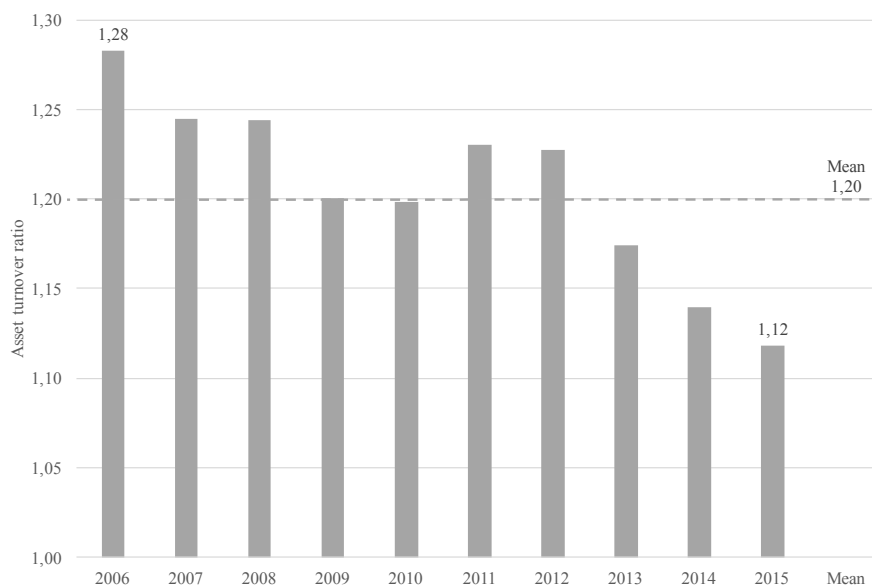
$$DPO = \frac{\text{Trade Payables} \times 365}{\text{COGS}}$$

COGS – Cost of Goods Sold

This ratio indicates in how many days (on average) the company pays its dues to suppliers. Trade payables are non-interest bearing liabilities. Managers strive to negotiate better terms of payment with suppliers and to increase the value of the DPO. Some companies and analysts use revenues instead of COGS in the denominator. Theoretically it's not correct.

3.3.1. Benchmarking activity ratios

In the years 2006-2015 asset turnover continued to decrease as the value of assets grew faster than revenues.



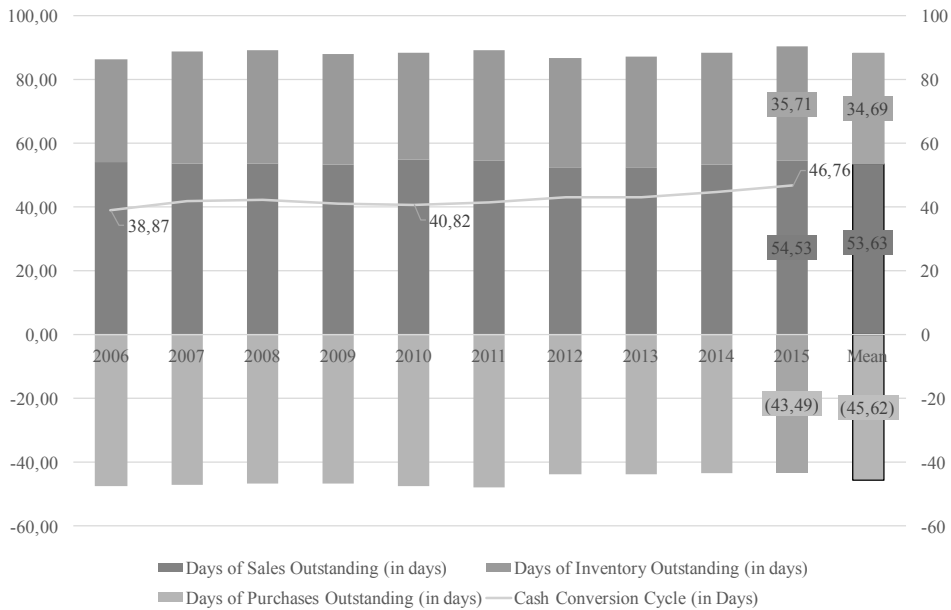
Graph 5. Asset turnover ratios 2006-2015

Source: own, data Central Statistical Office of Poland.

The Cash Conversion Cycle increased from 39 days to 47 days from 2006 to 2015 (Graph 6). At current levels CCC ratio is on similar level to the one observed in a recent survey conducted in United States¹. The Cash Conversion Cycle observed in some European countries is significantly higher^{2, 3}.

¹ 2016 US Working Capital Survey, <http://www.relconsultancy.com/research/working-capital-management/>, accessed 1.04.2017.

² 2016 Europe Working Capital Survey, <http://www.relconsultancy.com/research/working-capital-management/>, accessed 1.04.2017.



Graph 6. DSO, DIO, DPO and CCC ratios 2006-2015

Source: own, data Central Statistical Office of Poland.

3.4. Profitability ratios

The interpretation of profitability margins seems obvious – the higher the better.

Return on sales (ROS) – net profit margin

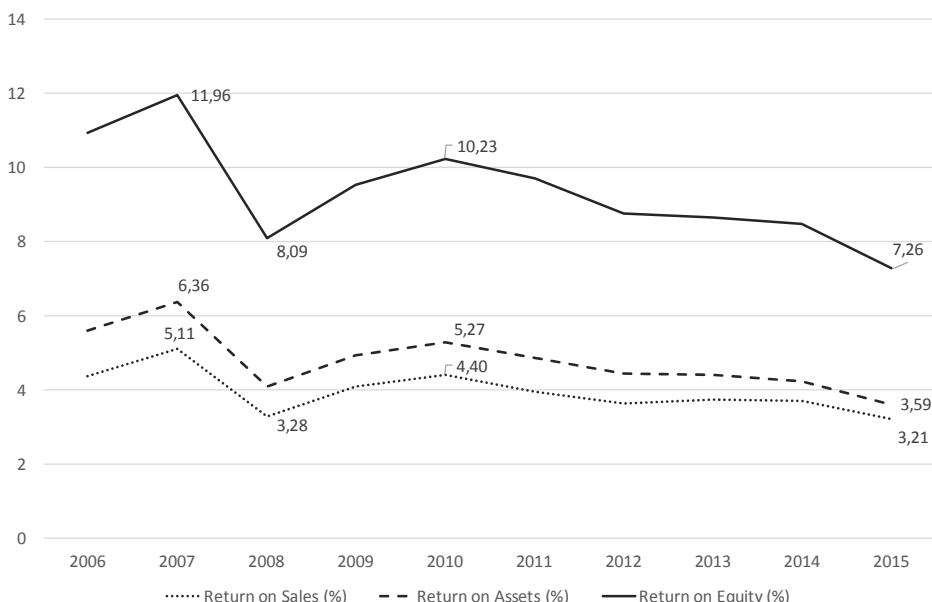
$$ROS = \frac{Net\ Profit}{Net\ Sales} \times 100\%$$

Return on assets (ROA)

$$ROA = \frac{Net\ Profit}{Total\ Assets} \times 100\%$$

Return on equity (ROE)

$$ROE = \frac{Net\ Profit}{Total\ Equity} \times 100\%$$



Graph 7. ROS, ROA, ROE ratios 2006-2015

Source: own, data Central Statistical Office of Poland.

Return on Sales depends on many factors that influence the company's ability to ask for premium prices from its clients. Innovativeness, intellectual property, brand recognition, access to resources determine the value of ROS. ROA is determined by ROS and the company's asset turnover. ROE depends on ROA and capital multiplier (ratio reflecting the use of debt in financing).

Damodaran provides for net margins and return on equity data from various markets³. His most recent data for „global” markets (42678 non-financial companies) indicates: ROS 4.36% and ROE 7.49%.

4. Conclusions

The changes in the value of financial ratios in 2007-2016 don't change the underlying theories. They change the perspective in the analysis of financial data. During the years 2006-2015:

- Debt ratios increased,
- Liquidity ratios increased,
- Asset turnover ratio decreased,
- Cash conversion cycle,
- Profitability ratios decreased.

³ <http://pages.stern.nyu.edu/~adamodar/>, accessed 1.04.2017.

These changes can be interpreted in the context of economic growth, interest rate changes, inflation and other economic variables. They can also be interpreted in the context of globalization, Poland's accession to European Union or global economic crisis.

They can however be used by managers in benchmarking and assessment of business' current financial position, planning and decision making.

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ACCOUNTING ASPECTS OF GREENHOUSE GAS EMISSION ALLOWANCES

/current issues in theory and practice
in the Republic of Bulgaria/

Rumiana Pozharevska*

1. Introduction

The subject of environmental protection has been particularly topical on a nationwide and international scale over the last 40-50 years. The scope of investments in ecological environment over time has been expanding and to date they are measured in billions of dollars. This tendency is accompanied by the origination and development of the concept of the so called „green” economy. The foundation of „green economy” is also grounded in a number of strategic documents within the framework of the European Union, including the Republic of Bulgaria as a full EU member as of 2007, the most popular document of which is „Europe 2020”. In some of them, it is specified that the notion of „blue economy”, which expands the principles of „green economy” by involving the protection and sustainable use of marine resources, needs to be given careful consideration (Goranova, Tananeeva, 2013). At an operational level, „green economy” is regarded as an economy whose income and employment growth is triggered by investments, which:

- reduce carbon emissions and pollution,
- improve energy and resource effectiveness;
- prevent loss of biodiversity and ecosystem services.

These relatively new economy development axes generate problematic fields with respect to identification of new accounting items and their adequate presentation in the financial statements of the entities. On an international scale, the interest to “green” accounting dates back to the end of 1960, when a field intended to manage the search of standards and instruments that might help the reporting entities to evaluate their environmental consequences, was for the first time developed. This theory and practice was further developed over the years.

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At a nationwide scale, the nascence of the so called “environmental accounting” occurred as late as during the 90-ies of the XX-th century. As of today’s date, the notions of “environmental accounting” and “social accounting” are quite often understood as equivalent ones thus eliminating the differences in the reporting objects. There are unclear issues that could be observed both with regard to the identification of new accounting items and to the regulatory and methodological framework of their accounting treatment.

The object of study in this paper are the greenhouse gas emission allowances as accounting items and the specifics in their presentation in the financial statements of the entities.

Research Methods. The methods used in this study are of general significance and traditionally applicable, and they are: historical and logical method, comparative method, method of observation and monitoring, and regulatory approach.

Main proposition of the research. The national regulatory framework ignores the essential characteristics of greenhouse gas emission allowances, which leads to their incorrect identification as accounting items and to the development of inadequate methodology for their accounting recognition and presentation. The overcoming of these problems would answer the growing need of information for all categories of users of financial statements.

2. Literature review at national level

Regarding the origination of environmental accounting in the Republic of Bulgaria, tribute should be paid to the innovative ideas of the Bulgarian scientist, Prof. T. Totev, who, as early as in 1976, indicated the environmental protection as one of the fields to expand the subject of accounting (Totev, 1976). Ten years later, he developed his idea even further and included man power and environmental protection in the group of potential accounting items (Totev et al., 1987).

The developments and research works of the representatives of the national accounting theory over the last two decades can be provisionally divided into three groups:

- The essence of environmental accounting and cost accounting associated with ecology and environmental protection (Yonkova, 2007, 2010, Nesheva-Kyoseva, 2012, Markova, 2013).
- Presentation of the expenses associated with environmental protection in the financial statements (Nesheva-Kyoseva, 2012);
- Presentation of the expenses associated with environmental protection in the non-financial statements (Yonkova & Yordanov, 2010).

In retrospect and at a national level, the author does not know of any developments with their subject of research being the intangible resources

generated in connection with environmental protection, the achievement of energy and resource efficiency, performance of eco services, or in the prevention of biodiversity loss. The issue has been for the first time treated with a focus on applied research over the last couple of years (Pozharevska, 2017).

Environmental accounting is getting more frequently related to Integrated Reporting and the associated concept of sustainable development of companies and added value generation (Sustainability Reporting) – new trend in corporate reporting, which supports the presentation of items and parameters that have not been encompassed so far (Yonkova, 2012). Initially, it started being applied by companies functioning in the energy industry, crude oil, gas and other natural resource production. The major reason for the occurrence of the new trend was the growing criticism towards the information from the financial statements and the dissatisfaction of the public, investors and the remaining stakeholders with the existing information asymmetry. Integrated reporting, as an end product of a complex synergic process between the different parts of a reporting entity on one part, and the customers and the environment on the other part, is based on pillars primarily of intangible character. Examples in this respect could be: reporting entity's business model; customer relations; reporting entity's trademark and goodwill; reporting entity's impact and connection with the environment.

The new national regulatory accounting framework¹ (effective as of 01.01.2016) makes a step forward regarding the answer to the processes currently taking place, involving topics like ecology and social capital. The currently effective *Accounting Law* [Retrieved from: <http://top-account.net/zakoni/138-zakon-za-schetovodstvoto.html>] stipulates in Chapter Seven „Annual Activity Report”, art. 39 p. 2, that the „entities shall prepare an annual activity report, which shall contain at least the following information: 2. Analysis of key financial and non-financial performance indicators, having relation to the business activities, including the information on issues associated with ecology and employees. When preparing the analysis in the activity report, it is possible to include references to the amounts of costs reported in the annual financial statements and additional explanations in connection with them”. The main parameters of the non-financial declaration are presented in the same Chapter, Section III „Non-financial declaration”, in art. 48 and art.49². The statutory regulation provides that the non-financial declaration shall:

¹ Adopted in connection with the transposition of the provisions of Directive 2013/34/EC of the European Parliament and of the Council.

² According to §29 of the Additional Provisions of the Law, art.48-52 have taken effect as of 01.01.2017.

- contain a description of entity's policies concerning its activities that have been performed in the field of ecology, social issues and those associated with employees;
- include a short description of entity's business model;
- contain a description of the policies that have been adopted and followed by the entity with regard to environmental and social issues, including the activities that have been accomplished during the reporting period and the results of such activities;
- specify the imminent objectives, risks and tasks concerning the environmental and social policies including a description of such activities that would have led to unfavorable impact on the environment, employees or other social issues;
- contain a description of the main performance indicators associated with the environmental and social issues.

When a reporting entity fails to comply with the adopted policies regarding one or some of the issues (subject of the non-financial declaration), it is required that the reasons for such noncompliance with the adopted policies be clearly and duly substantiated.

3. Statutory regulation of greenhouse gas emission allowances

The European Union greenhouse gas emission trading system is a principal element of the climate change policy and is frequently quoted as a reference model for the newly emerging policies in the field of climate change in other places of the world [Retrieved from:

http://www.eca.europa.eu/Lists/ECADocuments/SR15_06/SR15_06_BG.pdf]³.

In 1994, the European Commission identified the main lines of action for the development a *Green National Accounting* framework based on satellites to National Accounts [COM (94) 670]. In 1997, an international meeting took place in Kyoto (Japan) on reduction of greenhouse gas emissions and the *Kyoto Protocol* was signed. The Republic of Bulgaria ratified the Protocol on 17.07.2002. The mechanisms for reduction of greenhouse gas emissions determined in it are:

- reduction of emissions in real production;

³ The EU emissions trading scheme (EU ETS) was introduced on 1 January, 2005 in order to allow EU states to meet the commitments undertaken under the Kyoto Protocol. Thanks to this scheme, emissions reduction is accomplished at the lowest possible price for the public due to which it is the among the key EU instruments for the reduction of greenhouse gas emissions. A degressive ceiling of the number of emission allowances was affixed for the period until the year 2020 and beyond.

- realization of investments in environmental technologies in foreign economies for the purpose of transferring the reduced quantities of a certain country (the main line in these relationships is developed – developing countries);
- greenhouse gas emissions trading.

The subject of research in this paper is the third mechanism – particularly the greenhouse gas emission allowances and the accounting aspects of the rights associated with them.

In order to identify the new accounting resources, the essential characteristics of the studied items should be clear-cut: greenhouse gas emissions and the allowances for them. The Glossary of Climate Change Acronyms in the *United Nations Framework Convention on Climate Change (UNFCCC)*, defines greenhouse gas emissions (GHGE) as the atmospheric gases responsible for causing global warmth and climate change. The categories of greenhouse gas emissions (SCOPE) are three [Retrieved from:

<http://www.environmental auditing.org/LinkClick.aspx?fileticket=4NGmDeF%2BMUI%3D&tabid=73&mid=602>]:

- the first category (SCOPE 1): direct greenhouse-gas emissions from combustion of fossil fuel, of biomass etc.;
- the second category (SCOPE 2): indirect emissions generated by purchase or import of energy (electricity, cold, heat or steam);
- the third category (SCOPE 3): all other indirect emissions caused by road transportation activities or societies.

There are three approaches known in the international practice for reporting greenhouse gas emissions: inventory, global and regulatory. The different approaches have different objectives and should be regarded in the light of community needs. The main differences refer to emissions scale and to the type of the emissions taken into consideration. The inventory approach is directed only towards direct emissions generated within the geographical boundaries of a single territory (SCOPE 1). The global methods identify all direct and indirect emissions generated by the activities on a territory or in a community (SCOPE 1, 2, 3). The regulatory method is directed towards SCOPE 1 and 2.

According to the *EU Emissions Trading Scheme (EU ETS)* one EU allowance (EUA) corresponds to the right of emitting the equivalent of one tonne of carbon dioxide over a certain period of time (CO₂), (Directive 2003/87/EC of the European Parliament, 2003). Emission allowances can be used by operators within EU ETS for their verified emissions or can be sold to other operators who need such allowances. Emission trading allows the countries that have unused emission units to sell them to countries that have surmounted their ceiling limits.

The Bulgarian *Registry of Greenhouse Gas Emission Allowance Trading* is an electronic database for administering allowances of greenhouse gas emission (GHGE), the access to which is possible in two modes – a public part and a part that requires registration. The registration based access is only for holders of accounts and is connected with the payment of a registration state fee according to the arrangements spelled out by the *Ministry of Environment and Water (MOEW)*. The Bulgarian Registry of Greenhouse Gas Emission Allowance Trading ensures the accurate accounting of the holding, issue, transfer, cancellation and withdrawal of allowances and units under the Kyoto Protocol. The Registry maintains information about:

- CO₂ emission allowances and units under the Kyoto Protocol allocated and kept in the operator holding accounts;
- Annual verified emissions for the installations;
- Execution of allowance transfer between holders of accounts;
- Fulfillment of commitments.

The national registry administrator, within the meaning of *EU Commission Regulation 2216/2004*, is the *Executive Environment Agency (EEA)*. According to the statutory provisions, the buildup, functioning and maintenance of the Registry is managed by the *Minister of Environment and Waters*, while the current maintenance and the performance of Registry's functions is undertaken by the *Executive Environment Agency*.

On an international and national scale, greenhouse gas trading is established on purely market-based principles where the pursued effect is to impose limitations and control over pollution with the emissions mentioned above. This process is accomplished at international licensed commodity exchanges closely specialized in this type of trading. At a carbon-focused commodity exchange, it is possible to conclude spot transactions, as well as forward and swap agreements. The commodity exchange principle, clearing and settlement are equivalent to security trading. The sales are realized virtually because the transactions as a matter of fact are transfer of certificates. The GHGE allowance trading mechanism is a unique system, in which it is possible to clearly distinguish the objectives and the means for achieving them. The strategic goal is to force the European and global industries to reduce greenhouse gas emissions. In order to achieve this goal, the possible approaches are three: the first approach is to develop an appropriate system of taxes; the second one – administrative introduction of penalties in case of exceeding the allowed emissions; the third one – to allocate a limited number of allowances on the market and to let the market determine the GHGE price. And since the access to the market of allowances is free of charge, they can be acquired: either through coercion to comply with the obligations associated with the emissions, or through voluntary reselling and realization of

capital profits. The ceiling limits and the trading itself are set out by quantity, by means of allowances (*permits for a certain quantity of emissions*). The total number of allowances may not exceed the administratively imposed ceiling limits. If a similar situation arises, companies shall have to buy the quantity of allowances they need from companies that have not used the entire quantity of allowances, i.e. they have reduced the emissions released in their production. The stimulating aspect of the trading is to ensure an income for those who pollute less. The condition for the use of the revenue obtained in the sale of allowances is that it should be used only for environmental projects associated with higher efficiency in the reduction of greenhouse gas emissions. The main products traded within EU are:

a/ European Union Allowances (EUA) – carbon emission permits granted to European enterprises under the European Emissions Trading Scheme (ECTE), by the EU and/or by the national governments, respectively. The companies that have exceeded their allowances can purchase additional permits from companies that have reported some extra quantities.

b/ Primary and secondary certified emission reductions (CER) – within the framework of the clean development mechanism (CDM) of the United Nations, *CER* represent certificates for pure energy and sustainable development projects in the developing countries. They can be used in certain regions of the European Union, providing opportunities for investments in projects under the Clean Development Mechanism in countries such as India, Brazil and other countries. The difference between primary and secondary *CER* refers to whether these certificates have been purchased under the CDM directly or indirectly through third parties.

c/ Emission Reduction Units (ERU) – certificates for pure energy and sustainable development projects in Central and Eastern Europe.

d/ Verified Emission Rights (VER) – this type of products are to a great extent identical with the those examined so far, however they have not been verified within the United Nations. Instead, these rights are obtained under a variety of quality standards such as ISO 14065, Voluntary Carbon Standards, (VCS) etc.

To put it in a summarized definition, after the short presentation of the GHG emission allowance trading, the „commodities” are certificates of rights and allowances which have a definitely intangible character. And the allowances are *permits for a certain quantity of emissions*. In practical terms, this is a new classification category of resources, which do not accommodate within the traditional notions of reporting entity's assets. Frameworks for their accounting and fiscal treatment have been developed from the beginning of the XX-th century, but to a limited effect. They concern both accounting items identification and the methods of their reporting and the approaches for their presentation in the financial statements. The main aspect of the research in this part and in connection

with the objectives of the paper is to clarify whether intangible assets are generated for the reporting entities holding greenhouse gas emission allowances. And if the new items can not be determined as non-current assets, then what their real nature is.

4. Recognition and presentation of greenhouse gas emission allowances (GHGE) for accounting purposes – current problems in the national accounting regulatory framework

The complexity in determining emission allowances for accounting purposes is proven by the short life of IFRIC 3 „*Emission Rights*“, adopted by IASB in December 2004, withdrawn as of 01.07.2005 and having no analogue to date. According to the stipulations in the document, emission rights issued by governments are intangible assets that have to be recognized in the accounting statements in conformity with IAS 38 *Intangible Assets*. GHGE allowances are not subject to amortization however being subject to impairment in line with the arrangements of IAS 36 *Impairment of Assets*. Each participant producing emissions is obliged to set aside provisions in conformity with IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*. During the short time of application of this Interpretation, some IASB members expressed their concern about some „accounting mismatches“ in asset's measurement, while the provision is measured at fair value of the rights needed to settle the obligation. After a review of the comments received by the European Commission with regard to the Interpretation, including EFRAG (negative advice), IASB prepared a conclusion that IFRIC 3 is an appropriate interpretation of IAS 37 and IAS 38 requirements, but that the "accounting mismatch" requires further consideration of the issue. IASB withdrew IFRIC 3 until completion of this additional analysis.

At a domestic level, the accounting and fiscal regulation of emission allowances is treated only in a *Statement of the Fiscal Policy Department of the Ministry of Finance* on the National Plan for Allocation of Allowances in the Greenhouse Gas Emission Trading for the period 2008-2012, approved by the European Commission [Retrieved from: www.minfin.bg/document/9467:1]. For the purposes of accounting and fiscal treatment under the *Corporate Income Taxation Law* (CITL), the participants in allowance trading are distributed into: enterprises, operators of installation and allowance traders. The assets recognition and the accounting treatment is viewed in the Statement from the positions of IAS and NAS, because as at 2008, both accounting bases were admissible for application. As at 2016, as provided in the new *Accounting Law* (art. 34. par. 1 - 3), the annual financial statements (AFS) of public-interest entities shall be prepared

on the basis of IAS, while micro, small, medium and large entities shall prepare them on the basis of NAS. It is permissible for the latter to choose to issue their AFS on the basis of IAS, provided that no change has been made to the basis of accounting. Therefore, the main and the valid basis for the greater part of the reporting entities is the basis of NAS, and the provisions of a statement concerning the national accounting standards are of key importance. An opinion is expressed in the Statement which, in author's point of view, could be adopted as a definition of allowances correctly reflecting their nature, that is to say: „*Allowances do not constitute rights to produce emissions; they are rather an instrument for meeting the obligation that has arisen as a result of the emissions made. Therefore, the enterprise does not receive benefits systemically over the period of emissions production.*” „It can therefore be concluded from this statement that they should not be recognized as intangible assets since they are not rights but are rather instruments for meeting obligations. Moreover, they do not cover the threshold criteria concerning the realization of economic benefits and the provision that the asset should be of substantial significance in the generation of such benefits. However, the *Statement of the MF* provides that the enterprises, operators of installations, should recognize the allowances granted free of charge as intangible assets, which should be reported in conformity with IAS 38 and NAS 38 *Intangible Assets*, because intrinsically they are identifiable non-monetary assets without physical substance. Allowances are not subject to amortization and are not amortizable tax assets, „because they do not correspond to the provisions of art. 51 of CITL”. The measurement on initial recognition is at fair value. With regard to measurements following the initial recognitions referring to entities applying the basis of accounting under IAS, it is admissible to apply the cost model and the revaluation model. Enterprises applying the accounting basis under NAS can only apply the cost model. Given that allowances are not amortizable, when determining their subsequent measurement, only the impairment losses are to be deducted from the cost pursuant to AS 36 *Impairment of Assets*. „In the event of impairment, the impairment cost is not recognized for the purposes of taxation in the reporting year but in the year of allowance derecognition (art. 34 and 35 of CITL)” [Retrieved from: <http://www.lex.bg/laws/ldoc/2135540562>]. The allowances granted free of charge by a government are determined as „government grants” (donations), according to IAS 20 and NAS 20 *Accounting for Government Grants and Disclosure of Government Assistance* and it is stipulated that they should be reported according to the procedures of the same standards. When funding/financing is accounted and presented in the annual financial statements, it is only permitted to apply the income approach in its two modifications: without derecognition of acquired asset and with derecognition of acquired asset to the amount of the grant.

It is specified for both groups of entities that „allowances are not a financial asset pursuant to IAS 32 and AS 32 *Financial Instruments: Disclosure and Presentation*, because they do not represent a capital instrument, neither a contractual right to receive cash or other financial assets.

In summary, according to the Statement of MF, entities, operators of installations, regardless of the accounting basis being applied by them, have to recognize GHGE allowances as intangible assets at fair value.

As far as traders of GHGE allowances are concerned, the stipulations are exceptionally interesting particularly for those reporting entities that apply NAS as their basis of accounting. The enterprises applying the accounting basis under IAS recognize inventories for accounting purposes, because for them they are current assets held for the purpose of being traded. „Purchased allowances fall within the scope of inventories, pursuant to IAS 2 *Inventories* and are subject to reporting under the same standard. Taking into consideration the fact that the entity holds purchased allowances only for the purpose of subsequent reselling, so therefore, pursuant to paragraph 6, item „a” of IAS 2, allowances are inventories (assets held for sale in the ordinary course of business). It is worth noting that regardless of the title of IAS 2 *Inventories*, the definition of inventories does not provide a requirement for availability of physical substance (materiality). „It is specifically underlined that purchased GHGE allowances do not fall within the scope of intangible assets, reported under IAS 38, because they are held for sale (paragraph 3, item „a” of IAS 38), due to which this standard is not applicable for them. Pursuant to IAS 32, they are not financial assets as well, neither are they assets held for sale as provided in IFRS 5 *Non-current Assets Held for Sale and Discontinued Operations*, since the latter is applied for non-current assets (paragraph 2 of IFRS 5), while purchased allowances are current assets because they are held for the purpose of being traded. The initial measurement of purchased allowances is their acquisition cost. As at the date of the financial statements, allowances are measured at the lower of cost and net realizable value (paragraph 9 of IAS 2). With reference to the sale of allowances, the difference between the sale price and their book value is reported in the statement of comprehensive income (income statement) through profit or loss. The financial result is recognized for the purposes of taxation when determining corporate tax according to the arrangements of CITL in the reporting year.

The entities, traders of GHGE allowances, applying the basis of accounting under NAS, are in a very interesting situation. According to the *Statement of MF* „pursuant to NFRSSME, purchased allowances:

- are not inventories, because unlike IAS 2, p.2 of NAS 2 *Accounting for Inventories* requires that the asset should be tangible in order to fall within the scope of the standard;

- do not fall within the scope of intangible assets reported under NAS 38, because they are purchased and held in the entity for the purpose of sale (p. 1, item „a” of AS 38), due to which this standard is not applicable to them;
- are not financial assets according to NAS 32, because they do not constitute a capital instrument, neither a contractual right to receive cash or other financial assets.

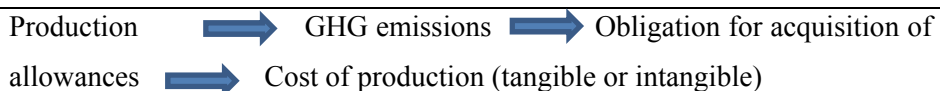
Having regard of the statement expressed, the question of reporting allowances has not been settled in NFRSSME; hence, the reporting under IAS should be applied, i.e. p. 2.1 of the present statement shall be applied.“ GHGE allowance transactions are treated as supply of services and are chargeable according to the provisions of VATL. And this is where another question generated by the *Statement of MF* arises. If an entity is at the same time an operator of installation and a trader, who has recognized an intangible asset upon obtaining the allowance, how are they supposed to account for this allowance sale transaction – as a supply of a service or as an intangible asset sale?

Taking into consideration that, in addition to operators of installations, other traders (legal or natural entities) are also allowed to take part in the GHGE allowance trading scheme and the fact that, pursuant to the effective *Accounting Law*, the basis of accounting for above 98 % of the entities are the national accounting standards, the question of how they are supposed to recognize and account for allowances still remains open. According to *Decree № 394/30.12.2015*, introducing the provisions of Directive 2013/34/EU of 26 June 2013 of the European Parliament and of the Council, amendments are made only to four NAS [Retrieved from: <http://www.minfin.bg/tdocs/1449063913.pdf>]⁴. Amendments to the remaining NAS have not been introduced, and they have not been updated since the year 2008, and the *Statement of MF* on the accounting treatment of allowances has been drawn on their basis. The only solution so far for trader entities is to apply p. 25.2. item „b” of NAS 1 *Presentation of Financial Statements* (to apply IAS on issues that lack explicit provisions in NFRSSME for resolving them, as long as these requirements are not in contradiction with the regulatory acts of the European Union in the field of accounting.), provided that the managing body has established it in the accounting policy at the beginning of the reporting period.

⁴ AS 1 *Presentation of Financial Statements* (§ 3), in AS 24 *Related Party Disclosures* (§ 4), in AS 27 *Consolidated Statements and Reporting of Investments in Subsidiaries* (§ 5) and a new accounting standard is created AS 42 *First-Time Application of National Accounting Standards* (§ 6).

5. Justification and suggestions with regard to accounting identification and financial presentation of GHGE allowances

Allowances are part of reporting entity's property controlled as a result of past events. Nonetheless, they can not be conclusively and indisputably classified to one of the existing categories of assets. *They are not for sure financial assets*, because they do not correspond to the definition of financial instruments – they are not cash, neither are they an equity instrument, nor a contractual right for exchange or receipt of cash or other financial assets. *They are not intangible assets* because they do not meet the threshold criteria for substantial use in the activities and for the realization of economic benefits of such usage. Indeed, allowances definitely do not have physical substance. But the possession of allowances does not guarantee the pursuit of activities with regard to emissions releasing CO₂. The possession of allowances is only a consequence of the pursuit of such activities. Greenhouse gas emission entitlements can not be considered to be intangible assets, i.e. pollution rights, since they do not result in economic benefits. What is more, it is possible for environmental programs to be carried out without being in possession of the respective allowances. The lack of allowances for a certain period of time does not lead to irregularities and no penalties exist for greenhouse gas emissions. There is only an obligation for the reporting entity to retribute to the state the allowances corresponding to the implemented emissions, at a specified date. The European legislation does not foresee bans on installations in case of non-fulfillment of the obligations for restitution of allowances related to emissions [Retrieved from: http://www.seringas.caissedesdepots.fr/sites/seringas.interext.cdc.fr/IMG/pdf/la_comptabilisation_des_quotas.pdf]. Hence, it is not necessary for them to be part of the non-current assets in order for the ordinary business activities to be performed. Taking these characteristics into account, the greenhouse gas emission allowances can be rather identified as a guarantee/security or authorization for activities over a certain period of time. Such an authorization issued for a period of several years could probably be identified as an intangible asset, if it also meets the rest of the threshold recognition criteria. But this authorization is clearly distinguished from the allowances, which need to be acquired due to released greenhouse gas emissions. *GHGE allowances should be treated as new, intrinsically unique „resource”*. They are not strictly physical stock of raw materials. Though their purchase is necessary for the manufacturing activities, they are not physically involved in the process of production, but only virtually. Enterprises releasing GHGE are facing a new expenditure for the production of goods and services, in consistence with the principle „those who produce pollution should bear the cost”. Emissions do not lead to direct payments to the state in the form of taxes, but to the obligation to purchase and retribute allowances to the state.



Initial measurement at cost upon recognition of GHGE allowances is suitable for the entities that purchase allowances as part of their manufacturing activity, but it does not reflect correctly the risks undertaken in the context of using the allowances as a market instrument. On the other hand, measurement allowances formed as a result of the application of the market approach are suitable in financial aspects, but they cause unwanted instability in the balance sheet items for the business. In this respect, the French model of accounting could be useful, where the acquisition of allowances for production activities is measured at nil value, and the arising obligation for the restitution of allowances to the state is only to the amount of the excessive emissions above the regulated GHGE allowance portfolio. The allowances under this approach are managed off the balance sheet, but have to be presented in the non-financial declarations of the entities [Retrieved from: www.focusifrs.com/.Livres_de_proposition_Comptabilisation].

On an international level, allowances are treated as a new type of raw material. The purchase of allowances proportionate to CO₂ emissions is inevitable for the entities releasing GHG. This purchase is connected with the production cycle. Actually, the allowances need to be managed as a resource of substantial significance for the production process. As raw material, they can be obtained for the purposes of production or for reselling them. The dual nature of GHGE as a coercive and a market instrument allows using them in two economic models: „production” model (purchase of allowances in order to meet the obligations) and „commerce” model (voluntary purchase). The „production” model is applicable for entities releasing GHG, while the model of „commerce” is appropriate for enterprises that do not release GHG. In both models, GHGE allowances are treated as specific raw material. As distinct from physical goods and other inventories, allowances are characterized by an intrinsic function associated with their statutory regulation. They are not physically destroyed by the manufacturing process and can at entity’s option be obtained prior or after CO₂ emissions. Nonetheless, the entity releasing GHG may not avoid their purchase.

6. Conclusions

The subject of GHGE allowances is not only topical at a nationwide scale, but it also generates a lot of accounting problems that need their opportune solution. In this paper, the author attempted to identify them as accounting items and to provide views on their accounting treatment and presentation in the

financial statements of the entities releasing greenhouse gas emissions and of the entities that are allowance traders. The following conclusions could be set out as a summary of author's considerations and statement presented above:

- greenhouse gas emission allowances are not intangible assets, neither are they financial assets;
- they are specific raw material (inventory) for the entities releasing GHG and a specific commodity (inventory) for the entities that trade with allowances;
- the model of obtaining GHGE allowances predetermines the approach of their accounting treatment and presentation.

The options before the national theory and practice are two, so that these specific resources can be adequately presented in terms of accounting. The first option is to revise p. 2 of NAS 2 *Inventories* by removing the restriction that only material resources can be recognized as inventories. The second option is to develop a new individual accounting standard in analogy to the French AS 21 *Greenhouse Gas Emission Allowances* [Retrieved from:

http://www.economie.gouv.fr/files/files/directions_services/cnocc/avis/avis_CN_OCP/2015/Avis_n_2015-02_Norme_21_EP.pdf], which will be expected to regulate the items, the identification and recognition approach, the measurement of GHGE allowances, the reporting model and the method of their presentation in the financial statements and in the non-financial declaration of the reporting entities.

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THEORETICAL NATURE OF DUALITY IN ACCOUNTING

Kameliya Savova*

1. Introduction

Accounting has a rich and centuries-old history. From the very origination of accounting, it has been companion to mankind. Its evolution consists in the development of accounting thought. Its formation as a practical activity and as a science with theoretical foundation and a research method is the outcome of economic, social, cultural and political factors accompanying the civilization. By preserving its identity, accounting has been established as a profession, as a system of knowledge creating unique information, recognized as an international language of business.

Accounting theories present it as an empirical and theoretical knowledge. There is confidence that knowing, understanding and applying these theories improve the professionalism and contribute for the future development of accounting science and practice.

The subject of this paper is the theoretical justification of duality in accounting.

The aim is to present the main viewpoints of accounting scholars about duality in accounting in a historical retrospection.

Some of the specific tasks required for the achievement of this aim are: clarification of the basic interpretations on accounting duality from the perspective of the economic and legal theoretical orientation in accounting.

The expected results are connected with the explanation of the nature of duality in accounting through the means of comparative analysis of its different interpretations by making summarized conclusions on its expressions.

2. Theoretical trends in accounting

The accounting theories come as a result of accumulated knowledge, of scientific comprehension of business processes, of development in knowledge. They appear to be „logical structures of different statements used to explain the scientific foundation of accounting which is built on the invariable accounting

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principle of the absolute equation of values in movement, of dual expression of property and capital” (Dobrev, D., 1946, 394-395).

The nature of business operations from the capital turnover in an entity is interpreted in a specific manner from the standpoint of science. This is the basis of formation of various tendencies in accounting.

The legal trend is the earliest one to emerge in a historical aspect due to the fact that business operations are examined according to the form of relationship they generate. This is the visible and tangible side of the activity which presumes further business activity. The economic substance of facts, phenomena and processes in capital turnover is comprehended, interpreted and justified on a later stage of the scientific thought development. This is how the major directions in accounting are formed: legal and economic. Their representatives theoretically illuminate the basic issues such as double entry of business operations in the accounts, the essence of the types of accounts, the accounting balance sheet, etc. Their economic and legal aspects should not be unilaterally perceived. Moreover, these two aspects reciprocally presume each other, they complement and develop accounting as a science.

The trends in accounting theory are harmonized at a later stage and a peculiar synthesis is accomplished between them. Nowadays, accounting is interpreted from the standpoint of its economic substance under compliance with the legal requirements, standardized approaches and policies adopted.

3. Duality in accounting – legal aspects

The legal aspect of duality in accounting is based on the following major theoretical grounds.

Personalization and generation of information about the accounts:

Duality in accounting has a fundamental significance in the history of accounting theoretical thought and has an inherent relevance (Malishev I.V., 1981). It was reflected as early as in the treatise of Luca Pacioli „Particulars of Calculations and Their Recording” (*Particularis de Computis et Scripturis*), through the presentation of the rules on the application of double-entry (dual) accounting (Pacioli, L., 1994). According to L. Pacioli, double-entry booking of business operations in the accounts helps to build an organization in order to obtain the required information both about the liabilities and about the receivable (Pergelov, K., 2005). It is obvious that the legal aspect of accounting duality is mainly applied. Still, the beginning is set for the purposes of clarifying the essence of accounts through double-entry booking: of legal relationships as rights and obligations and of the resulting changes in the property and financial position. These are efforts to economically justify business operations.

The theory of exchange is perceived as a legal substantiation of accounting duality due to the following more significant reasons:

Based on the exchange relationships, each business operation is regarded as a legal act according to which, at one and the same time, an entity derives economic benefit and another one provides for such a benefit. This is considered as duality in accounting. It is justified by the concurrent origination of a liability for the entity, which obtains, and of an entitlement to a receivable for the entity, which provides. An important circumstance is that the participants in the exchange relationships are personalized. The subject of transaction requires that both the product being sold, and the reason for such a sale, should be reflected. That is why, in business operations, in addition to the legal act of the purchase and sale, its reason started being monitored both in terms of value and functionality. Therefore, duality in legal relationships gives rise to duality in the accounting treatment of business operations as well: the seller records the entitlement to a receivable and revenue from the sale of a particular product, while the buyer registers a liability and obtaining of economic benefits of particular functional designation. The justification of double entry reflection of business operations in the accounts through the exchange of goods has a strong influence on the progressive development of the science of accounting.

The ownership relationships with regard to capital sources manifest themselves through duality in accounting as rights and obligations that are immediately connected with the owner (Sokolov, Ya. B.; Sokolov, V.Ya.; (2006), *Istoriya buhgalterskogo ucheta*, M., 90-94).

These relationships are described by the so called „logismography” which is regarded as part of legal sciences. Its author is the Italian economist Giuseppe Cerboni (dictionary and encyclopedia academician). The notion of „owner” denotes the going concern as an aggregate of opposing interests of two categories of entities: the proprietor, on the one hand, and third parties, on the other hand. That is why, business operations are described in logismography through the means of a proprietor’s account and third parties’ account. The accounting entries in these accounts are parallel and there is equivalence in value between „debit” and „credit”. A conclusion was drawn that „the amounts posted as debits to proprietor’s account are equal to the amounts posted as credits to third parties’ account, and vice versa – the amounts posted as debits to the account of third parties is equal to the amount posted as credits to proprietor’s account”. This is an expression of money and value equation. However, it is not possible to track the movement in the change of valuables both of the owner and of the third parties. This is so, because debit and credit movements on the accounts are different. Therefore, the types of business operations are of unclear substance.

The dual aspect presentation of valuables in an enterprise (reporting entities) is regarded as economic relationships embodied in assets and as legal relationships of the entity with the owners and creditors.

The balance sheet assets are viewed as an aggregate of property forms, while the liabilities are treated as a reflection of the origin of this property. It is underlined that the rights on property are of principal importance for accounting (Piyatov, M.L., 2012). Therefore, property is specified from the standpoint of legal relations, on the one hand, and on the other hand – according to its value and money estimation. In this connection, the correlation between rights and liabilities expressed by double-entry presentation reflects the economic stability of an entity.

The posting of accounting items for distinct business operations is substantiated on the grounds of the theory of causality (Pomazakov, N. S., 1929).

There is a cause and effect for each business operation. The cause is reflected on the credit side and the consequence (effect) on the debit side. This is a fundamental principle when establishing an enterprise – the proprietor invests capital and as a result of this assets are acquired. Judgements are valuable for the theoretical elucidation of accounting. The unity between property and capital is interpreted to all intents and purposes from an economic aspect. From the view point of jurisprudence, these are legal acts with a certain reason and the corresponding result (effect).

A summarized inference about the juridical treatment of accounting duality is that it is identified by posting business transactions to the respective accounts. Business transactions are exchange relationships whereby receivables and liabilities are concurrently generated. And as each business transaction is dual at its core, containing a cause and an effect, so is the correspondence between the accounts in the accounting items substantiated. The ownership relations between the sources of capital are designated as legal ones, while the manifestation of property forms – as economic relations (Stoyanov, S., Savova, K., (2015), 66-67).

4. Duality concept in accounting – economic aspects

The economic aspect of duality in accounting is substantiated by the following more important theoretical statements.

The nature of capital turnover in an entity and the resulting economic relationships are regarded as an argument with inherent features determining the duality in accounting.

One of the reasons is the need of establishing the financial result, which comes as a consequence of the ongoing quality and quantity changes of property forms in the business activity. The arising rights and obligations in the business transactions are the consequence of the dynamics in the economic substance of

material valuables. Capital is understood as the central position and in this relation duality is revealed through its constituent elements and functional structure of the assets in which it is embodied. The assertion is that the nature of accounting duality is a presentation of the movement and change of property forms the result of which are the arising legal relationships.

The economic relations in the business activity of an entity substantiate the duality from the standpoint of the changes in the value of assets (Sokolov Ya. V and V. Ya. Sokolov, 2006, 77-78). This is how the fundamentals of accounting as a science have been laid. The changes in the value of the assets are as a result of distinct and specific business transactions. Adequate requirements (principles), such as reliability, timeliness, documentation, chronologic presentation, completion, etc., are defined and applied for the purpose of generating accounting information.

The theory of exchange is adopted as an explication of accounting duality by a variety of accounting scholars – such as Leote, Gilbo, Jean Courcelle–Seneuil (France), Skubitz (Austria-Hungary), Garrison (USA), Malone (Italy), Wolf, Siver, Blatov (Russia) and many others (Stoyanov, S., Savova, K., 2015, 42-112).

The nature of exchange relationships forms a belief that exchange is at the bottom of business activity and entity's management. Each exchange transaction presumes two changes reflected as debit and credit movements in the respective accounts, and consequently in the general financial and property position. For the purpose of the effective functioning of each item, it is required that information should be generated in the entity under an account opened for such an item. This is made by analogy to the „personalization“ in the legal substantiation of duality. Due to that reason, accounting as an activity is necessary for the business entities, and most of all, for their management. In this connection, the following conclusions are made:

The substance of business transactions and their methodological presentation should conform to owner's decisions.

Rational analytical accounting, as specified by the management, is required.

The risk of mistakes also depends on the number of accounts, due to which the quantity of accounts used should be optimized.

Precision is of critical importance in accounting. That is why, it is necessary to check the movements on the accounts, on the one hand, and the equation between the amount of debit movements and the amount of credit movements in the journal and in the general ledger.

Based on the economic substance of the exchange relationships and the need of their effective control, it is possible to define the functions pertinent to accounting, such as:

Reporting function, associated with the logical classification of assets and capitals used in the business activity – own and borrowed ones;

Social function, juxtaposing the interests of different social groups;

Economic function – business processes in an entity are managed on the basis of accounting information.

From the perspective of the management and its objectives, duality in accounting is identified as a means of control of personnel activities.

To this effect, the accounts are personalized for the individuals between whom relationships and responsibilities are established. The relationships and responsibilities themselves are a result of the economic substance of property forms the movement of which generates legal relationships. It could be said that accounting is a complex discipline of economics and law. This is the reason for the Italian accounting scholar Francesco Villa to identify three segments of accounting:

- theoretical accounting segment, the substance of which is comprised of economic and administrative relationships;
- applied accounting segment concerning the rules used in the composition and usage of accounting books and registers;
- organizational accounting segment, which serves for the purposes of management and examination of accounts.

Duality in accounting is also substantiated through the nature of the balance sheet.

A number of scholars consider balance sheet to be an organizational foundation of accounting. Some of them are: I.F. Sher, H. Nicklish, O. Schmalenbach (Germany), L. Dixie (England), N.S. Lunski, R.Y. Veitsman (Russia), D. Dobrev (Bulgaria), etc. Thus, the balance sheet trend is formed in the theoretical research of accounting. Duality is substantiated by the double entry presentation of capital, regardless of its origin, as specific property forms and according to its origin. There is a constant equation between assets and liabilities in the balance sheet. Essentially, this is a dual expression of the same values reflected according to their specific form and according to their origin. They are the result of the information generated in the accounts. The duality of accounts reveals the dynamics by the changes in the accounting items. The equation of values in the changes of accounting items is actually the duality of the balance sheet itself. An account, if separately regarded, reflects the movement of the items in a distinct business transaction. In their aggregate and mutual dependency, they reveal a balance sheet in dynamics. (Dobrev, D., 1945, 22-23). The assets and liabilities exposition of accounting items in a balance sheet is the basis for the classification of assets accounts and liabilities accounts and is also a reason for double entry presentation.

The substantiation of accounting duality through balance sheet can also be identified as the genetics of accounting, as a distinctive unity of induction and deduction, of concretization and generalization, of individuality and representation.

It is a summarized conclusion about the economic treatment of accounting duality that it is identified by reflecting business transactions on the accounts as a result of exchange processes. Its essence is the reflection of the movement and change of property forms. This movement and change has identical values, which is a balance sheet in dynamics. The equation of values is grounds for the effective management and control of business activities.

The economic and legal aspect of duality in accounting has a contemporary setting. Its specific manifestation is in the following more important directions.

A detailed analytical accounting is organized for the accounts of contractors and for the individual responsibilities, which is in line with the provisions on their personalization and contributes to their effective management;

The correspondence between the accounts in the accounting items is between the participating items in the capital turnover. This is a balance sheet in dynamics.

Business transactions are the outcome of contractual relationships according to the effective legislation, which constitutes grounds for actual legal relationships. The importance of accounting for a certain enterprise and for the economy as a whole is the reason to provide for its statutory regulation as a professional activity and as a manifestation in the regulations of other statutory acts. This is the reason for the discussions about a new trend in legal activities called „Accounting law”, which is expected to determine the principles of accounting and accounting system. The „accounting law” is in unison with the economic substance of this activity and is at the core of the effective accounting practice, science and theory.

5. Conclusion

During the second half of the 20th century, accounting was established as a self-sufficient science, independent of legal, political and economic views. Accounting information is created through the means of its inherent research method for its subject of research. The evolution of accounting practices also implies development in accounting theory and methodology. Well-known is the interrelation between progress and skepticism.

Skepticism (<http://bg.wikipedia.org>) is a philosophic concept according to which there are at least two equivalent answers, at least two truthful solutions, for any question, regardless of which area of the surrounding environment it treats.

Normally, in accounting, the exact answer can be only one. In some cases, a statement of principle is expressed that the answers are more than the questions. This diversity of solutions to a particular accounting situation is useful in certain cases, while in others it causes hesitation and delay of information over time. The realization of a variant where a certain answer is suitable as a solution to more than one accounting cases could be a felicitous idea of skepticism.

Skepticism, perceived as a critical, suspicious, doubtful attitude, is also typical for the activities associated with double-entry presentation of business transactions in the accounts, i.e. with accounting duality, making accounting items, interpretation, analysis and auditing, etc. (<http://www.ippnou.ru/>). A dispute exists whether double entry is a consequence of the balance sheet or, conversely, the balance sheet is a consequence of double entry. Over time, as a result of skepticism, an inference was made that such a dispute is meaningless.

The double entry of business transactions to the accounts has enormous advantages, but this is not enough. This is so because entity's business activities are not reflected in a summarized form. Moreover, the very interpretation of double entry itself, the value of credit and debit movements, can not be made without ambiguity. On the one side, there is an explanation through the expression of their quality and value, on the other side is the interpretation of their qualitative diversity. And according to the words of the philosopher Whitehead (1861 – 1947): a clash of doctrines is not a disaster – it is an opportunity for practical usage based on the principle „Trust but verify!”

The common understanding and definition of double entry of business transactions to the accounts as an element of the method of accounting complies with the process of generating accrual-based and interim accounting information. This is the basis for reflecting accounting information under the respective items in the financial statements.

The existence of different theories about duality in accounting is a manifestation of skepticism on the following important issues:

- Specification of entitlements to receivables and liabilities;
- Ownership relationships regarding sources of capital;
- Nature of assets and capitals;
- Balance sheet presentation of accounting items;
- Correspondence of accounts in the accounting items.

The explication of the specified issues in both of the theoretical trends concerning duality in accounting is as follows:

Key aspects of duality in accounting	Legal substantiation	Economic substantiation
Specification of a receivable and of a liability	The legal contract constitutes grounds for the concurrent origination of receivables and liabilities.	The entitlement to a receivable and liability is a consequence of the dynamics in the economic substance of accounting items.
Ownership relations regarding the sources of capital	Different ownership relations with reference to the sources of capital.	Different ownership relations with reference to the sources of capital.
Nature of assets, liabilities and equity	Economic relationships are embodied in assets, and legal relationships are embodied in liabilities and equity.	The double aspect presentation of capital as specific property forms and as origin of financial sources.
Correspondence of the accounts in the accounting items	The account that is credited reveals the cause of the business transaction, while the debited account reveals its consequence (effect).	The correspondence between accounts reflects the dynamics with the changes in the accounting items
Capital turnover	Not applicable as a substantiation of duality	Need of determining the financial result (profit/loss)

Which of the specified possible answers is correct? Possibly, all of them could be adopted. This is so because double entry presentation of business transactions in the accounts can be denoted as a construction, which is not isomorphic to reality, but is suitable for the accounting practice and reveals the dynamics of the financial and property position of an entity. It appears to be the basis for determining the result of the implementation of capital turnover. It embodies the dual presentation of capital as specific property forms and as sources of finance.

Is skepticism surmountable? Yes and no. The possible logical explanation is the interest of the management. The opposite answer is built on the eternity of movement, in the immensity of knowledge, in the aspiration to perfection. Therefore, skepticism can be regarded as a continuous presence, because absolute attainment of knowledge would mean the end of evolution. The words of Aristotle come as a confirmation that „whatever causes subsequent things to be true is itself most true”.

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ONLINE PAYMENTS IN POLISH E-COMMERCE SECTOR

Grzegorz Szymański*

1. Introduction

Development and popularity of the Internet and modern telecommunications technologies have influenced the spread of e-commerce. The Internet increased the competitiveness of the e-commerce sector, enabling potential recipients to buy products in the most remote stores. A determinant of this rapid development is also a wide and easy access to information that favors making good purchasing decisions. The pace of e-commerce's development changes and it is slower than in the last few years. This slower pace is probably connected with the saturation of the market and a fewer number of new e-customers. The dynamic development of the Internet changes the roles and negotiating force of individual participants in contemporary distribution channels. Furthermore, it has a positive impact on the position of clients, as well as relationships with suppliers and contractors.

Researches carried out by eMarketer (a market analysis company) show that the value of the e-commerce market has exceeded one trillion dollars in 2012 (Emarketer). In Poland, it is estimated that the value of the e-commerce market in 2014 amounted to approx. 26.6 billion zlotys, which represented about 3.5% of the total retail trade (Mazurek, 2015, pp. 1273-1278). On the other hand, the turnover of the Polish e-commerce market in 2008 amounted to 11 billion PLN, and 13.4 billion PLN in 2009. Currently, the Polish e-commerce market is worth about 35 billion PLN, which means 8-10% growth per year, including 69% of e-shops generating a net profit. This positive trend should not be changed even by the recently discussed trade ban on Sundays, which is indirectly directed at e-shops, especially the delivery option (GUS, 2016). The high growth dynamics of the Polish e-commerce sector is also confirmed in the Internet Standard study (Internetstandard, 2016), where 18% of surveyed e-shops were established in the last year, and only 14% of these shops are on the market for more than 10 years. One of the most important determinants is the increased security of online transactions with a special payment area for clients.

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Increase of security and expanding the range of offered payment methods in online trading platforms can significantly affect the competitiveness of the entity. Customers have various requirements, habits and experiences at the e-payment level, so the analysis of these features should constitute an important element of the realized strategy. The research objective of this study is to identify popular forms and indicate further perspectives for the development of online payments in the Polish electronic market.

2. Development of the e-commerce sector in Poland

Electronic commerce, commonly known as e-commerce, includes all kinds of methods and techniques aimed at the finalization of a commercial transaction taking advantage of electronic means and devices, including the Internet, telephony and interactive TV. The most common widespread method of electronic commerce is internet commerce, so the term of e-commerce is increasingly used as a synonym of trade on the Internet. Also in this publication, the term of e-commerce will refer only to the activity that uses the Internet medium.

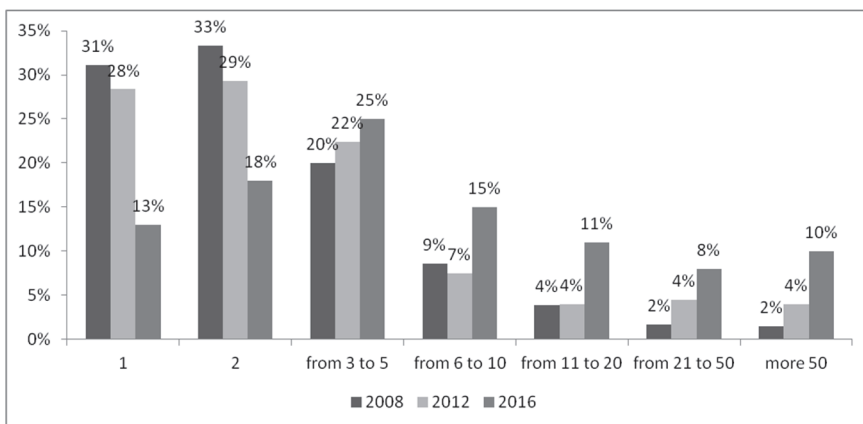


Figure 1. Number of people operating e-shops in the years 2008-2016

Source: own study on the basis of: **Internetstandard: Report 2016 E-commerce Standard**, 2008, 2012, 2016, www.internetstandard.pl/whitepaper/

According to the researches of the Polish Central Statistical Office (GUS) from 2016, 80.1% of households had at least one personal computer at home, and also Internet access (80.4%), including 75.5% of households with broadband internet. The main reason for not having access to the Internet, 70.6% of households indicated the no need to use it. Over 30% of people aged 16-74 took advantage of the e-government services. Children in the family have a significant impact on the possession of the Internet access, because 97.7% of households with children declare the possession of access to the Internet, where among childless

families this percentage is only 72%. Similar but less important is the area of residence – the difference in favor of households from large cities is almost 10 percentage in relation to rural areas. A significantly smaller difference has been identified among online shoppers – 32% of people from large cities, and 29% of people from rural areas use e-commerce. On the other hand, at the business level, companies that trade through the network more often (22 percentage points of difference) made purchases than sales. The percentage of companies making online orders was almost three times higher than companies that received these orders (GUS, 2016).

Over the past 8 years, the number of online shoppers also increased significantly. In 2008, every third entity was operated by one person, while in 2016 – only 13% of such e-shops were identified (Figure 1). The increasing number of buyers forces e-commerce managers and owners of e-commerce portals faster and more efficient service. This causes the increase in the number of employees needed to handle orders.

Initially, the development of e-commerce in Poland was limited by numerous barriers, low security level, fear of changes, lack of visible advantages and a small number of internet users. Nowadays, the increased interest in this form of shopping is driven by advantages and disadvantages, among which the most essential is no need to leave home. Moreover, the possibility to buy 24 hours a day, lower prices and easy of price comparison are important (Table 1). 55% of Polish online shoppers think that a rich offer of payment options is one of the key motivating factors. Probably this is related to the determinant in the form of convenient shopping without leaving the house. The wide payment offer in e-shop increases the trust of customers through the ability to choose the most famous and popular methods used by users. Furthermore, buyers in the online network are now more aware of existing threats, as well as rules and behaviors that increase safety. E-payments and purchases of products via the Internet are considered by the vast majority of users (88%) to be safer (Rudzewicz, 2016).

Table 1. Motivating factors for online shopping

Factor	Percentage of indications
Purchase opportunity – 24 h	84%
No need to leave home	79%
Lower prices	75%
Ease of comparing prices	68%
Ease of finding rare / specialized products	67%
Bigger assortment	66%
Various forms of payment are available	55%
Access to product information	48%

Source: own study on the basis of: Gemius: E-commerce in Poland 2015, Gemius for e-Commerce Poland, <https://www.gemius.pl/files/reports/E-commerce-w-Polsce-2015.pdf>

Creation and implementation of innovation is an important factor in the development of enterprises today, especially in the banking sector (Dzikowska et al., 2002). Also important is the analysis of customer expectations and increasing the number of forms of payment offered.

3. Essence and role of payment in e-commerce

Polish online shops offer really great opportunities of selecting a payment method (Figure 2). The most popular form is the bank transfer. From enterprise's point of view, this is the cheapest and the most reliable option, but much slower than fast e-transfers and more complicated for the customer. In the case of a fast internet transfer, the only user's task is to confirm the payment. There is no need to enter the required data, which are automatically added. 61% of Polish e-shops offer payment on receipt. This solution is probably a requirement, which increase satisfaction of customers, because it is one of the most complex and risky forms. Although credit cards are not a very popular payment tool in Poland (Szymański, 2016), over half of the surveyed e-shops offer this solution to their customers. Much less popular payments are more innovative forms: mobile applications and Bitcoins. The first purchase with the use of Bitcoins took place in May 2010. Laszlo Hanyecz, a computer programmer from Florida, wrote on the online forum that he will pay 10000 Bitcoins for two pizzas. The previous equivalent of two pizzas was approx. 41 dollars, but the dynamic rise in the popularity of this virtual currency caused that as early as July 2014, 10000 Bitcoins were worth 12 million \$ (Polasik et al., 2015), and currently (March 2017) more than 10 million dollars.

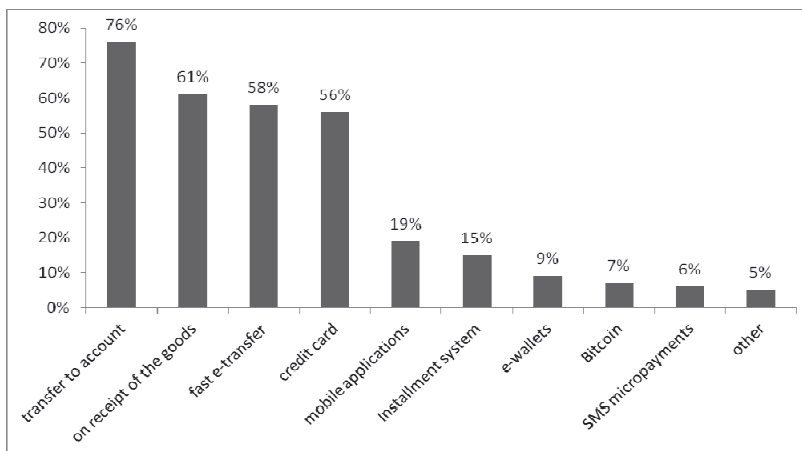


Figure 2. Payment methods available in online shops in Poland

Source: own study based on: *Internetstandard: Report 2016 E-commerce Standard*, 2016, www.internetstandard.pl/whitepaper, p. 33, (23.03.2016)

Bitcoins are one of many virtual currencies that, despite the fact that they are not very popular in Poland, have many advantages (Przyłuska-Schmitt, 2016). The installment payment system is applied only in 15% of Polish e-shops. Purchases with a greater value (mostly household equipment and computer equipment, less often – products from the travel industry) are mainly financed in this way. Online shops are able to spread out the purchase amount in installments thanks to the cooperation between banks and online payments operators. The advantage for a client is the ability to buy products, which are currently out of his reach or a single payment is too big for the client's budget.

Every fifth analyzed online shop allows clients to pay with mobile applications. According to the report of the Chamber of Electronic Commerce (Izba Gospodarki Elektronicznej, 2016) – in 2016, more than half of Internet users took advantage of dedicated mobile banking applications, and among mobile buyers – this percentage increases to 77%. Mobile payments are more commonly used by residents of large cities (over 500 thousands residents) – 58% than people living in rural areas (21%). Already at the beginning of the e-payment popularization, the most useful feature of all mobile payment methods turned out to be a traditional transfer performed via a mobile device (Chmielarz, 2009), which has now been replaced by the dedicated banking applications.

Table 2. Advantages and disadvantages of Bitcoins

Advantages	Disadvantages
The fact that financial institutions do not need to mediate in transactions	High price variability (high speculative risk)
Low maintenance costs of the Internet account	Risk of unsecured or accidental removal of own bitcoin portfolio
Higher cryptographic security in comparison to banking encryption	Risk connected with a hacker attack
Almost full anonymity of transactional parties	Ability to use in criminal activity
Speedy transactions	Too far-reaching supervision
Irrevocability of transactions	Lack of consistent international rules
Openness of the system for each network user	Anonymity of the system's creators
Global coverage	

Source: Przyłuska-Schmitt J., *Bitcoin – intrygująca innowacja*, *Bank i Kredyt* 47(2), 2016, p. 150.

Online wallets are not very common. There are provided in 9% of Polish e-shops. E-wallet is a type of a foreign currency account, where customers can deposit and manage money. In the case of this form, realization of transactions between the buyer and the seller is carried out without the bank, and funds are transferred between virtual accounts created by both parties at the payment's provider. By analyzing characteristics of e-wallets, they can be identified as mobile wallets, which (according to definition) may be defined as a set of services that allow the user to make payments in an electronic form from a mobile device.

The mobile wallet enables the use of different electronic instruments that are based on electronic money or non-cash money (Górka, 2013). An advantage (from the customer's point of view) is the ability to maintain anonymity when carrying out a transaction what significantly increases the security and reduces barriers and unwillingness to share any seller's data (Chinowski, 2013). Payment security and seller data sharing becomes a bigger in the case of online foreign purchases. The most popular foreign e-commerce website is eBay (Gemius, 2016), but the most dynamic development presents the Chinese online portal – Aliexpress. Every single month, this portal has more than 10 million visits from Poland. The vast majority of these visits are direct (39%), but almost every fourth visit is realized via Google (23%). Less popular intermediaries, which increase the number of visits in Aliexpress.pl, are Facebook (19%) and links on forums, chat rooms and other online portals (17%) (IRCenter.com, 2016). The dynamics of popularity is shown in diagram 3, where over the last 4 years, there has been a systematic increase in the number of queries in the Google search for the keyword „aliexpress” among Polish Internet users. If this trend will be maintained, Aliexpress will probably be the leader of foreign e-commerce services in Poland in the near future. The implementation of payment options – not only via credit card, but also in the form of e-wallet with the use of Przelewy24 (a famous service in the Polish community), may definitely increase the popularity of Aliexpress portal in Poland.

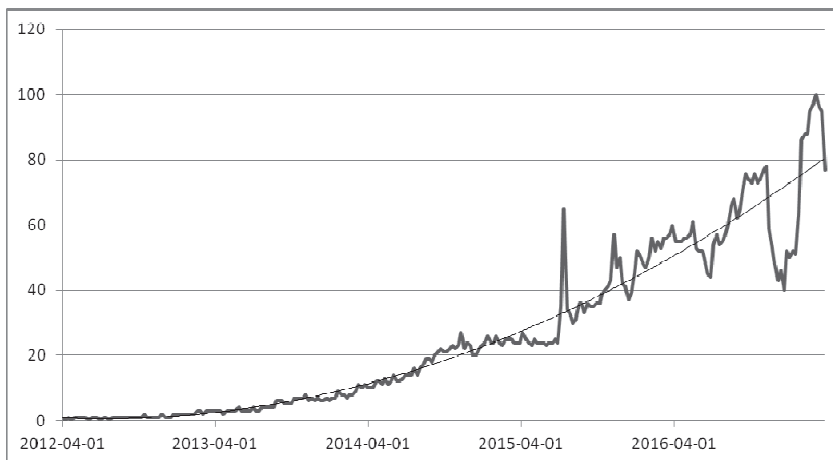


Figure 3. Number of searches for the keyword „aliexpress” among Polish Internet users in the Google search during the period April 2012 – March 2016

Source: own study based on:

trends.google.pl/trends/explore?geo=PL&q=aliexpress, (29.03.2017)

An extensive and interesting classification of payment methods from the point of view of the Internet shop was presented by Polasik and Kunkowski

(Kunkowski, Polasik, 2011) (Table 3), who made a division in terms of the moment of payment and type of intermediary. The basic intermediaries included: banks, non-bank institutions and non-financial channels. SMS micropayments, personal collection, coupons for online payments, payment networks for bills and cash on delivery payment belong to non-financial forms, where the seller does not directly use financial institutions. On the other hand, the transaction's settlement moment distinguishes three basic types, in which immediate moment is one of the most popular forms beneficial for both seller and buyer. From the buyer's point of view, a quick payment reduces the total time of purchase, and the advantage for the seller is an immediate payment, as well as access to money – this significantly improves the financial liquidity. The least convenient form for entrepreneurs is payment on receipt, because in the event of not receiving the ordered product by the client, all costs of delivery and execution of the order are covered by the seller. This form is used by buyers in order to increase the security, because the purchased product is delivered and the payment is made after this delivery. For this privilege, the recipient must pay more than in the case of instant payments. However, by offering a wide range of payment options, e-shop increases its competitiveness and the number of buyers. Lack of a favorite and checked form of payment often causes the abandonment of a shopping cart and transfer of a potential customer to another online shop. In accordance with researches of Triggered Messaging, 61% of buyers abandon a shopping cart in e-shop and they do not finalize purchases. Identification of causes and their levelling may definitely help to increase sales and profits.

Among the essential determinants, which cause the abandoning of shipping carts by Internet users, we can indicate (marketerplus), (ehandelmag):

- Need to login and create an account in order to make transactions;
- Too large order form;
- Disclosure of additional transactions costs, e.g. too expensive delivery costs, additional packing costs or shipment insurance costs;
- Lack of payment form expected by the customer;
- Unclear rules for e.g. delivery, payment or complain;
- Lack of phone number on the website;
- Confirmation of the order requires a multiple confirmation – e.g. via e-mail.

Analysis of causes concerning the abandoning of shopping carts is one of the most important methods to increase profits of the company from the e-commerce sector. The implementation of many types of payments will significantly limit one of the indicated features.

Table 3. Classification of payments methods from the point of view of the online shop's operations

Type of intermediary Moment of settlement	Non-financial channel	Non-bank payment institution	Bank
Immediate	Premium payment SMS/MMS	Online payment integrator ^{a)} Virtual payment service ^{b)} Mobile payment	e-transfer ^{c)} Payment card
Delayed	Personal collection, coupons for online payments, payment networks for bills		Bank transfer Installment credit/loan
After shipment	cash on delivery payment	Escrow type payment ^{d)}	

a) Online payment integrator – a company that mediates in many types of payments in favor of online shops. On the basis of a framework agreement, the intermediary provides an automated support for many payment channels in a manner, which does not involve a shop in this process.

b) Virtual payment service – a system that enables the transfer of payment to the recipient's e-mail address via virtual accounts. The funds, which are necessary to carry out payments, usually come from the charge of the payer's credit card. This method allows the acceptance of payments by individuals (P2P transactions). The most popular entity of this type is PayPal.

c) E-transfer (*pay-by-link*) – this solution is an online interface that automatically generates a bank transfer form authorized by the client in the online banking service of his or her bank. Therefore, it is a cover for traditional bank transfer, but high convenience of the customer and immediate notification of the online shop about the transaction creates a significant added value. A main disadvantage of e-transfers is their limitation to the national banking system (usually).

d) Escrow online account is a type of a trilateral agreement concluded between the buyer, the seller and the intermediary (in this case – a virtual payment service). Escrow account protects the seller from the risk of withdrawal from the transaction, insolvency or unreasonable refusal of payment by the buyer, and the buyer against the failure to deliver the purchased goods.

Source: Kunkowski J., Polasik M., *Wykorzystanie metod płatności w polskich sklepach internetowych*, „Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. Informatyka Ekonomiczna”, 2011, No. 22, p. 99.

Aspects of payment are also an element subject to the Polish Consumer Rights Act (Dz.U.2014.0.827). This Act states that „the entrepreneur shall ensure that the consumer, at the time of placing the order, clearly confirm that he know that the order is connected with the obligation to pay. If the placement of the order is related to the use of a button or similar function, there must be clearly and legibly marked in words „order with obligation to pay” or „another equivalent unequivocal wording”. The customer should receive clear and readable information about limits concerning the delivery and accepted payment methods. Additionally, there is also an important guideline indicating that the entrepreneur should make a repayment in the event of the customer's withdrawal from the agreement, using the same method of payment, which was used by the consumer, or the consumer explicitly agreed to another method of return, which does not involve any costs for him. These requirements cause additional restrictions for the

seller, both in the context of the preparation of regulations, as well as design and online administration of the trading platform. However, expanding the offer in terms of payments may enable the acquisition of new clients and increase the satisfaction among current customers.

According to the latest report prepared by Gemius (Gemius, 2016), among the existing forms of payment that encourage to online purchases, the fast transfer via payment service (e-wallet) occupies the first place according to e-consumers (59%). In the second place, with a much smaller number of indications, there is a cash payment with receipt of goods at the courier (39%) and cash on delivery (36%). The last two forms (from the customer's point of view) are characterized by high security of the whole transaction, because client receives the purchased product at the same time he makes a payment. However, one in four respondents is motivated by the possibility of paying via a traditional transfer. In this option, the needs to fill in all transfer details and confirm its realization. Payment via credit card at the time of ordering and payment by cash in case of personal pickup in the shop were indicated by approx. 20% of respondents. Less attractive forms of payment included: SMS (7%), BliK (6%), installment payments (4%) and QR codes (3%). Important factors are socio-demographic characteristics and experiences of respondents. By analyzing Figure 4, which presents the most motivating two forms of payment (online shopping), it can be observed that the age of customers plays a huge role. Quick transfer through the payment service is much more motivating for people aged 24-35, i.e. persons, who have recently completed their education and are likely employed. On the other hand, the form of cash payment at the courier is much less attractive for this group in comparison to other groups.

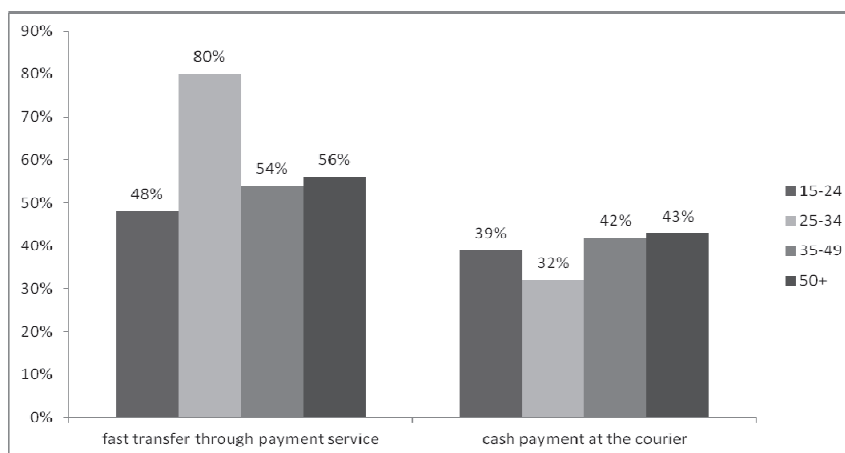


Figure 4. Selected form of payments motivating for Internet purchases according to age
 Source: own study based on: Gemius, *E-commerce in Poland 2016*, Gemius for e-Commerce Poland, https://ecommercepolska.pl/files/9414/6718/9485/E-commerce_w_polsce_2016.pdf, (27.03.2017)

Equally important disproportions were obtained in the distribution of respondents due to education (Figure 5). The vast majority of people with higher education (88%) are more motivated to online shopping by the ability to make quick payments than other groups. For people with lower education, a greater motivator is the cash payment when they pick up the purchased goods. Analysis of behaviors and opinions of customers in the context of correlation with their features should constitute the basic characteristics when defining the client's profile about the selection of a target group (undertaken marketing activities).

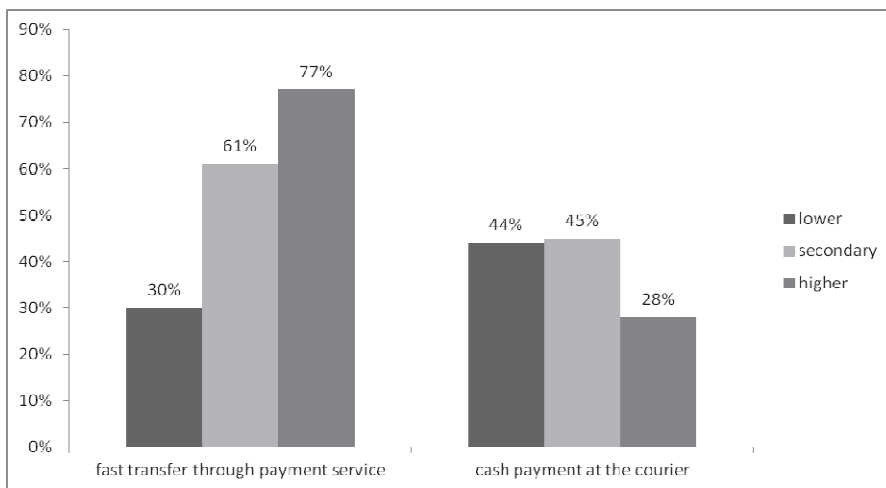


Figure 5. Selected forms of payment motivating for online purchase according to education
 Source: own study based on: Gemius, *E-commerce in Poland 2016*, Gemius for e-Commerce Polska, https://ecommercepolska.pl/files/9414/6718/9485/E-commerce_w_polsce_2016.pdf, (27.03.2017)

The presented results show that not only general results, but also more specific characteristics of respondents should be taken into account during the analysis and behaviors and opinions of customers. Generalized results can only indicate tendencies or trends in the analyzed range, but for companies operating in the turbulent environment of e-commerce sector, detailed correlations can get a significant competitive advantage.

4. Conclusion

Nowadays, the conscious client (looking for products on the Internet) expects not only low prices, but he pays more and more attention to the ability to make quick and safe online payment. An additional requirement is also the ability to carry out the transaction in various currencies, using familiar tools and reputable entities specialized in the realization of online payments. Cash payments are

replaced by non-cash payments – both in Poland and in the entire world. There is no indication that this trend may change, and forecasts indicate that it will be escalated. The forms of payments analyzed in this chapter are considered at the B2C (Business to Consumer) level, i.e. a trade based on online shops designed for an individual customer. An interesting aspect was the analysis of popularity and expectations of buyer in B2B model, which in terms of the volume of turnover in the Polish e-commerce sector represent a larger share than B2C in the global value of the e-commerce market in Poland. In the near future, online B2B platforms will intend to improve the intuitive operation, allow independent management of the user's account, enable the personalization of prices and they will be taken advantage of automated shopping recommendation systems. Moreover, product availability flow and more accurate information about time of delivery will be improved (Malinowski, Senkus, 2015). Payments in the online e-commerce sector are moving towards the mobility (Bezhovski, 2016) and intelligent support systems. More and more solutions and tools will work „in the cloud” and use elements of Big Data (Pavithra et al., 2016) and business intelligence (Suchanek, 2010).

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THE ROLE OF EMOTIONAL FACTORS IN THE FINANCIAL PHENOMENA

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1. Introduction

In the traditional literature concerning the financial markets, there are two basic assumptions stating the following: during the process of decision making, the subjects gather and use all available information in order to obtain the maximum of usefulness and they have unlimited information processing capacity which enables them to update their beliefs on the basis of new information in continuous way. Such assumptions are based on a belief that individuals act traditionally, i.e. they use all proper information available when they form expectations concerning the future economic situation. (Garcia, Roa, pp. 297-315).

The most recent study on finances suggests that in fact, the information has very little to do with the process of making the financial decision. In many circumstances, the multiple factors of psychological nature not only seem to be crucial during the decision making process, but also shape the role that information plays in them. (Garcia, Roa, pp. 297-315).

Such study has contributed to the development of a new financial concept, the so-called behavioral finances, which focuses on the behavior of investors that leads to multiple market anomalies and market ineffectiveness. This new financial concept explains the individual and group behavior through the integration of knowledge in the fields of: anthropology, sociology, psychology, finances and economics. Thanks to the use of that knowledge, said concept becomes the means to predict the situations which will take place on the financial markets in the future periods, (Park, Sohn, 2013).

The important stage in development of this relatively new knowledge branch is the application of quantitative methods in the analysis and predicting of events on the financial markets including the psychological factors being traditionally considered as impossible to measure.

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2. The financial decision making process in the light of behavioral finances theory

In the matters of traditional look at the financial decisions, the informative problems are perceived as resulting from the complexity of processes concerning savings and investments. The belief dominating for a long time stated that to make such decisions, agents must be able to predict different varieties such as: future interest rate, availability of increasing amount of various financial instruments, probable risk and effectiveness of investment, level of future salary, taxes and inflation, pensions packages concerning the particular person, in progressively complex conditions, as well as uncertain economical and financial surrounding. In accordance with this attitude, in order to make a financial decision, a person needs the information and knowledge of finances, as well as the skill of processing them. As the theory of Fisher, Hicks and Kaldor shows, the early elaborations in finances solved the problem of lack of information and processing skills by introducing the assumption of perfect agents or ideal information, or generally considering simple rules of action based on the situation of partnerships and their forecast results obtained from the financial investments, such as: net present value and internal rate of return (Garcia, Roa, pp. 297-315).

The early research on financing was developed in the conditions of economic and financial environment being much less complex than it is currently. However, along with the increase of financial and economical environment complexity, it became necessary to propose more realistic assumptions on usage and obtaining of the information, especially regarding the fact how the individuals construct the forecasts, which are used then in the decision making. return (Garcia, Roa, pp. 297-315).

In accordance with the theory of rational expectations, which assumes that the individuals use all available information in the intelligent way, i.e. they know the basic patterns of economic policy and the best model reflecting the presence. Simultaneously, the expected changes, especially recalled by the movements in the economic policy, can lead to agent's mistakes because this theory does not assume the perfection of information. However, the mistakes in predictions do not have the systematic nature because agents learn through their mistakes.

Also on the basis of rational expectations, the theories of investments and savings were developed within the frames of lives of Modigliani and Brumberg and the Friedman's theory of permanent income. return (Garcia, Roa, pp. 297-315).

In the traditional theory of investing created by Merton, and Samuelson, it is assumed that the individuals maximize the usefulness by using the information or during the process of learning, by the assumption of rational expectations. Simultaneously, it is believed that the prices of shares reflect the company's

economic condition and give the information which can be later used by agents to formulate the value of future income transfer in the forms of dividend and profits. In this case, the concept of rational expectations leads to the hypothesis of effective markets, in accordance to which, the current market prices of assets reflect all existing information referring to them as well as the future price volatility depending on the accidental and unpredictable occurrence of new information. Due to the fact that in the theory of rational expectations, they are dependent on the information, the low quality of information can lead to the faulty forecast.

As the consequence of the crisis of many traditional financial theories, the approach accepted in matter of behavioral finances was to give the alternative for the theory of usefulness maximization for better presenting of decision making processes, including the psychological factors documented by specialists of cognitive psychology (Schinckus, 2011). The elaborations concerning the behavioral finances are partly caused by the excessive trust in group and cognitive mistakes of particular individuals which lead to the excessive investments in assets bearing risk or show the excessive appetite for risk, opposite to the market signals based on the real, available and clear information (Garcia, Roa, pp. 297-315).

It results from the observed dependency in behavioral finances, in accordance with which the subjects are eager to store information which is consistent with their preferences but they ignore the opposite ones. Therefore, in accordance with the theory of cognitive dissonance, the subjects have greater trust in their beliefs than it is justified and they use only a part of available information. (Garcia, Roa, pp. 297-315) In reality, even if they process the information, sometimes they prefer to ignore it, following the impulse or opinions of others.

Shafir and Tversky (1992) analyzed this effect using „the prison dilemma” and showed that when people were forced to make a decision in the situation including uncertainty, they generally tended to reduce it by obtaining the additional information even if their final decision was not based on it. Apart from this research, other authors showed that the additional information can increase trust in the mad decision, even if the quality and accuracy of this decision is not increased. It suggests that when more information is available, people have greater trust in their beliefs than they should. This phenomenon is known as the „knowledge illusion” and it shows the tendency of growth along with the increase of difficulty in the decision making process. Subjects seek additional information even if it is inadequate, because they believe that obtaining greater amount of information will influence positively the quality of their own decision (Garcia, Roa, pp. 297-315).

The analysis of the problem with obtaining the information and dealing with uncertainty overcame by the individuals within the behavioral finances showed also the significant role of excessive trust in their own beliefs in economic reality perception. The processes of making investment decisions constitute one of the

crucial areas where people reveal, most frequently, the excessive self-esteem which in this context can be defined as overestimating of the obtained information accuracy, which brings the investors to reject the available information referring to the real value of financial assets (Benabou, Tirole, 871-915).

Another characteristic tendency for the decision making processes is occurrence of investors' belief that the available information is the most appropriate; and the assigning a higher probability of events occurring, which is easier to check, more updated and familiar. It led to the formulation of perspective theory by Kahneman and Tversky. The authors such as Goldstein and Gigerenzer, Nisbett and Sloan describing other phenomena, claim that the individuals usually seem to respond to the particular and connected statistical information in a better way than to the statistical information of general nature. It led to the strong development of investment advisory services being characterized through a transfer made by an adviser of the particular information concerning the financial instruments during the conversation which decides about the direction of the investment (Garcia, Roa, pp. 297-315).

However, the experiments conducted by DeBondt and Thaler, (1985) reveal the correctness according to which the investors, characterized by the highest self-esteem, have the tendency to enter into transactions in the more aggressive way in comparison to the others. The authors such as Baker M., Ruback R. and Wurgler J. assumed that there are both rational managers as well as irrational investors in a particular financial market. The investors can overestimate the effects of particular investment which results in the ineffective allocation of capital, rejecting simultaneously the investments with the positive value. On the other hand, the underestimated companies in a good economic condition can be forced to resign from the precious investment opportunities. (Hyoyoun, Wook, 2013).

The similar consequences holds the behavior of irrational investors of fusion transactions and takeovers. Shleifer and Vishny, while analyzing the market of these transactions, offered the temporary model of market. They assumed that because the company-purchaser is often overestimated, the purpose of overtaking is not obtaining the effect of business synergy but maintaining the temporary higher value for the long-term stockholders. Baker, Ruback, and Wurgler (2004) assumed that there are also irrational managers in the capital market who overestimate their skills and are certain that their actions lead to the maximization of company's value. They have the tendency to make exceeded investments until the time when they meet the limit of debt, however the level of over-investment decreases when they need to use their own capital to finance said investment. The development of behavioral finances resulted not only in defining the particular phenomena observed on the financial market but also made them the basis of strategy of behavioral finances. According to Bloomberg, 13 funds use the crucial concepts of behavioral finances (Table 1).

Table 1. The aims of investment funds using the concepts of behavioral finances

Fund name	Fund objective
JP Morgan Undiscovered Value Fund	To recognize irrational investors' behavior and to use it to earn excess profits in the markets
Activ Constant Profit GLB-I	To seek long-term growth
Conquest Behavioral Finance AMI	To achieve an absolute return with a long/short strategy
Activ Trend Global AMI-P	To seek long-term capital appreciation
Deka-BF Eurorenten Total Return-SA	To focus on total return
Deka-Institutionell –Protect A	To produce yields that are higher than comparable money market rates
Fund Advisors Cayaman SPC – Klio Fund	To achieve an absolute return with a long/short strategy.
Dog Fund	To seek long-term capital growth
LGT Global Activ Timer Fund (USD& EUR)	To strive for a dynamic market participation that increases equity exposure when bull markets are expected while decreasing equity exposure in bear a market.
Multi-Axxion Stockpicker	To outperform a portfolio consisting of international equities using a behavioral finance approach
HSH Strategy Sentiment LS	To seek absolute return
Maestro SICAV Lux-TBIC Global Equity Index Strategy Fund	To achieve highest possible return in the reference currency
Peccata Global	To seek mid to long-term returns & growth

Source: elaboration based on: Hyoyoun P., Wook S., 2013.

Despite the fact that from the point of view of effectiveness, the investment funds based on the theory of behavioral finances has better results comparing to other actively managed funds against the assumptions accepted by them (Hyoyoun, Wook, 2013). According to the opinion of such authors as Santoni and Kelshiker (Santoni, Kelshiker, 2010, pp. 56-72) they have no ability to predict the turning points on the market but they are characterized by the lower level of variability. The certain common deviations for all funds can be observed and they result from the behavioral factors on the market, such as the January effect. Because the funds as the investment companies constitute the important group of institutionalized participants of the financial market (Gruszczyńska-Broźbar, 2007). The occurrence of the exceeded self-esteem – as the characteristic of people managing e.g. the hedge funds – can be truly non-beneficial for the economics. It is the crucial factor that the excessive self-esteem occurs in people who are the experts in the particular field and it can lead to prevention of information processing and, as the consequence, to make wrong decisions (García, Roa, pp. 297-315). The managers of these funds, paid depending on the achieved results, can apply multiple investment techniques including the short and long positions and leverage to increase the profits and lower the risk (Łobodziński, 2014). Hedging refers

to all activities aiming at limitation of investment risk connected with the changes of prices on the markets. The increase of risk in the wallet of investment hedge fund – shaped by the instruments such as currencies, shares and derivatives – often constitutes the reason for financial crisis. (Gabryelczyk, Ziarko-Siwek, 2007).

Determining the reasons for these recessions on the basis of theories supplied by the behavioral finances and supported by the use of quantitative methods, can create the significant impact on explanation of the phenomena existing in the financial markets.

3. Measurement of the emotional factors in the financial decision making process

Since the excessive self-esteem results from the theories elaborated within the scope of behavioral finances, it is often the most important determinant of shares' prices. The authors such as Karavias Y., Spilioti S., Tzavalis E. used the econometric techniques in order to determine the degree (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6) of deviation between the market prices of shares and their fundamental value, it can be explained by the risk premium and/or the effect of investors' emotions. The subject of research concerned the moods of investors caused by the effect of „infection”. To count the fundamental values of shares, the authors used the book values and the forecast of annual profits of the companies noted in the stock market during 1987-2012. This way, they used one of the complementary methods of valuation of phenomena occurring on the financial market - the fundamental analysis – aiming at preparing the information necessary to determine the value of company and to estimate the value of its incomes in the future, as well as to determine the expected scale of changes in shares prices (Ostrowska, 2007).

Basing the shares estimation on the book value of the company and value of future profits of the company for a few periods from the future, which can be obtained from the financial statements published by the companies (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6), the authors avoided the assumption concerning payment of dividends which is connected with high uncertainty. The identification of these factors and the measurement of the power of their influence on the prices of shares, helped reveal to what degree, in comparison to the observed numbers, it can constitute the explanation of the level of the general deviation of the prices of shares from their basic values for data in cross-section of branch and for time ranges. Data used in the analysis included 37 companies of index FTSE 100, noted in the permanent way on the stock in Great Britain within 1987-2012. This period includes the range of extraordinary events, such as the crisis of stocks in 1987, 1997, 2001, 2008 and 2010, which can be caused by the influence of the behavioral factors on the prices of shares (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

The occurrence of statistical significant dependences as the crucial condition of the quantitative method application (Łuniewska, 2008, p. 18), has been used by the authors to analyze the phenomena in scope of the behavioral finances. The authors used Ohlson's model, in accordance to which, the fundamental value of share i , within time t (marked as), is determined by the book value and the discounted value of future profits, which means:

$$P_{it} = B_{it} + \sum_{\tau=1}^n \frac{\varepsilon(E_{it+\tau} - r_f B_{it+\tau-1})}{(1+r_f)^\tau} \text{ for all } i, \quad (1)$$

Where $B_{it+\tau-1}$ and $E_{it+\tau}$ mean respectively the book value of the company and the profits of company i for one share, r_f is the risk-free interest rate (known as the discount factor), $\varepsilon(\cdot)$ means the expectations operator, depending on the information set of current period it and $E_{it+\tau} - r_f B_{it+\tau-1}$, presents the over average profits of the company i in the future period $t + \tau$, these profits constitute the difference between the profits $E_{it+\tau}$ of the company i by the cost of lost possibilities to invest its capital (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). In accordance to the competitive powers, it is assumed that the profits $(E_{it+\tau} - r_f B_{it+\tau-1})$ tend to reach zero. Therefore, they are equal 0 in the formula (1), after the period of $t + n$. The model (1) does not include the risk premium and/or the results of investors' moods. These effects can explain the differences between the basic values of share price P_{it}^* , and their market value, marked as P_{it} . It is expected that the results of risk premium lead to the decrease of real (market) price of share P_{it} within time t , in comparison to its basic value P_{it}^* in order to discount the possible future losses or discount the future gains $E_{it+\tau} - r_f B_{it+\tau-1}$. Such losses may require higher expected profits of share i , comparing with those included in its fundamental value P_{it} . On the other hand the effects of investors' moods cause the tendency to overestimate price P_{it} in the periods of optimism in the market and to return towards its basic value P_{it} in the periods of financial crisis (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). To survey the relative weight of risk premium and/or the effects of emotions in explanation of inclinations of the price of shares from their basic value, i.e. $P_{it} - P_{it}^*$, the authors considered the model (2) determined by means of the following formula:

$$P_{it}^* - P_{it} = c_i + \sum_{j=1}^J \beta_{ij} Z_{ijt} + \sum_{k=1}^K \gamma_{ik} X_{kt} + \delta_i SENT + u_{it}$$

$$u_{it} = \sum_{m=1}^M a_{im} f_{mt} + e_{it}$$

for $i = 1, 2, \dots, N$

$t = 1, 2, \dots, T$, (2) where u_{it} is the determinant of mistake which represents common factor.

The model (2) concerns three different groups of variables explaining the difference between $P_{it} - P_{it}^*$ because every event is the effect of interaction between many factors (Łuniewska, Tarczyński, 2006, p. 9). The first group includes variables Z_{ijt} reflecting the influence of various specific factors for the company such as its profit rate to the price; rate of book value to the market price; and rate of dividend to the price, marked as follows: E/P, B / M i D / P. These variables can cover the factors connected with the risk premium being current in the model of Fama-French (Fama, French, pp. 23-49). It shall be emphasized that this set does not use multiple crucial variables such as: competitiveness, relationships with suppliers and recipients and technological progress (Garstka, 2009). The second group defined by the variables of X_{kt} includes k-observed macroeconomic variables reflecting the volatility of risk premium connected with the business cycle of common values for all shares i (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). The last group of determining variables includes the factors enabling to cover the effect of investors' moods (marked as $SENT$) (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

One of the model advantages (2) is that apart from the observed economical changes it enables to include m-unobserved common factors, explaining the inclinations of $P_{it} - P_{it}^*$, despite those included by means of the observed economical variables. The relative importance of these factors for the difference of $P_{it} - P_{it}^*$ can be assessed by the measurement of model adjusting such as the determination factor R^2 . Panel data methods enable to estimate the time series observations of factors f_{mt} from the residuals of model (2), obtained in a first step, by exploiting the cross-section dimension of the data (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). Table 2 includes the statistics' influence summary on the deviation $P_{it} - P_{it}^*$ of various groups of variables explaining the model (2), including the factors values of correlations between them.

Table 2. Summary statistics of price deviations and the different groups of explanatory variables of model including correlations coefficient values among all of them

correlation	Price deviations	E/P	B/M	D/P	SIZE	DF	MARKET	SENT	GROWTH	INF	TREM	EXCH
Price deviations	1	-0,08	-0,45	-0,23	0,15	-0,06	0,05	0,06	-0,05	-0,05	-0,005	0,09
E/P		1	0,15	-0,01	0,06	-0,08	-0,00	0,01	-0,06	0,02	0,07	0,02
B/M			1	0,48	-0,18	0,15	-0,06	-0,10	0,07	0,16	-0,10	-0,05
D/P				1	-0,25	0,12	-0,04	-0,10	0,02	0,08	-0,07	-0,04
SIZE					1	0,06	0,31	0,21	0,11	-0,04	0,08	0,15
DF						1	0,23	-0,24	0,65	0,6	-0,69	0,23
MARKET							1	0,17	0,13	-0,03	0,03	0,2
SENT								1	0,14	-0,24	0,4	0,31
Summary statistics												
Mean	1,49	0,13	0,56	0,04	-0,08	5,83	2,10	-0,97				
SD	3,34	1,33	0,48	0,03	0,35	(3,81)	6,87	9,89				
min	-21,23	-2,84	-1,12	0	-3,32	0,24	-16,32	-19,49				
max	23,49	26,6	4,25	0,31	1,79	14,48	13,06	24,43				

Source: elaboration based on: Karavias Y., Spilioti S., Tzavalis E., 2016, pp. 1-6.

The data concerning the market prices are obtained 15 days after the announcement day of annual financial statements from the list when they absorb the information included in the financial statements of the companies. On the other hand, the fundamental prices P_{it} are calculated with regard to the data concerning profits and book value on the day of annual financial statements of the companies. The variable, such as the size of the company „*SIZE*”, is calculated as the product of the market price of the share and the amount of shares in turnover. The variables such as the book values B_{it} and E_{it} are counted appropriately on the basis of balance and summary of gains and losses. E_{it} is used to calculate the extraordinary future gains determined as AE , by the formula:

$$AE = \sum_{\tau=1}^N \frac{\varepsilon(E_{it+\tau} - r_f B_{it+\tau-1})}{(1+r_f)^\tau}$$

where $E_{it+\tau}$ is counted for $N=5$ of future periods and forecast $B_{it+\tau}$ are obtained as:

$$B_{it+\tau} = B_{it} + \tau - 1 + E_{it} + \tau, - D_{it} + \tau$$

where: $D_{it+\tau}$ means the forecast of dividend for the share in the period $t+\tau$.

It is calculated by means of current rate of dividends payment k as $D_{it} + \tau = E_{it} + \tau \times k$. The macro economic variables used in the analysis are measured in the following way: *GROWTH* means the growth rate of GDP UK; *INF* is based on the index of prices of consumption goods of UK; *TERM* is the difference between rate of interests of 10-year-long debentures and 3-month-long treasury bill; *DF* means rate of interests for 3-month-long treasury bill; *EXCH* is the percentage change of real effective currency rate. The annual turnovers on the stock market (MARKET) are calculated on the basis of prices index FTSE100 UK. The variable presenting the sentimental factor SENT is percentage change of moods index marked as SI. This indicator is the weighted average of particular indicators of trust, such as the indicator of trust in: industrial, service, financial, detail trade and construction sectors and the rate of consumers' trust. The advantage of this model is the fact that in comparison to the consumers' trust indicator often applied in the empirical research (SI), it can constitute more representative measurement of investors sentiments maintained in the economics and at any moment (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

Table 2 presents the statistics of deviation of prices $P_{it} - P_{it}^*$ and various groups of determining variables of model (2), including the factor of correlation. As well as in other research, the results in the table show that the average values E/P , B/M , D/P and MARKET are positive in scope of the sample surveyed by the authors. Except B/M , D/P and SENT, all other exhibit substantial volatility. The average value of $P_{it} - P_{it}^*$ equals 1.5, not equal to zero at the level of 5% of importance which is coherent with the hypothesis of investors sentiments, stating

that $P_{it} > P_{it}^*$, as the result of excessive optimism. However, the standard deviation and the minimal value of $P_{it} - P_{it}^*$ registered in the table exhibit that there is great probability of negative values of $P_{it} - P_{it}^*$ for example: $P_{it} < P_{it}^*$ for a few cases given in the sample which is consistent with the risk premium hypothesis (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). Finally, the results in the table reveal that there is low level of correlation between the specific variables for the company and the macroeconomic variables of model which mean that those two different groups of data can be treated as the independent risk sources. The variable connected with sentiments *SENT* seems to be more correlated with the macroeconomic variables *TERM* and *EXCH* than with the variable concerning the economic growth *GROWTH*.

To evaluate the relative meaning of sentiments and the effects of risk premium influence in the explanation of deviations of $P_{it} - P_{it}^*$, the authors conducted the calculations of model for five different specifications. The first one concerns in the model only those variables being connected with the effect of sentiments changes i.e. *SENT*, and second one included only a group of company specific variables such as (E/P, B/M, D/P, size). The third specification includes only the set of macroeconomic variables (*GROWTH*, *INF*, *TERM*, *EXCH*, *MARKET*), and the fourth one concerns simultaneously all aforementioned groups of variables. Last but not least, the final – fifth – specification of the model includes the unobserved factors which had the significant influence on $P_{it} - P_{it}^*$. Despite the aforementioned, there are also two other specifications of the model. The first one uses the percentage change of consumers' trust index, marked as *CC*, instead of the variable concerning the emotions *SENT*, while the second one includes the variable *CRISIS* being useful in covering the effects that are often connected with the periods of financial crisis, where the prices of shares P_{it} tend towards the primary values of P_{it}^* . The interaction of *CRISIS* with *SENT* (or *CC*), defined as $CRISIS \times SENT$, enabled to catch the negative effects of sentiments for the P_{it} prices of shares.

In accordance to the results obtained by the authors, the variable influencing the sentiments of investors (*SENT*) has the significant and positive impact on the deviation of prices $P_{it} - P_{it}^*$ of all alternative specifications of the estimated model. This variable, in reference to the company specific variables or presenting the macroeconomic situation, explains the significant part of whole variability of $P_{it} - P_{it}^*$. The important conclusion from the model on the basis of the deviation estimation concerning the variable which refers to the sentiments is that in normal periods 1% growth of economic sentiments causes the increase of P_{it} price of 2 pence in reference to P_{it}^* , ceteris paribus. The role of variable as the rate of consumers' trust *CC* is also significant at the level of 8%. The negative calculations of deviation for *CRISIS* and $CRISIS \times SENT$ are also agreeable with the forecasts concerning the sentiments

influence on the shares prices in the period of financial crisis. They are caused by the amendments of shares prices P_{it} in regard to their primary values P_{it}^* (Karavias, Spilioti, Tzavalis, 2016, pp.1-6). The following correctness which can be observed, concerns the fact that the specific variables for the company explain higher percentage of entire price change for $P_{it} - P_{it}^*$ than the macroeconomic ones.

The connection of these two groups significantly increases the explanatory power of model (2) which as R^2 reaches the level of 22%, while including in model the unobserved factors increases the explanatory power of model by only 2%. These results exhibit that the majority of volatility $P_{it} - P_{it}^*$ can result from the unsystematic factors ("economic noise") which are not connected with the systematic factors of f_{mt} and other groups of observed variables.

Analyzing the impact of specific features for the company and the macroeconomic variables on $P_{it} - P_{it}^*$, the bilateral dependence for B/M and D/P can be revealed to be in compliance with the hypothesis concerning the risk premium. It can be explained that the growth of B/M or D/P which influences lowering the price of shares P_{it} relatively to P_{it}^* , compensates to investors the possible loss of development of company and gains possibility in the future (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

In reference to the macroeconomic group of variables, the results of research reveal that TERM, EXCH and DF have crucial influence on the volatility of shares prices in reference to their fundamental value, at the level of 5%, in all specifications of the considered model. The role of economic growth (GROWTH) is significant at the of 5%, only for the specification of a model without factors f_{mt} level (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

The negative estimations of deviation indicators (TERM and DF) can be considered as reflection of potential losses in the share prices caused by future increase of interest rate, and in case of GROWTH, it can mean the worsening conditions in the future perspective of companies' development. Additionally, the positive sign of EXCH deviation can be connected with the fact that the growth of effective real currency rate means the improvement of the international competitiveness with the national economics which decreases the risk of share price.

To check if the above conclusions are applicable in reference to the endogeneity terms resulting from the current correlation between the determining variables and the category of mistake, the estimations of model (2) were presented excepted the non-observed factors f_{mt} , based on the first difference, 2-leveled estimator GMM. Instead of factors f_{mt} , to cover the adjustment of share prices in the past to $P_{it} - P_{it}^*$ all estimated specifications of the model include the dynamic repressors as the deviations from price of one period earlier $P_{it-1} - P_{it-1}^*$. The results for the modified version of a model confirm the strong influence of investors' sentiments on the difference $P_{it} - P_{it}^*$. As before, the negative

calculations of deviation factors of CRISIS and $\text{CRISIS} \times \text{SENT}$ (or $\text{CRISIS} \times \text{CC}$) reflect the amendments of prices P_{it} to their basic values P_{it}^* , occurring in the periods of financial crisis. The role of other determining variables in the model is different only for SIZE because in the modified model, its determining force grows up to 5%, in all versions of model, including the influence of financial crisis on $P_{it} - P_{it}^*$. The positive relation between these variables can reflect the opinions of investors concerning the shares of big companies' capital which are connected with lower risk of bankruptcy due to their size, and which cause higher offered prices in comparison to the small companies (Baker, Wurgler, 2006, 1645-1680). It constitutes another proof for the behavioral attitude to the share valuation.

4. Conclusion

The recalled model of the estimation of the price of shares – based on the forecast of incomes conducted by the analysts and the book values – shows that the inclinations of shares market prices from their basic values can be explained both by the risk premium as well as the effects of the investors' moods. It constitutes the clear evidence of the significant progress in development of relatively new knowledge branch – which is the behavioral finances – by the possibility of applying the quantitative methods to analyze and the psychological factors being traditionally considered as impossible to measure. The use of econometric models enables to catch the significant influence of optimism on the overstating of current prices of shares in comparison to their basic values in the periods of normal business cycle and the influence of negative moods of investors on the return of shares prices to their basic values of financial crisis. The authors of the recalled model showed that the effects connected with the risk premium can be caught by the particular variables such as the relationship between the price and the book value and dividend and the size of the company, and the macro economic variables such as spread between the long-term and short-term earning capacity rate of legal papers, the rates of interests change regarding 3-month long credits and the effective real currency exchange rate. The quantitative methods confirm also the increased correlation between the macroeconomic variables than the microeconomic ones' and the investor's mood (Baker, Wurgler, 2006, pp. 1645-1680). The development of quantitative methods to measure the phenomena occurring in scope of the behavioral finances will result in better understanding of observed values on the financial markets, which must be nevertheless conducted all the time in scope of the theories worked out in cognitive psychology as well as the traditional finances.

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THE ROLE OF DIRECT TAXES IN THE STATE BUDGET STRUCTURE REVENUE – THE CASE OF BULGARIA AND POLAND

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1. Introduction

Taxes are the main source of revenues in the public finance sector because higher tax rates lead to higher average consumption of public goods². In the early nineties Tanzi and Shome (1992) stated that the importance of the structure of taxation is directly related to the stability of the macroeconomic framework. The more stable the macroeconomic framework, the more important becomes the tax structure. Tanzi has observed the tax policy appears among the four East Asian most successful countries so called ‘Asian tiger economies’ (Singapore, Hong Kong, Taiwan, South Korea-) since 1987 (Tanzi, 1987). Some of these countries had very low income tax rates on both individuals and enterprises, but others did not. In general income tax rates were not particularly low in these countries, except in Hong Kong. Furthermore, the tax environment for investors and decision makers in general was quite stable, since tax rates were kept essentially unchanged over decades and the structure of taxation was left intact over many years. Thus, the playing field was not just levelled across investments at one moment of time but also over time. These low rates were assumed to stimulate high savings and to encourage the use of that saving in the most productive activities. The 1997 Asian financial crisis affected all four Asian tiger economies. However, the four ‘Asian tigers’ recovered from the 1997 crisis faster than other countries due to various economic advantages including their high savings rate (except South Korea) and their openness to trade (Woodall, 1998). The 2008 financial crises redirected an interest to the emerging economies. In recent years, tax reforms were carried out in most EU countries. They were focused on reducing the tax burden (European Commission, 2015). Nowadays fiscal reform and the role of government in fiscal policy are still the subject of discussion between academics and policy makers. Every EU country prepares a convergence or stability programme every year in which there is a medium – term fiscal programme including issues about taxes.

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¹ Economists groups of OECD confirmed the results obtained in earlier publications, that high tax burden adversely affect the level of GDP per capita (Cotis, 2005).

Direct taxes are taxes imposed directly on the income or assets of the taxpayer.

Direct taxation is related to the taxpayer's income and wealth situation. Taxpayers' income is taxed according to their size and organizational and legal form. Legal and physical persons are taxed separately. Taxation of corporate income is different from the taxation of income earned by natural persons. Personal income tax is personal tax, it takes into account the personal situation of the taxpayer, for example: the state of the family, the amount of income. Corporate income tax is a direct and mandatory tax. It is a state tax, and is of a lucrative and material nature.

According to Mankiw and Taylor direct taxes could be substituted by indirect taxes. Tax consumption is directed automatically on the saving accounts and it is motivating to increase savings (Mankiw, Taylor, 2009).

Referring to Tanzi and Shome (1992, 1987) conclusions about the importance of structure of taxation for the stable tax environment for investors and decision makers author has decided to compare direct taxes revenue in Bulgaria and Poland. The first country is example of low stable taxes (10%) started in 2008. The second one is connected with decreased progressive scale from top rate 40% to 32% started in 2008, too.

The question arises: what is the role of direct taxes in tax revenue State Budget in time of crisis (2008) and in post-crisis year (2014). One can assume that the decline amount of direct taxes ratio can encourage to substitute direct taxes by indirect taxes. The governments of EU countries are looking for the renewed sources of revenues.

One should remember that successful Asian countries had so called 'small budget' it meant budget State revenue less than 30% GDP and welfare state countries had 'big budget' with State budget revenue above 40% GDP. Bulgaria is an example of 'small budget' country and Poland in contrary is a case of 'big budget' with State budget revenue higher than 30% GDP. Fiscalism is defined as the participation of the state in primary income factors of production. One of the fiscal measures of the state is the *tax ratio*, which is the relation of tax revenues to GDP. This is a macroeconomic measure of the burden on national tax authorities, which in this way co-finance the activities of the state (Grądański, 2004).

The purpose of the paper is to present the role of direct taxes in the structure of the state budget under conditions of crisis and post-crisis (conditions of economic stability).

In order for the purposes to be accomplished, this study proceeds as follows: first section is introduction with briefly literature review. The second one recalled standards functions of taxes as they are important to go on with the role of direct taxes on the state budget. Then the analysis of income revenue structure in Poland

was presented. Next section was dedicated to comparison of direct income revenue structure in Bulgaria and Poland. The conclusions are the last section.

2. Tax functions

The role of taxes on the economy and the effects of this impact are reflected in the tax functions. In the market economy, taxes are attributed to three basic functions: fiscal, regulatory and stimulating (Wolański, 2009, p. 27).

The fiscal function is the oldest function of taxes. In the past it was the only function. The fact is that taxes play a major role in the supply of budget revenue. The fiscal function is universal, which means that each tax fulfils it. Not all taxes have the same efficiency, they perform this function to varying degrees. The best example of fiscal function in Poland are four of the most efficient taxes: goods and services tax, excise duty, personal tax, corporation tax (Wolański, 2009). The fiscal function is understood broadly, it covers elements of social and economic policy, including the form of sharing of national income. In this sense, the differences between the fiscal function and other non-fiscal functions are blurred (Ofiarski, 2006).

The stimulus function is to use taxes so that they are as favourable as possible for the economy and stimulate the achievement of appropriate financial and economic results. Stimulation may involve the introduction of specific taxes, the differentiation of tax rates, the use of increases, reliefs and exemptions (Głuchowski, Patyk, 2011). Properly designed reliefs, exemptions, exemptions from economic tax bases should motivate the taxpayer to make or expand business in a given area so that in the future, thanks to the development of these fields, there will be achieved the highest tax revenues (Wolański, 2009, p. 31).

Other tax functions may have derivative and complementary functions in relation to the fiscal function.

The regulatory function rely on shaping the income and assets at the disposal of the taxpayer. Part of the income in the form of taxes is transferred from economic entities to the state budget, where it serves the functions of the state such as education, health, defense, etc. It is essential in the regulatory function to allow the taxpayer to leave the choice between action and omission. Tax intervention can not limit the taxpayer's right to choose between spending his income on investment or consumption, between saving and spending on investment or consumption (Ofiarski, 2006). Some authors claim that taxes can perform financial, economic and social function (Etal (ed.), 2008). Literature study show that high-tax countries have been more successful in achieving their social objectives than low-tax countries (Brooks and Hwong, 2006). The social function of taxes is to protect selected social groups from excessive fiscalism.

3. Analysis of budgetary revenue in Poland in 2008, 2015-2016

Among the direct tax group, taxes on income and wealth are presented as they affect the state budget. Other direct taxes are the source of the municipal budget. Therefore, the analysis of the role of direct taxes on budgetary revenue will focus on income taxes. This will be income tax from natural and legal persons. The figures will be presented in zlotys and in % of GDP.

The budgetary revenue analysis was carried out for 2008 and 2015-2016. The financial crisis in 2008 should reduce tax revenue coming from income taxes. In the crisis, people lose their jobs, businesses sell less goods and services. Taxes on income are paid on fewer employees and lower profits. In Poland in 2015-2016 we have a good economic situation, the economic union is positive and the unemployment rate in Poland remained at a low single-digit level. It appears that budget revenues from direct taxes in these two periods should differ and show the importance of income taxes under conditions of crisis and economically stable conditions.

In 2008 the biggest budget revenue was from the goods and services tax. The second place, due to the size of receipts, was personal income tax and the third one was corporate income tax. In 2015, income taxes also had a lower share of budget revenue. It is easy to see that direct taxes are not the most important tax revenue. The sum of income from income taxes in Poland is almost the same as the tax on goods and services.

Table 1 figures the budget revenues in Poland in 2008, 2015-16. Corporate tax revenues were higher during the financial crisis year than in 2015. The income from personal income tax was higher in 2015 than in 2008.

Table 1. Amount of budget revenues in 2008, 2015-2016 (in PLN)

Type of taxes	2008	2015	2016
Corporate tax	34.635014	32.894156	17.673301
Personal Income tax	67.193526	83.140 145	40.723115
Tax on goods and services	101.782739	123.120798	62.441522
Excise tax	50.490 116	62.808633	31.098183
Taxes abolished	3456	60	2
Tax Game	1.404861	1.337125	716895
Total tax revenue	255.509712	303.300 917	154.053718

Source: <http://www.finance.mf.gov.pl/budzet-panstwa/wnywy-budzetowe/-/document>.

Table 2. Percentage share of individual taxes in budgetary revenue in 2008, 2015, 2016

Specification	2008	2015	2016 ½ year
Corporate tax	13.55%	10.84%	11.47%
Personal Income tax	26,29%	27,41%	26,43%
Tax on goods and services	39.83%	40.59%	40.53%
Excise tax	19,76%	20.70%	20,18%
Game tax	0.54%	0.44%	0.46%
Abolished tax	0%	0%	0%
Tax on some financial institutions	lack	0.01%	0.90%
Total tax revenue	255.509712	303.300917	154.053718

Source: own calculation based on <http://www.finanse.mf.gov.pl/budzet-panstwa/wnywy-budzetowe/-/document>

The share of personal income taxes in budget revenue is similar in 2008 and 2015. In 2008 it was – 26.29% and in 2015 it was – 27.41%. It is different from corporate income tax. In the year of financial crisis 2008, the percentage of tax revenue was higher than in 2015 and amounted to 13.55% and in 2015 it was only 10.84%.

4. Direct taxes revenues in Bulgaria and in Poland in (2008, 2014) comparing to EU28

In 2015, tax revenue in the EU-28 remained relatively equally distributed between net social contributions (13.2% of GDP), taxes on production and imports (13.6%), and current taxes on income, wealth, etc. (13.0%).

For the EU-28, the share of current taxes on income, wealth, etc. has decreased from 2007 to 12.1% of GDP in 2010, but showed an increase of 0.8 pp of GDP in between 2010 and 2013, stagnated between 2013 and 2014, before increasing slightly to 13.0% of GDP in 2015 (European Commission, 2015). From 2008 to 2009 the share of direct taxes decreased more than GDP and the fall in direct taxes was more pronounced than the fall in indirect taxes.

Table 3 and 4 present revenues income structure in Bulgaria and in Poland in 2008 and in 2014. It is easy to notice the difference significantly in direct taxes revenue in Bulgaria and EU 28. It was respectively 6.3-5.5% GDP; 12.0-13.0% GDP. Poland experienced higher level of direct taxes revenue than Bulgaria but still lower than EU 28. It was respectively 8.4-7.0% GDP; 6.3-5.5% GDP; 12.0-13.0% GDP.

Table 3. Structure by type of tax in Bulgaria in 2008 and 2014 (% GDP)

Structure by type of tax	2008	2014	Change
Indirect taxes	14.6	12.9	-1.7
Direct taxes:	8.4	7.0	-0.6
– Personal income taxes	5.3	4.6	-0.7
– Corporate income taxes	2.7	1.7	-1.0
– Other	0.4	0.6	0.2
Social contributions	11.4	12.3	0.9
Total tax revenue	34.4	32.1	2.3

Source: own calculation.

Table 4. Revenue tax structure by type of tax in Poland in 2008 and 2014 (% GDP)

Structure by type of tax	2008	2014	Change
Indirect taxes	16.9	14.5	-2,4
Direct taxes:	6.3	5.5	-0.8
– Personal income taxes	2.7	3.1	0.4
– Corporate income taxes	3.0	2.0	-1.0
– Other	0.6	0.4	-0.2
Social contributions	7.4	7.7	0.3
Total Tax Revenue	30.6	27.8	-2.8

Source: own calculation.

According to Bulgarian convergence programme 2009, GDP growth in Bulgaria increased by 6% in 2008. In 2010, a recovery of the Bulgarian economy was expected to start in the second quarter, with real GDP growth rate accelerating to 0.3% on an annual basis. Bulgarian GDP growth accelerated to 0.9% in 2013, while being 0.6% in 2012. In 2014 the Bulgarian GDP growth accelerated to 1.7%. In 2008-2014 Poland also was a country with one of highest GDP growth among EU28 countries.

In EU 28 in the crisis, taxes on the income or profits of corporations experienced a decline in 2008 and further decreased in 2009. It is interesting that the same taxes in Poland and in Bulgaria decreased further in post-crisis year 2014. Corporate income tax had a trivial role in both countries in 2014. The main components of direct taxes in Poland was tax on the income of individuals. It was 5.3% GDP in 2008 and 4.6% GDP in 2014. The different situation was observed in Bulgaria as the both of direct taxes had nearly the same amount (Table 3).

The direct taxes ratios are higher in Poland than in Bulgaria. Both countries experienced the same decline in corporate income tax between 2008-2014. It was 1 pp. It was connected with decrease of economic growth in Bulgaria from 7% in 2008 to 1.7% in 2014 (Ministry of Finance 2009). It should be noted that personal income ratio in Poland increased in 2008-2014 by 0.4 pp. It could be caused by decreasing the top rate income personal tax from 40% to 32%. It seems that further reform base on successive decreasing tax rate can cause higher income tax revenues for the state budget. On the other hand Bulgarian's experience with low tax rate 10% for both direct taxes do not encourage to apply too low tax rates in Poland. Direct taxes ratio in Bulgaria and in Poland are significantly different from the direct taxes ratio in EU 28 countries.

5. Conclusion

Direct taxes are not the most efficient taxes for the state budget in Poland and in Bulgaria. Their tax ratios have second place after the tax on goods and services. Income taxes from individuals in Bulgaria is more important to the state budget than corporation tax. In Poland the sum of two income taxes is almost the same as the receipts from the tax on goods and services, so one can say that direct taxes are very important for tax revenue of the state budget.

The stimulus function is to use taxes so that they are as favourable as possible for the economy, and stimulate the achievement of appropriate financial and economic results. It seems that direct taxes also act as a stimulant, and especially personal income tax, as the proceeds of this tax are increasing. The stimulus function of corporate tax can be play an important role in Poland from 2017 because its rate has been reduced from 19% to 15%.

It seems that the regulatory function of corporation tax will be less important in Poland because starting from 2017 only 15% of income will be allocated to the needs of the state and it had been 19% before. Polish tax rates in the personal income are 18% and 32% and have not changed recently. In Bulgaria there is flat tax 10% for every direct tax. The lower tax rate can cause smaller amount of direct tax revenues in Bulgaria than in Poland.

The economic function of the tax is realized by influencing the economy. Lowering corporate tax rates may be an example of low taxes as an instrument for boosting growth.

Direct taxation also plays a financial role, which consists in equipping public-law entities with financial resources for the implementation of public tasks.

Direct tax revenues have played the important functions: fiscal, stimulating, regulatory, economic and financial. They are the second most important income for the state after receipts from the goods and services tax in Poland and in Bulgaria

and it goes in parallel with European trends in Taxation in EU28. (Tables 1 and 2). The main components of direct taxes are taxes on the income of individuals and corporations. In the crisis, taxes on the income or profits of corporations experienced a decline in 2008. Direct taxes have taken longer to recover.

Because of differing national tax structures, indirect taxes, direct taxes and net social contributions vary considerably in importance from country to country in terms of the tax revenue they generate. The role of direct taxes in the structure of the state budget measured by 'tax ratio' was bigger under conditions of crisis than in post-crisis (conditions of economic stability). The policy makers could consider further tax reform base on successive decreasing tax rate that can cause higher income tax revenues for the state budget. After analysis Polish and Bulgarian case one can assume that the decline amount of direct taxes ratio in the recent years can encourage policy makers to substitute direct taxes by indirect taxes. On the other hand literature study show that low-tax countries have been less successful in achieving their social objectives than high-tax countries.

The conducted analysis have the preliminary character and can be continue in further research.

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