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Barriers of Activity-Based Costing Implementation in Polish Companies

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To my parents
Wioleta Miodek

To my beloved wife, Renata
Tomasz Wnuk-Pel

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INTRODUCTION

Since it originated in the late 1980s, the concept of activity-based costing (ABC) has been quite popular among companies all over the world, mainly due to the fact that there has been a large number of publications and courses related to the concept. Additionally, the concept became incorporated into university curriculums. However, implementing ABC is not easy. The process of implementation is complex and requires a lot of resources. Despite the fact that the concept of ABC has been known and used by companies since the 1980s, it has not diffused widely and it is still perceived as an innovation. The differences in the diffusion of ABC among countries stem from the different stages of management accounting development, different sampling, and different times when the research was conducted.

The majority of studies carried out so far in Poland on the concept of ABC focused on determining the scope of ABC use, and they explained the problems and barriers related to the process of ABC implementation to a minor extent. Another issue that has not been investigated in more detail is the identification of factors influencing the use of ABC. The first studies which proved the existence of ABC in the practice of Polish companies were conducted in 2000 by Sobańska and Wnuk. Later studies revealed only a few cases of ABC's adoption. More in-depth research on the problem of ABC diffusion in Polish companies was carried out by Karmańska (2003), Januszewski and Gierusz (2004) and Wnuk-Pel (2006, 2009, 2011, 2014). All the previous studies showed that the number of companies using the ABC system, implementing it, or planning to implement it, was growing, yet there were cases when companies abandoned ABC.

In the light of the previously mentioned facts, filling the identified research gap, i.e., the analysis of the scope of ABC use and the barriers to its implementation, seems very important. This study mainly aims to determine the level of ABC diffusion and identify the barriers to adopting this system in Polish companies. The general objective of this study is met through accomplishing several specific objectives, in particular:

- the development of the concept of ABC and its diffusion around the world as a reference point for further detailed research on the functioning of ABC systems in Polish companies;

- the scope of ABC implementation in Polish companies at the beginning of the 21st century in the light of ABC diffusion in the world;
- the factors which facilitate ABC implementation in Polish companies;
- the ways that information from ABC is used in companies;
- the key reasons underlying the lack of interest in ABC implementation from the perspective of companies which abandoned implementation or never considered it;
- the key difficulties related to ABC implementation from the perspective of companies which are considering its adoption.

In order to achieve the main goal and also specific goals of the research, two research methods have been applied: a literature study and survey research.

1. In terms of the literature study, both Polish literature and foreign publications have been analyzed. Such extensive literature studies enabled the authors to formulate their own findings and compare the findings with other research carried out in Poland and other countries.

2. In order to achieve the main objective of this work, survey research among Polish companies was performed. A questionnaire survey was applied as the research tool. It consisted of two parts: questions related to the general characteristics of the surveyed companies and questions related to the issue of ABC. The questionnaire was completed by 167 companies, although only 143 correct questionnaires were qualified for further analysis. The questionnaire was performed between December 2014 and May 2015. The data for analysis was collected by means of anonymous questionnaires sent by e-mail to companies trading on the Warsaw Stock Exchange and NewConnect; the questionnaire was also uploaded onto the goldenline.pl website. However, the majority of questionnaires were directly obtained from students of postgraduate studies and Master of Business Administration (MBA) programs. The Statistical Package for Social Sciences (SPSS) was used to analyze the data. It needs to be stressed that the results of the study should be interpreted with caution due to the non-random sampling, thus, the results should not be generalized in terms of all companies in Poland. On the basis of the conducted surveys, the following specific hypotheses have been verified:

- ABC has little popularity in Polish companies;
- ABC implementation is influenced by such positive factors as: production type of company, company size, foreign capital share, the level of competition, the diversity of the manufactured products, and the share of indirect costs in total costs;
- companies use information from ABC to calculate product costs, to streamline budgeting, to perform profitability analysis, to carry out analysis of activity and process costs, to set prices, to evaluate performance, to design new products and reduce non-value adding activity costs;

- the reasons behind the lack of interest in ABC mainly include: satisfaction with the current system of cost accounting, staff resistance, high implementation and maintenance costs, difficulties with the model's construction, a lack of management board support, inadequate computer software, and uncertainty of the benefits resulting from ABC implementation;
- the difficulties related to ABC implementation anticipated by companies considering ABC implementation include: problems with the model's construction, high costs of implementation and maintenance, staff resistance, and insufficient IT resources.

3. Additionally, apart from the above research methods, a comparative analysis of the author's own research with similar research conducted both in Poland and around the world has been carried out.

The monograph consists of five chapters. The first chapter analyzes changes in management accounting at the turn of the centuries and factors which have contributed to those changes. Problems related to using traditional systems of cost accounting in modern companies in relation to those changes have also been presented, and it was also shown how these problems may be solved by means of ABC.

The second chapter presents the stages of ABC development, beginning with the first version of the system from the late 1980s, through all the transition concepts (the second and subsequent generations of ABC) and ending with time-driven activity-based costing (TD ABC) and resource consumption accounting (RCA), concepts that originated at the beginning of the 21st century.

The third chapter analyzes previous studies on the use of ABC in Poland and around the world. In particular, it pays attention to survey research which focused on the diffusion of ABC, factors affecting the decision about the implementation of ABC, and research on problems related to its implementation.

The fourth chapter presents the research methodology, i.e., the problem and the research objectives. The research hypotheses are presented, and the applied tools and research techniques are characterized. Moreover, this chapter presents the applied methods that ensure the credibility and reliability of the questionnaire research.

The fifth chapter presents the analysis of the obtained results and verifies the research hypotheses. On the basis of the responses to the questionnaire, the status of ABC in Polish companies has been determined. Additionally, familiarity with the ABC system, the areas of its application, factors conditioning its implementation, as well as opinions about possible future implementation of ABC in companies are presented in this chapter. The last area of analysis relates to the barriers and problems expected by companies which were planning ABC implementation, as well as companies which abandoned implementation after analyzing its usefulness, or companies which had never considered implementing ABC. The final section of the book contains key conclusions and limitations, as well as possible further directions of research.

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CHAPTER 1

COST ACCOUNTING IN THE MANAGEMENT OF MODERN ORGANIZATIONS

1.1. Management accounting at the turn of the 20th and 21st centuries

At the turn of the 20th and 21st centuries, companies around the world underwent incredibly rapid changes. Companies from Asia, the US, and Europe, in response to greater access to information, technological development, and globalization of markets, implemented new management methods. To meet the pace of the changes, they took initiatives which enabled them to meet the needs of customers, modify organizational structures, and implement new technologies. Increasing competition resulted in providing diversified products of high quality, supplied to customers in an efficient way with high added value (Bromwich, Bhimani, 1994). The market at the turn of the century was characterized by uncertainty and constant radical changes. The survival of a company in such an environment depended on its ability to identify new perspectives and skills to adapt to the ever-increasing competition. In such conditions, companies implemented innovative production systems (total quality control – TQC, just in time – JIT, or computer integrated manufacturing – CIM), advanced technologies and new organizational and managerial techniques. Along with technological changes, the practice of managing a company also changed, with the changes including alterations in information systems of management accounting. Among the most important factors affecting the change in the scope and role of management accounting in this period, one can find (Burns, Scapens, 2000; Horngren *et al*., 2005):

- global competition – increased competitiveness at the end of 20th century and in the early 21st century caused a greater interest of organizations in their market environment, competitors, and customers (in particular the problem of customer satisfaction);

- the development of information technology – access to information technology (widespread use of personal computers, the development of database technology, and integrated management support systems) affected the flow of information in organizations and the nature of their work (especially in areas other than operations, for example, in management accounting departments);
- organizational changes – orientation towards core competencies and outsourcing of other activities affected the process of business management (e.g., it triggered the transfer of some competences from functional departments in headquarters to operating departments).

All these changes, i.e., growing competition in the global market, rapid development of information technology, and organizational changes, had a significant impact on the change in the scope and importance of management accounting. On the one hand, they contributed to the implementation of innovative solutions, and on the other, they influenced the use of traditional methods of management accounting.

In the late 1980s and early 1990s, the drive to improve the efficiency of business management, both in theory and practice, became evident. This led to the development and diffusion of such methods as:

- ABC, activity-based management (ABM), which are studied in numerous works by Cooper and Kaplan (Cooper, 1987a, 1987b, 1988a, 1988b; Cooper, Kaplan, 1991; Kaplan, 1988);
- balanced scorecard (BSC), developed by Kaplan and Norton (1992);
- total quality management (TQM), see: Deming, 1986; Oakland, 1989;
- benchmarking (Bogan, English, 1994);
- life-cycle costing (LCC), which was developed in the 1960s in the US Department of Defense (Bromwich, Bhimani, 1994).

The turn of the 1980s and 1990s brought more than just the development and diffusion of ABC, BSC and LCC. In this period, one can see an increased interest of American and British companies in solutions of management accounting which were being used successfully in other countries, particularly in Japan. The increase of interest in management performed by Japanese companies (including methods of management accounting), was a result of unprecedented success of these corporations in global markets (higher productivity and innovativeness of these companies meant financial success). The managers of Japanese companies introduced a strategy of cost reduction of products during their entire life cycle by using such methods as LCC, target costing (TC), Kaizen, and TQM. Japanese methods became more and more known, and gradually implemented more and more outside Japan; this was due to the diffusion of theoretical knowledge about them and due to the global expansion of Japanese companies which used these methods around the world. At the turn of the 1980s and 1990s, the internationalization of knowledge on management accounting was evident. The phenomenon even intensified over the following years.

The evolution of management accounting that took place at the turn of the centuries led to some controversy as far as its scope, methods, tools, and concepts are concerned. The system which was mainly to provide data on costs changed into a system that shapes economic information and plays a part in the management process. This concerns in particular those aspects of management accounting which are oriented towards strategic objectives on the border of management accounting, strategic management and marketing. A term that attempts to establish a framework for the concept and methods of strategically-oriented management accounting is strategic management accounting. The term was first used by Simmonds, who defined strategic management accounting as "the provision and analysis of management accounting data about a business and its competitors, for use in developing and monitoring business strategy" (Simmonds, 1981, p. 26). The introduction of the strategic dimension to management accounting emphasized the importance of information about competitors, demand and the market. Simmonds argued that companies can use instruments that will be able to provide accurate information necessary for strategic decisions. In the literature one can find many definitions of strategic management accounting,[1] however, despite nearly thirty years since the introduction of this concept, there is no one generally accepted definition.

Strategic management accounting is often contrasted with operational management accounting, sometimes also called conventional management accounting. Operational management accounting is oriented to the past, individual decisions, individual reporting periods, as well as separate units. However, in contrast to operational management accounting, strategic management accounting is focused on the future, external relations, many periods, and strategic business segments (Sobańska, 2010, p. 95). Despite the fact that, in most companies, management accounting focuses on the implementation of operational tasks, the situation may change in the future. Management accounting can and should change so that it takes the strategic conditions of the company into account.

The direction of management accounting development in subsequent years will be increasingly affected by the external orientation of companies. Modern companies will cooperate more closely with suppliers and customers, they will form strategic alliances, and will outsource more often. Further development of information technology, particularly the Internet, will enable companies to launch new channels of distribution and communication in terms of relationships between suppliers, manufacturers and customers. The development of information technology will also affect the way certain functions are performed, e.g., human resources management, accounting and finance, and IT, introducing greater

[1] The analysis of 10 definitions of strategic management accounting by, inter alia, Simmonds, Bromwich and Shank, was carried out by Szychta (2007, pp. 167–168)

outsourcing of these activities. The gradual blurring of boundaries between a company and its environment will be a result of greater external orientation and outsourcing of traditional functions. The information system of management accounting will have to change, and start providing, depending on the needs, internal and external information, which is balanced for effective decision-making and effective performance evaluation. Modern organizations will increasingly focus on the function of coordinating the allocation of resources between organizations operating in the market and will invest less and less in traditional physical assets. Intellectual capital will become a key asset of a company (Roberts, 2003). It will be increasingly important to measure intellectual capital, a key aspect in the long-term ability of a company, to create a competitive advantage. Due to the fact that companies will focus more on creating value by means of intellectual capital, managing this knowledge will become increasingly important. Along with the growing importance of knowledge and its effective management in an organization, the importance of management accounting as a tool for facilitating and supporting these processes will increase.

Modern companies will focus on coordinating resources (including knowledge), without owning them (the centralization of resources, processes and properties will not be necessary). The potential of a virtual company will be based on the use of knowledge to electronically integrate the resources that corporate alliances will have. The organizational structures of companies, their priorities, and methods of operation will change, and with them the information systems of management accounting will change too. These changes will be mainly influenced by such factors as the external orientation of organizations, accelerating cycles of internal reporting, taking into account the complexity of processes, customer orientation, strategic integration, and further dynamic development of e-business (Bhimani, 2003).

1.2. Problems related to the use of traditional systems of cost accounting

The changes which occurred in the functioning of companies combined with the changes in the companies themselves led to a situation where commonly used cost accounting systems became no longer useful. Traditional cost accounting originated during the Industrial Revolution and its main objective was to establish the full cost of manufacturing products. The conditions in which companies functioned at that time (a seller's market, where supply is less than demand) meant that the system of cost accounting fulfilled the information needs of the owners, and guaranteed profitability in the short term (Sobańska, Wnuk, 2000).

In traditional systems of cost accounting, departmental costs are initially collected in the cross-section of cost centers identified in the core and support activities, so that after allocating the costs of the support activity and establishing mark-up rates for each cost center of the core activity, products manufactured in a given cost center could be incurred (alternatively, services in service companies). Indirect overheads (general and administrative costs, sales costs, etc.) are usually allocated to products for the purpose of analysis (products profitability analysis and service profitability analysis). Direct costs are directly allocated to products on the basis of measurement and source documentation.

It needs to be stressed that applying different procedures of indirect cost allocation (e.g., recognizing indirect costs in the cross-section of a larger or smaller number of cost centers, or the use of different allocation keys) does not influence the total sum of indirect costs incurred by the company. The accuracy of indirect costs allocation, however, directly influences the quality and reliability of the information about product costs and activity costs, thus, it directly influences the accuracy of decisions made on the basis of information from the cost accounting system. The allocation of indirect costs is very important in almost every company, and the basic factors which influence the accounting procedures of control and the allocation of indirect costs are:

- the level and changes in the level of a company's indirect costs – if costs that are indirectly accounted in terms of type of operation, function, activity, or product, and services represent a significant, and growing, portion of total costs, then their allocation, accounting, and control are of particular importance;
- the variety of products and the complexity of processes taking place in the company – the more that the products and services are varied, the larger the number of more complex activities they involve, and the problem of indirect costs seems more serious (in this case, the correct allocation and accounting of indirect costs requires detailed production process documentation and cost documents);
- the number and diversity of job positions, the level of labor mechanization, technology – if products are manufactured in different job positions which are involved in the production of individual product lines in a different manner, or if the products are manufactured by means of different methods of production, then recognition of costs and procedures of indirect costs calculation should be as accurate as possible (it requires allocation of costs to products, but also to departments, or even workplaces or manufacturing cells).

The briefly outlined procedures of indirect costs allocation were, for decades, the only procedures which allowed for the allocation of an indirect cost to a product. These methods were appropriate at a time when companies produced a limited number of products, and the cost of direct materials and wages constituted a more significant portion of manufacturing costs than indirect costs. Due to the fact that indirect costs

(both production and non-production) accounted for a small part of product costs, people did not pay great attention to their calculation, and distortions in product calculation were not significant (e.g., if a company's indirect costs constituted 10% of total costs and their allocation to individual products was distorted by 10%, it would create an error in the calculation of product cost equal to 1% of the cost).

Traditional methods of accounting for indirect costs are no longer relevant today in many companies, and the information generated by these systems is often regarded as biased and inadequate to the needs of managing a modern company – a company that has changed and functions in a completely different environment than a few decades ago.

The development of competition is one of the factors affecting the information needs of modern business. It causes changes in technology, the automation of manufacturing processes, the extension of product ranges offered by the company, and the shortening of their life cycle. The use of new and rapidly changing technologies has led to fundamental changes in the cost structure of most companies. It is reflected in the decline in the share of direct wages in manufacturing costs and a change in their character – i.e., on the one hand, the work of people has been largely replaced by machines, and on the other hand, direct wages that once were part of variable costs became fixed costs or have been replaced by indirect costs of production (an increase in the wages of production-support employees in costs). The share of direct materials costs in the company's costs has also declined, making room for departmental costs and costs of supporting processes, such as marketing and advertising, research and development, quality, storage, etc. While in the past the cost of direct materials accounted for approximately 50% of all costs, costs of direct labor 35%, and indirect costs only 15%, today, these proportions have changed drastically - material costs account for about 45% of costs, direct wages only 10%, and indirect costs account for up to 45% (in extreme cases up to 70–80%).

The above analysis shows that both companies and their environment have changed – the cost structure of companies also has transformed. One element, however, remained essentially unchanged – traditional cost accounting, which is often not able to meet the new information needs of managers, and which sometimes provides irrelevant and erroneous information.

The increase of indirect costs in the share of product costs led to a situation in which errors in the calculation of indirect costs that once could be accepted, today are no longer acceptable. On the other hand, it should be emphasized that for modern companies, indirect costs allocation bases based on production volume seem inappropriate because we often observe that the cause-and-effect relationship between the volume of production and indirect costs becomes weaker. As a result, the use of traditional methods of indirect cost allocation leads to distortion of information about the unit cost of a product and its profitability.

A common mistake characteristic of traditional cost accounting systems is the fact that they underestimate unit costs of products manufactured in small series or on special order, and overestimate costs of typical products manufactured in long series. Moreover, using allocation keys based on direct wages (e.g. cost of direct wages, total wage cost, and cost of direct materials or manhours) as allocation bases results in overestimated costs of products manufactured by hand, and in underestimated costs of products made by means of automatic production.

The analysis revealed that traditional cost accounting may lead to significant distortions in the allocation of product and services costs, the incorrect evaluation of their profitability, and thus the wrong decisions being made. Therefore, a new method was sought. The method should lead to an improvement of:

- information about costs which is used in pricing decisions;
- profitability analysis in terms of products, customers, activities, and departments;
- measures of responsibility centers' activity;
- knowledge in terms of cost formation.

It is expected that the application of ABC will, in many companies, contribute to linking costs with their causes, and will ultimately lead to finding an effective solution to the above problems.

1.3. Activity-based costing as an answer to the downsides of traditional systems of cost accounting

When, in the 1980s, American companies were forced to compete against Japanese enterprises, their managers came to the conclusion that information provided by the traditional system of cost accounting was delayed and it hindered effective planning, control, and decision making. Quick and timely customer service became a priority. Excessive production and maintaining inventories were abandoned in favor of the JIT philosophy.

Criticism of the current systems of cost accounting and the new needs of managers led to the birth of ABC, which focuses on the processes and activities performed in the company. The main reason behind its creation was the need for more accurate accounting of indirect costs and more effective management of these costs. Other issues which also contributed to the creation of ABC were internal factors, i.e., a large number of processes unrelated to the core business, the diversification of activities, the development of new methods of management, the automation of manufacturing processes, and external factors: intense competition, increased customer requirements (intolerance of poor quality) and technological development (Szychta, 2007).

According to the concept of ABC, indirect costs (production and non-production) are allocated to products in relation to the activities that caused these costs. Thus, ABC rejects the traditional approach to the allocation of indirect costs, which initially collects these costs in the cross-section of production units. According to ABC, indirect costs are assigned to products on the basis of various allocation bases, some of which are, and some of which are not related to the number of manufactured products. ABC, therefore, constitutes a new method of measuring and calculating costs (however, it needs to be stressed that ABC covers only indirect costs, and it does not cover direct costs).

The application of ABC will influence various areas a of company's operation:

- in the case of sales and marketing, the calculation of costs based on activities may improve pricing decisions on the basis of more accurate product costs;
- in the case of production, information about the costs of individual activities may be of great importance; analyzing a company, from the point of view of activities performed, may help to identify the causes of costs, which prior to implementing ABC, people were not aware of; for the purpose of cost management, managers of departments, foremen, and supervisors should learn how to manage the causes of costs;
- in the case of accounting, reorganizing and detailing information about costs (the management should make a deliberate decision whether benefits related to obtaining information about the costs of identified activities and an improvement of product pricing will be satisfactory enough to justify undertaking the implementation of ABC).

The basis of activity-based costing is to perceive the company not through divisions or departments, but rather the processes (activities) needed to produce and sell certain products. Examples of such activities include: the supply of raw materials and semi-finished products, storage, the technical preparation of production, the provision of machines and equipment, quality control, and the preparation of batches of products for shipment. These activities consume a variety of resources, which is reflected in the cost of materials, labor, energy, etc. It should be emphasized that despite the fact that resources are consumed to produce and sell products and services, products or services do not directly incur costs, but activities incur costs. Since the concept of ABC emphasizes that activities (and not directly products) incur costs, their proper isolation is a starting point for calculations based on activities.

ABC was expected to provide answers to important questions about resource consumption and costs of products, customers, and processes, including such questions related to (Kaplan, Cooper, 2000):

- which activities consume resources;
- how much activities and processes cost;
- what the causes of activities and processes are;
- which activities are related to products, services and customers.

ABC provides more information than traditional cost accounting systems. In theory, this cost accounting system is "almost perfect", however, it should be taken into account that its application involves substantial financial investments (consulting, software) and a great consumption of time of managers (accountants, technologists, managers of departments, management accounting specialists, purchasing managers, sales managers, etc.).

Like other methods of management accounting, ABC was not created "at once". The concept had been improved and altered since the 1980s when the first known examples of its implementation emerged, until the early 2000s when new versions of ABC emerged, i.e., TD ABC and RCA. The development of those concepts over the years is discussed in Chapter 2.

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CHAPTER 2

THE ORIGIN AND DEVELOPMENT OF ACTIVITY--BASED COSTING[1]

2.1. The development of activity-based costing, 1984–1989

At the beginning of the 1980s, the criticism of management accounting was accompanied by a search for innovative practices in cost accounting in American companies. The most eminent representatives of this research stream were Kaplan, Cooper, and Johnson – Johnson worked at Portland State University while Kaplan and Cooper worked at Harvard University.

In the mid-eighties (1985), Kaplan began his research into the practice of management accounting in American companies. He selected a group of innovative firms and he assumed that companies which used advanced production technologies and innovative methods of management, such as JIT and TQM, would probably use innovative methods of management accounting. He hoped to find innovations in the fields of quality measurement, supply reduction, flexibility of manufacture, employee morale, and productivity, etc.; instead, he identified a gap (delay) in the diffusion of innovative management accounting methods. Kaplan (1985, p. 78) claimed that "the key to explaining the delay in the diffusion of accounting methods is that top management did not emphasize the need to improve the significance of management accounting systems." In the course of his research, Kaplan found no use of 'first versions' of ABC but he also failed to identify any innovative methods of management accounting.

The first example of an innovative approach to cost accounting in practice was the case study of Schrader Bellows, studied by Cooper (Cooper, Montgomery, 1985a, b; Cooper, Weiss, 1985). The company offered a wide range of products

[1] Chapter 2 is a revised version of Chapter 1 and 2 from a monograph by Tomasz Wnuk-Pel (2014).

in many versions, which led to the manufacturing of more than 2,700 products. In the beginning, product costs were calculated as a sum of material costs, direct remuneration costs, and indirect costs. The costs of auxiliary departments (setups, quality control, etc.) were calculated for primary departments, and indirect costs for each department were calculated as a quotient of indirect costs and the number of man-hours. In 1983, a product profitability analysis was carried out in the company. The analysis was conducted by means of a new method of indirect cost allocation. Changes appeared in auxiliary departments' costs calculations, and the calculation of sale costs and administration costs – in the new system they were directly accountable for products by means of different rates. The case study proved to be important because all indirect costs were calculated for products, not only indirect costs of manufacture, but also the costs of sales, administration, and overheads were calculated in this way.

Two years after Cooper's (1985) case study of Schrader Bellows, Kaplan (1987) found an innovative example of cost accounting use in John Deere Component Works. Initially, the company used a similar standard cost accounting to the one used in Schrader Bellows (indirect costs were accountable for products proportional to man-hours, and subsequently proportional to machine hours, the company used two cost pools). In 1985, a new system of cost accounting, called ABC,[2] emerged in the company; within the system, seven activities were distinguished: employee support, production on machines, setups, production management, material management, administration of components, and management. From the two initial cost pools (employee support and production on machines) 40% of costs were allocated to five new pools (setups, production management, material management, administration of components, and management). In the first stage, general ledger costs were allocated to relevant activities, and then the activity costs were allocated to products. The new cost accounting in John Deere Component Works was used in product pricing, the profitability evaluation of long-series production, making decisions about choosing products to be manufactured on automatic machines, and it also aided the process of decision-making in terms of production departments. Like the new cost accounting system in Schrader Bellows, in John Deere Component Works it was mainly used to allocate indirect costs to products and to make business decisions.

[2] A new form of cost accounting based on activities began to appear in the literature in the late 1980s. In Johnson and Kaplan's work (1987) the method was still not named; the authors only talked about a new system of cost accounting. One of the first publications which implied the abbreviation of ABC was Cooper's article (1988a), where he related to his earlier work where the term of *activity-based costing* was used (Cooper, Kaplan, 1988a). However, this article related to an even earlier work (Cooper, Kaplan, 1988b), in which the term *transaction accounting* was used. Some researchers (Jones, Dugdale, 2002) think that the term ABC/activity-based costing was not coined by Cooper or Kaplan, but they claim that it was the name for the cost accounting system functioning in one of the companies visited by Kaplan (John Deere Component Works).

At the same time as Cooper and Kaplan's works, yet another case study was researched by Johnson and Loewe; the case study of Weyerhouser (1987) turned out to be crucial for the formulation of the ABC method. In the company, a new system of accounting costs of auxiliary departments for customers was created. It not only embraced traditional auxiliary departments, but it additionally related to other departments previously treated as general e.g., the Financial Department. However, the most interesting practice observed by Johnson was the fact that managers of departments, which were recipients of services, could question the rate for the services of the auxiliary departments, and they could even purchase similar services from outside the company if the cost was lower (auxiliary departments could also sell their services outside). The system of internal settlements operating in Weyerhouser, the outsourcing of certain services, the lowering rates for other services, staff reduction in auxiliary departments, and the sales of those departments' services outside the company, made the employees aware of who the customer is, what kind of services are provided to that customer, and what sort of costs are associated with those services. The new system made the managers of operational departments realize how their departments generated demand for work in auxiliary departments and that forced them to manage activities instead of costs. The case of Weyerhouser is simultaneously similar and different to the cases of Schrader Bellows and John Deere. As far as similarities are concerned, the procedure of cost calculation, i.e., costs were first allocated to internal recipients or products, was comparable. In terms of differences, Johnson paid less attention to the improvement of accuracy of indirect cost calculations for products, whereas he emphasized the necessity to manage the activities.

The cost accounting systems researched in practice by Cooper, Kaplan, and Johnson were very similar, even identical, as Kaplan (1994b, p. 248) claimed, "After prefatory observations of the new transaction accounting, Robin Cooper and I saw, in fact, identical systems, which were used in other manufacturing companies: John Deere, Hewlett-Packard and Tektronix in the USA, Siemens in Germany or Ericsson and Kanthal in Sweden." Interestingly, in the meantime, manufacturing companies in many other countries around the world began to use innovative systems of cost accounting, and the systems turned out to be extremely similar, even identical. The implementations were undertaken not only by manufacturing companies, but also service companies operating in such sectors as banking, insurance, transport, the health service, and public sector started to be interested in the method of cost accounting based on activities.

At the same time as Cooper, Kaplan, and Johnson became interested in the new methods of management accounting, CAM-I[3] (Berliner, Brimson, 1988)

[3] CAM-I was originally Computer Aided Manufacturing International, then it changed to the Consortium for Advanced Manufacturing International, and more recently to the Consortium for Advanced Management International.

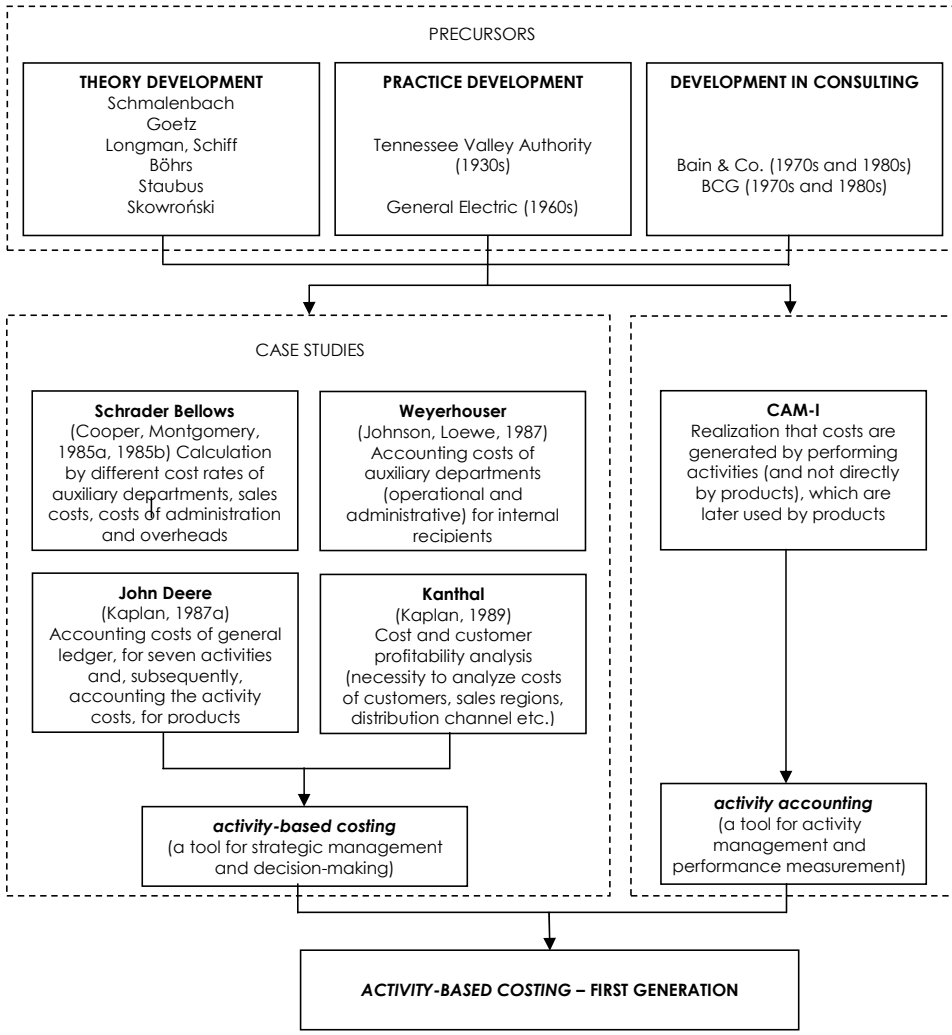
followed in their footsteps. CAM-I is a research organization sponsored by a group of several large companies, government agencies, consulting companies, and professional associations. The organization constituted employees of the above companies, as well as researchers from leading universities.

CAM-I's main aim was to promote IT use in production companies, and becoming interested in cost accounting was a by-product of their operation. Within the organization, the Cost Management System group (CMS) operated, which was formed in 1986, and it dealt with cost management systems. CMS's preoccupation with cost accounting stemmed from problems with the procedures of investment evaluation in numerical control machines and devices. The problems were related to the means of indirect costs calculation because the benefits resulting from the use of computerized control machines meant savings in those costs. CMS's task was to create, on the basis of CAM-I member companies' experience, a unified system of cost management, which would be accessible to all the associates of the organization. The creation of the activity accounting concept was a result of CMS's operation. The concept aimed to "measure costs of resources used in crucial activities of the company" (Berliner, Brimson, 1988, p. 85). Activity accounting focused on providing information for the calculation of costs of products, the measurement of costs in the dimension of a product's life cycle, and non-value activities. The information was taken into consideration during pricing, product life cycle management, performance evaluation, and investment decision-making. One of the most important conclusions stemming from CMS's work was the fact that products did not directly cause cost formulation but costs were generated by activities which are used by products. Despite the fact that CAM-I, in terms of the new cost accounting, used the term activity accounting, the concept is concurrent with ABC and even members of CAM-I used the expressions of activity accounting and ABC interchangeably (Jones, Dugdale, 2002).

It seems almost impossible to provide an answer to the following question: who 'invented' activity accounting/ABC? The concept itself mainly developed due to practices implemented by the member companies of CAM-I. However, undeniably, researchers such as Cooper, Kaplan, and Johnson, but also Foster or Brimson, hugely contributed to the development of the concept. These researchers spent a lot of time working in CMS (Cooper, Kaplan, Foster), leading project works (Brimson) or developing ABC outside the structures of CAM-I (Johnson). Although, the terms activity accounting and ABC vary, they are both used to describe concepts which are technically concurrent. It needs to be mentioned that, on the one hand, Cooper and Kaplan created the term ABC, and on the other hand, they participated in the works of the CMS group, which worked out the concept of activity accounting. Yet, it seems that the objectives which made these concepts emerge were slightly different. Activity accounting was devised to manage

activities whereas the concept of activity accounting was perceived as a method of performance measurement. ABC, on the other hand, was mainly a tool used in strategic management and was meant to facilitate the making of decisions in such fields as pricing or resource management. A simplified diagram presenting the development of the first generation of ABC is shown in Figure 2.1.

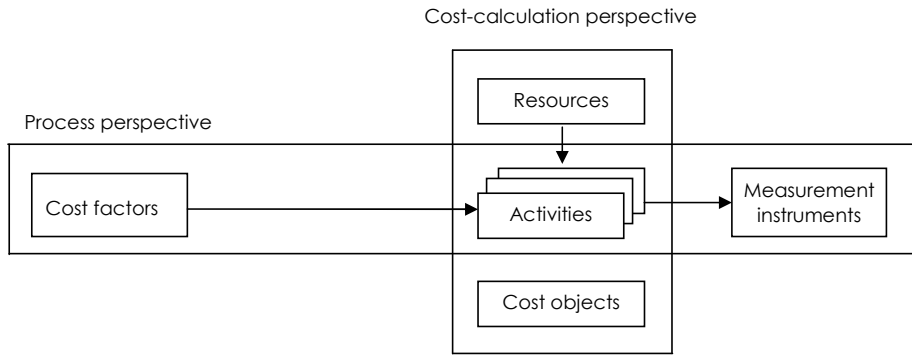
Figure 2.1. The development process of ABC's first generation



Source: own research

The new method of cost accounting used some common terms (CAM-I, 1992): resource, activity, cost object, resource driver, activity driver, cost driver. An attempt to formulate a general structure of ABC, which can explain the concept of ABC, was undertaken by CAM-I (see Figure 2.2).

Figure 2.2. The basic model of ABC



Source: Raffish, Turney (1992, p. 22)

The model should not be treated as a full illustration of cost flow in ABC, but rather as a general pattern which may be customized for the needs of an individual company. As shown in Figures 2.2 and 2.3, which illustrate an extended version of ABC, the model has two axes – the vertical one represents the cost-calculation perspective and the horizontal one represents the process perspective.[4] In the cost-calculation perspective, resources, activities and cost objects should be identified consecutively. In the first turn, the costs of resources identified in the company are calculated for activities isolated within the company through the use of resource cost drivers. Subsequently, such activities are calculated for cost objects isolated in the company, i.e., products, customers, etc. through the use of activity cost drivers. In other words, the cost perspective is a set of rules which help to calculate costs within the company. The horizontal axis, i.e., the process perspective, illustrates what happens in the company and it initiates with an incident which is called a cost driver. A cost driver causes an activity to use the resources necessary to achieve a certain result (the activity provides a certain result). The effectiveness of activities, in the process perspective, is measured both before and after an activity is performed, and measurement instruments are such criteria which enable the company to define performance and activity effectiveness. Control and analysis of

[4] In the general model of activity-based costing structured by CAM-I, the cost-calculation perspective from the early works by Cooper and Kaplan was accompanied by the perspective (dimension) of processes. The CAM-I model, therefore, constituted a developed model of the one by Cooper and Kaplan.

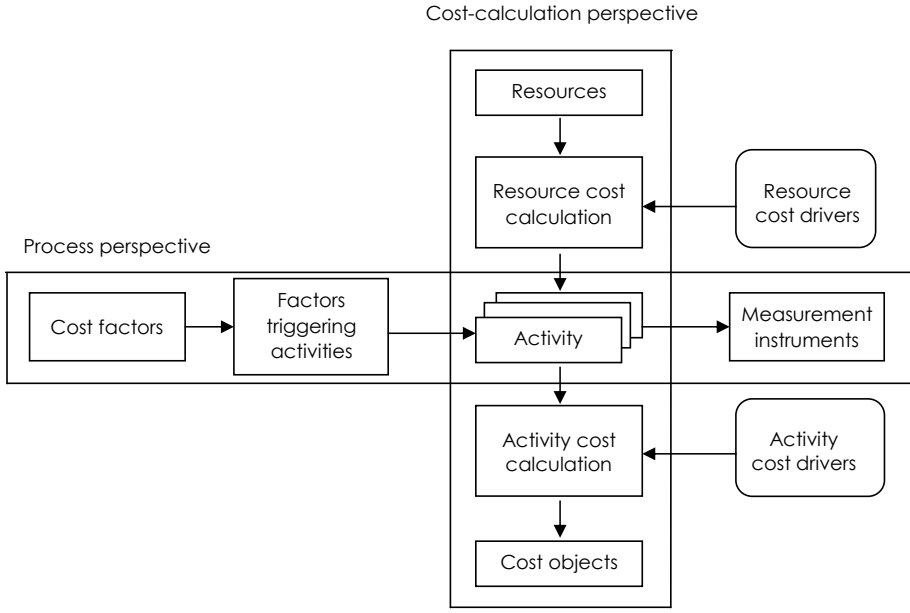
activities facilitate an improvement of realized processes e.g., designing products which are easy to manufacture or easy to service and repair.

In the developed model of ABC, which is presented in Figure 2.3, all the elements from the basic model have been enclosed (Figure 2.2) with the following additions:

- databases of resource cost drivers and activity drivers (they collect information from different systems in the company; the information is used for resource cost calculations for activities and the calculation of activities for cost objects);
- a factor triggering an activity (it sometimes links the emergence of cost driver to the beginning of a certain activity e.g., when quality control identifies a faulty finished product, it does not automatically mean that the product must be mended – it is the manager who makes such a decision about repair or disposal);
- in the developed model, the moment of resource costs calculation and the moment of activity costs calculation have been directly identified.

The developed model of ABC devised by CAM-I is presented in Figure 2.3.

Figure 2.3. The developed model of ABC



Source: Raffish, Turney (1992, p. 24)

According to Kaplan, practically all activities within a company are performed to support operational activities and provide products and services, and, therefore, these activity costs may be treated as product costs. ABC relates to all costs of

a company, not only to production costs, and thus, practically all costs should be allocated to products. In the first generation of ABC only two categories of costs, which should be accounted for products, were distinguished:

- excess capacity costs should not be allocated to products – the costs constitute period costs and should be separately shown in profit and loss account (despite the fact that the first generation of ABC already stressed the necessity to isolate and account for the result of excess capacity costs, the problem was solved in the second generation of ABC systems);
- research and development costs, related to working out entirely new products, also should not be calculated for products.

The first generation of ABC was supposed to be a more suitable tool for managers than the traditional standard costing. ABC was more suitable not only because it was more precise and objective, but additionally it linked cost objects with the activities they use, and activities with used resources in a more realistic way. According to Kaplan (1988), the first generation of ABC was not supposed to replace the traditional cost accounting systems, but the systems were supposed to exist and function in parallel – traditional cost accounting was meant to satisfy external needs whereas ABC was to satisfy the internal ones. Yet it needs to be stressed that not everyone agreed with Kaplan e.g., the managers of John Deere Component Works, the company researched by Kaplan, rejected the idea of the coexistence of two cost accounting systems. They claimed that maintaining two systems would be too expensive, and they wanted their previous standard costing to be replaced by the new ABC system (Kaplan, 1988).

Unlike a traditional standard costing system, ABC used more bases of allocation of indirect costs to products, which led to substantial changes in product costs. In the analyzed company Schrader Bellows (Cooper, Montgomery, 1985a, 1985b; Cooper, Weiss, 1985), changes in the cost of products ranged from minus 10% to plus 1,000%. Cooper and Kaplan (1988a, p. 25) interpreted the changes as "serious, systematic and (generally) impossible to avoid without using bases for indirect costs calculation based on the number of conducted transactions and not the number of products." Differences in product costs, both in the case of Schrader Bellows and other companies, were to prove the superiority of the first-generation of ABC over the traditional cost accounting system – interpretation was straightforward – ABC provides a more accurate product calculation. The cost of products, evaluated on the basis of ABC, should be taken into consideration when making decisions about dropping products, raising the prices of products, or redesigning production and distribution processes, etc.

According to Cooper (1988c, p. 1), "ABC systems are more accurate than the traditional systems of cost accounting […] they are based on a two-stage cost allocation procedure, which enables accounting indirect costs of resources used in

the production process for finished products." In the late 1980s, cost objects were noticed other than products for which calculation and analysis were prepared. In the case of Swedish company Kanthal (Kaplan, 1989), ABC enabled them to rank customers in terms of their profitability. It became evident that, apart from employing ABC to analyze indirect manufacturing costs for redesigning production processes, the system could also be used as a tool for marketing costs analysis, sales, and distribution costs in customers' cross-section analysis, sales region cost analysis, or distribution channel cost analysis.

In the late 1980s, the first generation of ABC was supposed to improve the accuracy of cost accounting and to provide information necessary for making decisions. According to Cooper and Kaplan, ABC was supposed to be a parallel system which simultaneously functioned with traditional cost accounting systems, and ABC was to provide managers with the key information needed for strategic cost management.[5]

Johnson had a slightly different approach to ABC than Cooper and Kaplan. In his article written in 1988 (p. 23), he stated that, "companies, in order to be competitive, must manage activities – not costs." Johnson was aware of the usefulness of information generated by the system of ABC in terms of long-term product management, however, he concentrated more on activity management, which he perceived as a key factor to achieving competitive advantage. Unlike Cooper and Kaplan, who stressed the meaning of accurate cost calculation, Johnson focused on the activities which generate these costs. He identified four steps in managing waste in operating activities (Johnson, 1988, pp. 28–29): "chart the flow of activities throughout the organization, identify the sources of customer value in every activity and eliminate any activities that contribute no value, identify the causes of delay or other unevenness in all activities." Johnson thought that managers, for proper management, need information which enables the identification and elimination of non-value adding activities. Johnson argued that information about activity costs would not be necessary for that, it would be better if managers used non-financial information, e.g., elapsed time, distances moved, space occupied, number of parts, etc. For Johnson, activity-based information was purposeful when it could be used to eliminate non-value adding activities, because that enabled companies to gain a competitive advantage.

To sum up the development of ABC at the end of the 1980s, it should be concluded that the system consisted of several related components: joint analysis

[5] Cooper's and Kaplan's views on the issue of management accounting in the late 1980s and early 1990s were concurrent. Kaplan appreciated Cooper's dedication in creating the technical aspect of activity-based costing; Cooper also participated in the preparation of ABC software (Kaplan was also deeply involved in marketing the software). Later, when Cooper (1996a, b) anticipated changes in the profession of management accounting specialists, his point of view was not supported by Kaplan.

of activities with department managers, the identification of resource cost and activity drivers, and the allocation of resource costs to activities and activity costs to objects (products, customers, etc.). It was assumed that the system of ABC would provide data on full product costs or customers, various data needed in decision-making (e.g., in terms of products and customers), and that it would attract managers' attention to customer non-value adding activities. The system's terminology, structure, and objectives were influenced by CAM-I, in particular by three authors – Cooper, Kaplan, and Johnson. The first generation of ABC emerged due to the cooperation of the researchers and practitioners who were involved in the works of CMS, and due to the case studies of Schrader Bellows, John Deere Component Works, Weyerhouser, and Kanthal. Companies which used ABC developed in the late 1980s concentrated on:

- accuracy improvement of product cost calculation by means of higher accuracy in indirect costs calculation – this objective was mainly emphasized by Cooper and Kaplan, who perceived ABC as a system which could be used in management in parallel with traditional cost accounting systems;
- cost reduction by means of waste elimination – this objective was highlighted in Johnson's works, who thought that ABC was mainly to eliminate non-value adding activities;
- improving operational management by means of a better performance measurement – this ABC objective was emphasized by CAM-I.

2.2. The development of activity-based costing, 1989–1992

In the very late 1980s and early 1990s, the concept of ABC underwent two crucial changes – firstly, provided resources and resources used were differentiated; secondly, the concept of cost hierarchy was introduced. The changes had a substantial influence on the shape of ABC, thus, they will be discussed in more detail.

As mentioned in the previous section, publications on ABC which appeared in the late 1980s were mainly published in journals for practitioners (e.g., *Management Accounting* (United States), *Harvard Business Review* and *Journal of Cost Management*). University researchers' interest in the concept of ABC was somewhat delayed. Once ABC became a point of their interest, it provoked strong criticism. The most severe critical standpoint was expressed by Goldratt, who was the author of the theory of constraints (TOC) – a concept which competed with ABC. Goldratt (1990) questioned precise product cost calculations, calling ABC a mistake and, in general, questioning its adequacy. The introduction of provided resources and resources used was, to some measure, Cooper's and Kaplan's

answer to Goldratt's criticism. Cooper and Kaplan claimed that there was some discrepancy in the definition of resource costs within ABC and the TOC – in TOC, a cost represents the costs of provided resources, whereas in ABC it represents the cost of resources used. Earlier, Cooper and Kaplan (1992) used the term excess capacity, which was replaced by unused capacity. This was not just a minor change in nomenclature. The concept of unused capacity was the key to distinguishing between provided resources and resources used. According to Kaplan (1992, p. 1), "ABC systems estimate costs of resources used by processes performed in an organization to manufacture products […] costs of provided resources or available ones are revealed in periodic financial reports of the organization."

Apart from differentiating between provided resources and used resources, there was another change in the second generation of ABC systems, i.e., the introduction of cost hierarchy. Cooper and Kaplan (1991) distinguished four levels of activities:

1. Unit-level activities, which are a function of the production volume for every unit that is being produced. Unit-level activities are, for example, production on presses and manual assembly.

2. Batch-level activities, which are not directly dependent on the production volume, rather on the number of batches in which the product is being produced (the costs of those activities change when the number of batches varies, but they remain unchanged regardless of the number of units in a given batch). Examples of batch-level activities are machine setups or batch quality control.

3. Product-level activities, which are not directly dependent on the volume of production nor the number of batches in which the product is produced, but they depend on the number of types of manufactured products (these activity costs change when the number of types of manufactured products changes, yet they remain unchanged regardless of the number of units in a given batch or the number of batches manufactured). Product-level activities are, e.g., the technical specification of products or the construction of prototypes.

4. Facility-level activities, which are not directly dependent on the volume of production nor the number of types of products being produced – these activities are common for all products manufactured in the facility. Examples of facility-level activities are, e.g., company management or safety management.

Distinguishing activities at the level of product series, type of product, and facility made the list of costs, which should not be counted among costs of unit, expand. Apart from costs of excess capacity or costs of research and development, which, with reference to the first generation of ABC, should not be calculated for products (units), in the second generation of ABC, these costs were accompanied by costs at the level of batches, type of product, and costs on the level of a facility. Cooper and Kaplan (1991, p. 132) claim that "calculation of costs on units may convey signals which will be wrongly interpreted by managers. If costs of batch-

level activities or product type costs are divided by the amount of products, you may be left with a bad impression that those are the costs which change along with the number of products." In the second generation of ABC, costs of products manufactured in a particular period of time are a total of direct costs and indirect activity costs at the level of a unit, series, and type of product. However, facility-level activity costs will not be included in the costs of products perceived in that manner. These costs should be seen as the fixed costs of a company because none of the activities related to the products have an influence on their level.

Distinguishing activities at the level of unit, batch, and type of product, as well as activities at the level of the entire company, constitutes a crucial change in the second generation of ABC. Systems of ABC from the first generation, in contrast to traditional cost accounting, were advertised as a tool which enabled the accurate calculation of all cost for products. However, precise calculation of product costs was not the main objective of ABC systems from the second generation (in general, Cooper and Kaplan stopped discussing the issue of accurate product costing as an objective of ABC). In the early 1990s, understanding cost hierarchy in the company and identifying important incomes and costs, as well as the provision of information needed for the process of decision-making, became the main focal point of ABC.[6]

Replacing the first-generation ABC with its second generation meant changes of two extremely important concepts – the first one was the concept of cost allocation, and the second one was the approach to variable costs. In terms of the first issue, Kaplan (1992) claimed that instead of cost allocation, it is more proper to use the term of cost estimates. Yet it needs to be stressed that the change had far more serious consequences than it might seem at first glance. Along with the change of nomenclature from allocation to estimate, a shift of emphasis in the whole concept of ABC occurred; the objective of ABC from the second generation was no longer to identify more precise full costs of products but to provide data accurate enough for managers to use them in the decision-making process.[7] It is also worth noting that the second generation of ABC was supposed to provide information which was accurate enough and not "more precise than traditional systems of cost accounting" (this type of information was required from the first generation of ABC). The change is significant due to the fact that the first generation of ABC was built around the system's ability to calculate product costs in a more accurate manner, in comparison with traditional cost accounting.

[6] Interestingly, in 1990, Kaplan stated for the first time that neither he nor Cooper coined the term of ABC; he claimed, "we did not invent the name: it was already used in John Deere company" (Robinson, 1990, p. 5).

[7] Costs which were accurate enough were calculated on the basis of estimations that used interviews with managers, employees' evaluations, and other accessible operational data (Kaplan, 1992).

Besides the concept of cost allocation, the approach to the issue of variable costs also changed in the second generation of ABC. The first generation of ABC perceived almost all costs as variable at the product level (Johnson, Kaplan, 1987; Cooper, Kaplan, 1988a). This approach changed in the second generation of ABC. Costs are not treated in that concept as variable or fixed, but instead the concept helps managers to understand the causes of cost variability. Attention is focused on the idea that, in order to reduce costs, it is not enough to reduce demand for resources available within the company. The reduction of resource demand itself will cause the emergence of unused capacity, and, subsequently, only a reduction of that capacity, or its alternative use, will cause a cost decrease or profit increase. The change in approach to variable costs was accompanied by changes in the approach to variable costing. In the late 1980s (the first stage of ABC), authors of ABC criticized traditional full costing along with usefulness of variable costing (Cooper, Kaplan 1988b). They claimed that a variable costing system, although correctly implemented, will not be useful in terms of pricing products in the current market and technological environment. After a few years, in the early 1990s (the second generation of ABC), Kaplan's attitude to variable costing underwent changes. He stated that after introducing the activity cost hierarchy to the concept of ABC "we understood that ABC was a concept based on contribution margin, and not a concept which attempted to calculate full unit costs in a more accurate manner" (Kaplan, 1992).

To sum up, it needs to be emphasized that by 1992 the formulation of the second generation of ABC had finished, and it turned out that the second generation considerably varied from the first. Instead of a concept based on full costing and concentrating on calculating more accurate unit costs, another concept emerged which was based on contribution margin with two types of resources (provided and used) with a hierarchy of activities in which the calculation of unit cost was disparaged.[8] It is worth noting that the changes which appeared in the second generation of ABC system, in comparison with the first generation, were authored by Cooper and Kaplan; Johnson did not take part in the construction of the second generation of ABC. In the late 1980s, when the foundations of ABC were established, Johnson had extremely high expectations towards the system of ABC, however, in the early 1990s his views changed. At first, Johnson (1991) doubted if ABC could provide operational managers with information which would be useful in terms of cost reduction and profitability improvement. Later, his point of view became even more radical, claiming that (Johnson, 1992, p. 26), "as the

[8] The key differences between the two generations of activity-based costing brought about the emergence of at least two attitudes. One group of researchers and practitioners ignored the changes and still perceived the ABC system as a tool which enabled the accurate calculation of full unit costs. The other group of academics and practitioners recognized the second generation of ABC as a better and developed version of the first-generation systems. It is still quite common to encounter ABC systems from the two generations both in university textbooks and in practice.

one who contributed to ABC diffusion, I feel obliged to warn you that, in my opinion, it went too far. I am convinced that the concept should be changed and its diffusion slowed down, if not ceased." He justified his criticism by claiming that information generated by accounting systems, in terms of the current global business environment, is unable to facilitate, in the long run, the competitiveness and profitability of companies.

2.3. The development of activity-based costing after 1992

Activity-based costing which was shaped between 1984 and 1989 became the first generation of ABC; crucial changes in the concept which occurred between 1989 and 1992 are called the second generation of ABC. Modifications in the system of ABC which took place after 1992 are called the third, and even the fourth generation of ABC. As far as the structure of ABC systems is concerned, Mecimore and Bell (1995) distinguished three generations of ABC. They additionally claimed that the emergence of the fourth generation would be possible in the future. Consecutive generations of ABC, differentiated by the two authors, accentuate different areas:

- the first generation of ABC accentuates activities and cost of product calculation;
- the second generation stresses the importance of processes and activities related to them;
- the third generation focuses on the value chain within a company (department);
- the fourth generation accentuates the relation between activities and processes among different departments of a given company.

The first two generations distinguished by Mecimore and Bell correspond to the development of ABC presented in the previous sections, respectively, between 1984–1989 and 1989–1992. The foundations of ABC which had been laid by 1992 constitute a model of ABC that is well-known and wide-spread in practice to date. After 1992, however, the concept underwent further changes, and that has enabled the formulation of other generations of ABC. The third generation (Mecimore, Bell, 1995) concentrates on linking activities to processes and then linking those processes to the complete business unit. Focus is on the way a company adds value to manufactured products or offered services. In the third generation of ABC, the values which influence the level of activities, are used to gain competitive advantage by means of value chain analysis. According to Mecimore and Bell (1995), in order to gain a competitive advantage, it is necessary to analyze all internal activities within a company and also external ones which have an influence on the business unit. While constructing the third-generation ABC system, it is important to design such a process structure so that it complies with the value chain in the company. In

order for the implemented system of ABC to support the formulation and realization of the strategy, it is crucial to include measuring instruments in the system which enable the measurement of the achievement level.

Apart from the focus on adding value to products and stressing the significance of the value chain concept, in terms of formulating and realizing a competitive strategy, the third generation of ABC characterized a special category of activities, i.e., support activities. Support activities are often very expensive and important for a business unit; the third generation of ABC emphasized the need to improve them, and that, in the long run, could have an influence on the improvement of the company's competitiveness. A comparison of the most important features of those three generations of ABC systems is presented in Table 2.1.

Table 2.1. Comparison of three generations of ABC

Items compared	Generations		
	first	second	third
Structure	cost center	cost center	business unit
Activities	product orientation	process orientation	firm orientation
Costs	manufacturing	process – both manufacturing, administration and selling	internal and external
Focus	product costing	process costing	value chain costing
Relationship between activities	no linkage	linkage	linkage
Cost drivers	internal	internal	internal and external
Planning	cost center	cost center	business unit
Controlling	cost center	cost center	business unit
Cost analysis	tactical	tactical	strategic
Hierarchy	product	process	firm

Source: Mecimore, Bell (1995, p. 23)

Summarizing the three consecutive generations of ABC, which are presented in Table 2.1, it may be concluded that the first one concentrates on improving product cost calculations, the second one focuses on providing information needed to improve effectiveness and measure achievements, and the third one stresses the importance of the value chain concept in the formulation and evaluation of competitive strategy.

2.4. Time-driven activity-based costing

In the late 1990s and at the beginning of the 21st century, practitioners along with consultants and university researchers began to embrace the idea that implementing ABC in its current form was troublesome. Among the main problems, they enumerated the high costs incurred and the fact that implementing the method was time-consuming, which was manifested at the stage of management interviews and surveys, as well as at the stage of gathering, processing and presenting data. ABC is difficult in terms of updating and modification, and the input data is subjective and hard to verify.[9] In most of its practical uses, ABC systems are relatively constrained, which means that their use makes it impossible to get a real and full picture of the company's profitability (only such a picture enables effective profitability management and improvement). Yet another important but separate problem related to the ABC system is the lack of solution to the problem of resource unused capacity.

As a reaction to the above problems, Kaplan and Anderson (2004) came up with a new form of ABC which is called TD ABC. Although the first traces of the new concept are to be found in 1998 (Kaplan, Cooper, 1998, 2000), its full version and its name were created in 2004[10] (Kaplan, Anderson, 2004). In 2007, Kaplan and Anderson published a book, in which they presented the new method along with a description of six case studies illustrating various aspects of TD ABC, as well as its use in companies from different business lines (a Polish translation of the book appeared in 2008). The authors see the concept as an independent structure and not an extension of ABC, and they call the previously known ABC rate base ABC, traditional ABC, or conventional ABC. One of the paragraphs in Kaplan and Anderson's book (2008) entitled Time-driven ABC: old wine in new bottles? even questions all relationships between duration drivers in ABC and TD ABC.

TD ABC is not frequently used in practice. Most of its implementations were conducted by the consulting company Acron, which was founded by Anderson, while Kaplan has been a member of Acron's board since 2001. From that year on, Kaplan and Anderson worked on improving ABC's effectiveness. The cooperation led to the integration of capacity costs calculation, which was suggested by Kaplan and Cooper (1998), with time equation algorithms modelling

[9] It is quite uncommon in companies which are using ABC that e.g., employees show that idle time constitutes a part of their worktime. If the idle time is not identified, then the rates for a unit of activity cost driver will be calculated for the assumption that the capacity has been fully used and that level is definitely too high (Szychta, 2007, p. 369).

[10] Kaplan and Anderson (2008, p. 10) claim that the term time-driven activity-based costing was used for the first time in 2001. Before, Anderson and the consulting company Acron, which had been using the new concept since 1997, applied the term transaction-based ABC.

complex transactions, which were authored by Anderson. This shaped TD ABC in its current form (Kaplan, Anderson, 2008). Acron, run by Anderson and Kaplan, is said to have implemented more than 200 TD ABC systems (Kaplan, Anderson, 2008, p. 10), both in its initial form, with the time equations used but without taking into account the degree of capacity use (1997–2001), as well as in its older variation when the implementation of time equations was extended by the problem of the degree of capacity use (after 2001).

According to the authors of TD ABC, their method's basic advantage is the lack of necessity to interview and survey people, which was crucial in the initial form of ABC to allocate resource costs to activities. Resource costs in TD ABC, by means of time equations, are directly allocated to cost objects (products, customers, etc.) using two types of data: cost rate per unit of resource capacity (stage one), and resource capacity use consumed by each activity performed in an internal unit (stage two).

In the first stage of the procedure, the costs of all resources in a given internal unit (or a process) are calculated – for example, the costs of an internal unit (process) such as management, employees, space, IT resources, vehicles, etc., must be calculated. Then, the practical resource capacity of a given unit is estimated. [11] The estimated practical resource capacity of a given internal unit does not have to be precise (Kaplan, Anderson, 2008, p. 24) and a mistake of a few percent is not important (major mistakes can be detected and corrected when unexpected shortages or surpluses of resource capacity of a given internal unit come up). Estimates of resource costs in a particular internal unit and estimates of practical resource capacity of a given internal unit enable the calculation of cost rate per resource capacity unit:

$$\text{cost rate per resource capacity unit} =$$

$$= \text{resource costs} / \text{practical resource capacity}$$

In the second stage of cost calculation according to the concept of TD ABC, cost rates per unit of resource capacity are used to assign resource costs of an internal unit to cost objects (products, customers, etc.). This procedure starts with an estimation of how much time from the practical resource capacity of a particular internal unit is needed to perform each activity within the unit. These estimates may be done by means of interviewing and surveying managers and employees

[11] Although in most cases resource capacity of a given internal unit is expressed by means of workers' time, this is not permanent. Capacity can be expressed by means of e.g., the number of machine hours (in a production department), the number of pallets (in a warehouse), mileage (in a transport department), etc. Kaplan and Anderson (2008, p. 59) suggest that capacity-driven activity-based costing would be a more appropriate term for TD ABC.

or by means of direct observation and measurement. Like the estimates of the total resource capacity of a given internal unit, these estimates do not have to be extremely precise; in most uses, approximate calculations are enough. Kaplan and Anderson (2008) claim that, in contrast to the time structure subjectively estimated by employees for the purpose of classic ABC, in TD ABC the degree of use of total resource capacity of a particular internal unit is easy to evaluate and verify. Once the time needed to perform each activity in a given internal unit is estimated, the cost-drivers rates of all types of activities performed in the given unit are calculated. To do that, the cost rate per resource capacity unit of a given internal unit is multiplied by the time estimates necessary to perform each activity. Alternatively, multiple activities performed within a particular internal unit in the conventional ABC may be replaced by a single time equation for a given department:

$$\begin{aligned}&\text{time related to products} =\\&\text{time of performing activity 1} \times \text{number of performed activities 1}\\&+ \text{time of performing activity 2} \times \text{number of performed activities 2}\\&\ldots\\&+ \text{time of performing activity } n \times \text{number of performed activities } n.\end{aligned}$$

It is worth noting that cost-drivers rates in TD ABC are slightly lower than similar rates estimated in the classic ABC. It stems from the fact that classic ABC overestimates the costs of performed activities because it takes into account both the costs of used and unused resources. Through estimation of the time needed to perform each activity within the TD ABC system, the company receives information about the costs and efficiency of activity performance, as well as about the time and costs of unused resource capacity. Unused capacity costs constitute period costs (they should not be calculated for products, customers, etc. but they should be allocated to a result of a given period).

According to the creators of TD ABC, the system overcomes difficulties in the implementation process of classic ABC and has the following advantages (Kaplan, Anderson, 2008, pp. 31–32):

- it can be easily and inexpensively constructed, maintained, and updated (the system does not require interviewing and surveying, and integrates well with existing IT systems);
- it enables the identification of unused resource capacity (both in terms of quantity – minutes, and quality);
- it exploits time equations which enable the incorporation of a certain type of activity, different from the standard activity, into a cost calculation;
- it can be more easily implemented than the classic ABC in an entire, large and complex organization (trading, service, or production company);

- TD ABC can be used for forecasting future resource demands, which facilitates resource capacity budgeting on the basis of quantity projections and the degree of activity complexity.

TD ABC may be regarded as a step forward in the development of cost accounting methods based on activities (i.e., the classic ABC). However, the system does not provide solutions for all the problems characteristic of the classic ABC; among the most important problems, one could enumerate:

1. The problem with actual costs use. Despite the fact that Kaplan and Anderson (2008) postulate the use of standard resource costs, in most practical uses actual costs are used. There are a few reasons for that (Gervais *et al*., 2009, p. 6). Firstly, actual costs are perceived as more credible by managers using cost accounting. Secondly, the use of actual costs, instead of standard costs, makes the connection between financial accounting and management accounting clearer. Thirdly, some companies cannot use information about standard costs because they do not draw up budgets. Replacing standard costs with actual costs causes well known problems and it may distort the results of calculations. The common use of actual costs in the TD ABC system is not a fault of the method itself, but a fault of the people implementing it, however, to reduce the problem, cost estimates should not refer to periods which are too short – longer periods should improve accuracies.

2. The problem with defining a normal level of capacity use. Isolating unused capacity costs in TD ABC is not something new,[12] however, defining normal levels of capacity use is not simple. Kaplan and Anderson (2004, 2008) claim that practical capacity is appropriate when it constitutes 80% of the theoretical capacity.[13] The authors also ensure that little errors in its estimates are permissible, and they will not have a practical significance. Probably, in most of cases, Kaplan and Anderson will not be mistaken. However, it must be taken into consideration that 'in most of cases' does not mean 'in all cases' and that the percentage of 80% is simply intuitive.

3. The problem with activity homogeneity. Kaplan and Anderson (2008) emphasize that activities performed within a single unit should consume resources proportionally (homogeneity assumption). An example of a car garage which specializes in trucks and owns specialist equipment that suits repairs of only one make of vehicles illustrates and explains the problem. In that case, this specialist equipment must be taken into account separately from other garage resources because it is used for a completely different purpose than the remaining resources. Despite the fact that Kaplan and Anderson know how to tackle the problem, other

[12] According to Garner (1954, p. 235), Gantt, who dealt with the issue of unused capacity at the beginning of the 20th century, stated that he was preoccupied with that problem not because it was new but rather because it had great significance in practice and, on the other hand, it was little understood by practitioners – Gantt claimed that in 1915.

[13] As previously mentioned, Kaplan and Anderson allow for practical capacity estimates as a disparity between theoretical capacity and idle time.

consultants and managers implementing TD ABC may not know how to do it. If the activities are not homogenous, it might lead to essential inaccuracies in calculations.

4. The problem with time measurement. TD ABC is mostly based on management's estimates (time of individual activity performance is estimated in that way). It may be claimed that the estimate's inaccuracy of labor time spent on individual activities in the traditional ABC has been replaced by the estimate's inaccuracy of unit time spent on individual activities performance within TD ABC.[14] Additionally, the use of hours to measure resource capacity is not appropriate in every case; sometimes the use of, e.g., machine hours, space, or mileage would seem more suitable.[15] On the one hand, this may be questioned, because Kaplan and Anderson condition the choice of capacity measurement on the type of activities performed within the unit. However, on the other hand, it should be taken into account that where the concept of TD ABC is used, the majority of companies use hours. Using time as an activity measurement was also possible in the classic ABC system, yet Kaplan and Anderson (2008) suggest that in TD ABC its use is different (in the classic ABC it is used at the first stage of calculation, i.e., to calculate resource costs for activities, whereas in TD ABC, time is used to calculate resource costs directly for products or customers[16]).

2.5. Resource consumption accounting

RCA emerged at the turn of the 20th and 21st centuries (around the year 2000). At the end of 2001, CAM-I established a group interested in and devoted to the

[14] Kaplan and Anderson (2008) criticize a popular practice during ABC implementation when employees estimate the time percentage they spend on performing individual activities. The percentage often equals 100%, or even exceeds 100%, which is of course impossible due to unused capacity. Instead of such an approach, Kaplan and Anderson suggest a different one which is based on standard unit time estimates needed to perform a given activity. This type of approach creates two problems – firstly, assigning such time is very difficult and, secondly, unit times, which have been already assigned, may be very unstable in longer periods, and their frequent updates will be necessary (especially in the area of support and general activities). Research by Cardinaels and Labro (2008) showed that activity time estimates in minutes are inflated, and that estimates expressed by means of percentage give better results; it contradicted the theory by Kaplan and Anderson (2004). The research by Cardinaels and Labro revealed that activity time overestimates reached up to 35%. A research of a small distribution company using TD ABC, conducted by Gervais *et al.* (2009), proved that the differences between declared standard times and the real times were as high as 20%, thus, they were definitely not insignificant.

[15] Due to the fact that almost all TD ABC systems use in practice hours as a cost driver, it may be concluded that worktime is a category which is controlled thanks to the system.

[16] In TD ABC, there is no stage of calculating resource costs for activities, which is possible thanks to the use of standard time rates for performing individual activities.

development of RCA (the group was a part of the CAM-I Cost Management Section). From then on, the career of new management accounting technique began, the idea developed, and it was validated and popularized through articles and case studies of its use in professional journals (at the beginning) and also research papers in academic publications (later). The development of the RCA method and its growing popularity resulted in the establishment of the RCA Institute, which became a platform for refining the technique and also its popularization through educational and consulting activities. In 2009, the International Federation of Accountants recognized RCA as a costing method which achieved a higher level of accuracy than traditional ABC methods and supported RCA as a method with a positive cost/benefit ratio. According to IFAC's Professional Accountants in Business Committee, the incremental value of information provided by RCA outweighs the additional costs of establishing and maintaining the system. In the view of the International Federation of Accountants, RCA can help organizations to improve understanding of the costs in their costing systems and also support better decision making in the companies. IFAC stresses that RCA offers companies the possibility to build proper cost allocation directly into their costing system and allows for an improvement of their performance.

RCA is a costing system (management accounting tool) based on two concepts – ABC used from the late 1980s in many countries all over the world, and *Grenzplankostenrechnung* (GPK which means 'flexible cost planning and control') used for decades primarily by German companies but also to some extent by companies in other European countries (especially, but not only, companies in German speaking countries). RCA combines (at the resource level) information on resource capacities and the influence of input/output relationships on cost behavior with ABC. RCA, just like ABC and TD ABC, has its supporters both in practice and in academia, and has sound theory which supports the method.

RCA has three building blocks – it takes a comprehensive view of resources, an unambiguous view of cost behavior, and is a quantity-based cost model.

The first core element of RCA, the foundation of RCA, is company resources such as materials, employees, machinery, and buildings. Resources are the source of company costs and revenues and information on resource capacity, utilization, and efficiency is crucial for cost allocation and managerial decision making. RCA recognizes reciprocal resource allocation and drivers of the resource pools. For all resources, capacity[17] is defined with respect to the manner in which a resource is consumed – the utilization of fixed costs for cost

[17] In resource consumption accounting, capacity is broken down into three elements: (a) productive capacity – the resource is producing goods or providing a service, (b) non-productive capacity – the resource is engaged in maintenance, set-up, standby, waste, (c) idle/excess capacity – the resource is not working because there is no work to do (idle/excess capacity includes time that management or law require that no work be done).

assignment is determined based on theoretical output, and proportional costs are assigned based on budgeted output. In RCA, costs can be assigned through cost centers (vertically) like in traditional costing, and also through activities (horizontally) like in ABC. For all resources, idle/excess capacity is separated and is not allocated to cost objects (products, clients, etc.) but is separately shown in profit reports. In RCA, capacity is defined not in relation to activities but in relation to resources (the main idea of such a treatment of idle/excess capacity in RCA is to show it to the managers responsible for the utilization of resource capacity and resource acquisition, and to help them with decisions concerning resources).

The second element of RCA, quantity-based modelling, means that the whole model is built with the operational quantities use (values follow quantities). In each resource pool, quantifiable output is measured allowing for the decoupling of monetary and output valuation, which facilitates variance as well as capacity analysis (by providing a distinction between cost assignment and resource consumption). In RCA, valuation occurs only when the quantities consumed are multiplied by output rates, which allows managers to analyze improvements in the efficiency (quantity used) separately from the output rates (prices). The RCA model is quite detailed and sophisticated even in comparison to ABC or TD ABC. There are hundreds and in some cases thousands of cost-drivers rates for resource pools in the model of cost assignment. Companies considering implementation should take into account the high degree of complexity in RCA models together with the high potential of the method in precise cost allocation (this means that the rate of RCA diffusion could be slow).

The third building block of RCA, the unambiguous view of cost behavior, is the answer to the debate about variable and fixed costs and their suitability in decision making (cost behavior in RCA is determined by changes in quantities of resources as they are applied to organizations' operations). RCA makes a distinction between fixed and proportional costs in terms of resource consumption, allowing for situations when proportional costs change to fixed costs. The idea of different costs for different purposes recognized in RCA means that the method uses various cost concepts to support decisions in different situations. RCA delivers information on throughput, contribution, and gross margin for products, customers, market segments, and other objects of the manager's interest. It is necessary to stress that costs that originate in the resource cost center (e.g., machinery) are primary costs of the resource and costs which are assigned to the resource cost center from another resource (e.g., employees) are secondary costs of the resource (allocated costs of employees are a secondary cost of machinery). Total costs of the resource (primary and secondary costs) are then separated into proportional and fixed elements, depending on the correlation between the input quantities and the output quantities from the resource. The

often-used notion of proportional except variable costs in RCA terminology is to stress the difference between costs that are variable with total production/sales volume and the costs that are proportional at the resource level. Separating costs into proportional and fixed elements could be subjective and, what is more, resource costs that change proportionately to the output of a supplying resource may change classification and be named fixed if they are consumed in a fixed manner. To improve the decision usefulness of information from RCA, some companies using the method employ replacement costs of the resources rather than historical costs.

In addition to those three building blocks of RCA, the approach allows for better profitability reporting by tracing all direct costs to products, and assigning indirect costs at causal and decision relevant levels to products and product groups, clients and client groups, market segments, and so on (separating proportional and fixed costs is maintained in profitability reports, and fixed costs include the planned use of otherwise proportional resources in a fixed manner, e.g., the use of labor for planned maintenance). Profitability reports in RCA present multiple contribution margins by deducting from revenues firstly the direct costs of products and secondly the various pools of indirect costs of different cost objects (product groups, clients, etc.). An important element of RCA is activity-based resource planning (ABRP). This planning and budgeting tool assesses unit standards for each resource pool, determines unit standards of resource consumption for consumers, estimates budgeted demand for resource output, and converts budgeted resources output into dollar items.

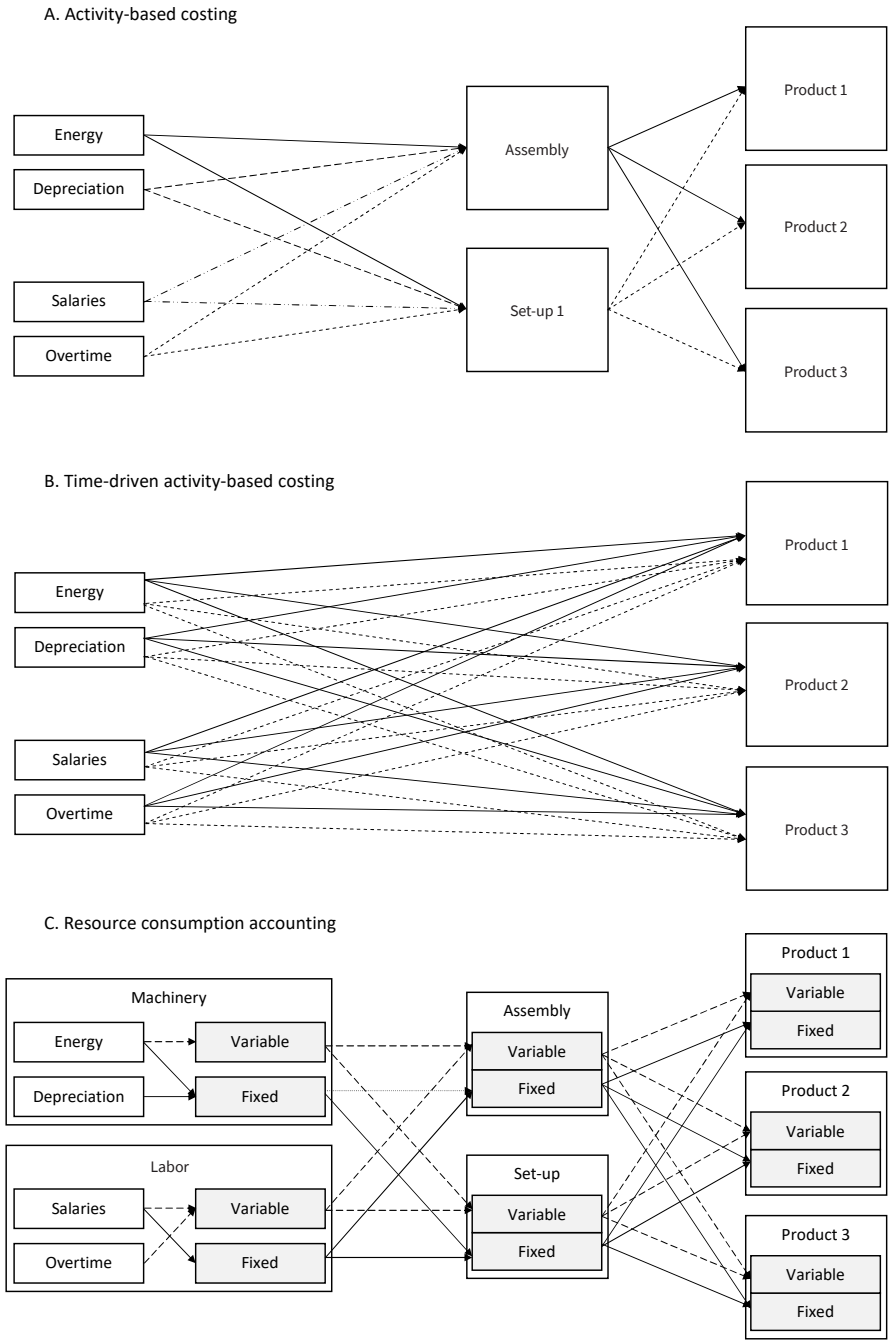
RCA, although based on the ABC approach (and GPK), is considerably different both from ABC and its extended version TD ABC – the main differences are shown in Figure 2.4. Panel A of the figure presents a simplified ABC model for a production department. Four resource pools were identified in the model (energy, depreciation, salaries, and overtime wages) and linked to two activity pools: assembly (unit level activity) and setup (batch level activity). After allocating resource costs to activities and establishing activity cost pools, the costs of each activity are allocated to the three final cost objects (products). Panel B presents the TD ABC model established for the same production department. Although the model looks similar to the ABC model in panel A (both models have the same resources and cost objects), it does not have activities. In TD ABC, resources are directly linked to cost objects (products) through resource-activity cost drivers (Kaplan, Anderson, 2004). Each driver represents a link between a resource and a cost object that consumes an activity. The number of activities that consume the same resource, and determines the number of resource-activity cost drivers between a resource pool and a cost object (it was assumed in the example that each resource is consumed by both activities – assembly and set-up). The value of a resource-activity cost driver is determined

by multiplying the number of hours for an activity and the resource cost per hour. The RCA model for a production department is presented in panel C. In this model, two resource pools – machinery and labor – were established, each containing two resources (the machinery pool included energy and depreciation while the labor pool included salaries and overtime). In contrast to ABC or TD ABC, in resource cost pools in RCA, proportional and fixed costs are separated (salaries and energy were divided into proportional/variable and fixed elements, whereas depreciation was classified as fixed, and overtime wages as proportional/variable). In RCA, as in ABC, resource costs are allocated to cost objects under the two-stage procedure – at first, resource costs are allocated to activities, and then activity costs are allocated to cost objects, but it should be stressed that under RCA, proportional and fixed cost are allocated separately and idle/excess capacity is eliminated from product costs. The treatment of idle/excess capacity costs in TD ABC and RCA is different. Whereas in the TD ABC model the consumption of resources is driven by time spent on different activities only, in RCA there are different (multiple) drivers which drive resource consumption. If the resources used in operations are homogenous (and proportional to hours), the picture of unused capacity in TD ABC and RCA would be similar, but if the resources used in operations are heterogeneous, RCA offers a better picture of unused capacity costs.

The RCA approach separating proportional from fixed costs seems to be suitable for planning and control decisions which depend on reliable information about cost behavior patterns (flexible budgeting). Flexible budgeting in a traditional format used a factory-wide or department-wide denominator volume and divided costs into variable and fixed elements based on production/sales volume (expressed usually in units or hours). The same concept (flexible budgeting) used in the RCA environment is much more detailed and precise, as it allows flexible budgeting application at the level of resources. The use of flexible budgeting as a tool for planning and control at resource level (not factory or department level as in traditional methods) enables managers to isolate variances in the rate and quantity of resources used in the organization. A RCA budget presents for each resource the difference between theoretical and budgeted capacity and also budgeted costs of idle/excess capacity (higher or lower than budgeted demand for a resource directly influence the costs of unused capacity). Presenting unused capacity and its costs allows managers to take actions to utilize or eliminate excess capacity, or, alternatively, it shows them possible shortages of resource capacity when future demand exceeds their supply.

The implementation of RCA should be considered by companies having problems with unplanned wasted resources and excess capacity costs which result in inadequate product decisions, shortages, and undercosting of resources in cost budgeting, and also distorted information for performance management.

Figure 2.4. ABC, TD ABC, and RCA comparison



Source: own research

RCA can be implemented in different ways: (a) it can serve as a complete costing system (changing the current costing system), (b) it can be implemented in one area first with subsequent implementation in other areas, (c) it can be developed and used in parallel to existing systems and if it proves its validity it can replace the current costing system, (d) it can be implemented in a general manner (not very detailed) and if provides enough benefits, modification to a more detailed version could be done.

Implementing RCA is possible in an Enterprise Resources Planning (ERP) environment because these systems provide data for strategic, tactical, and operational decisions (some ERP systems, e.g., SAP, provide RCA functionality). Implementing RCA in an ERP environment could enable the collection of more relevant information for decision making and could allow an organization to achieve its objectives.

2.6. ABC, TD ABC, and RCA compared

In reaction to the low level of ABC adoption which is caused, on the one hand, by unsolved problems inherent in the ABC method and, on the other, by the complex nature of the ABC implementation process, two approaches emerged as a possible solution – TD ABC and RCA. Both systems were developed as a response to the shortcomings of ABC but they represent different philosophies on the development of cost allocation and management systems.

Cost management systems like TD ABC and RCA must meet the cost/benefit criterion, meaning that benefits from the systems should be greater than the cost of operating the system. Whereas the cost of the costing systems consists of the costs of its implementation, modification and operation, the benefits from the system can be measured by the quality of the information provided by the system, especially for decision making. It seems that both TD ABC and RCA offer three main benefits in the context of decision making:

- they improve cost allocation, which is achieved by not allocating unused capacity costs to cost objects;
- they provide a linkage between resource pools and cost pools, which is done by applying the ABC paradigm in both models;
- they separate idle/excess resources, which is achieved by providing information on unused resources and their costs, which enables managers to address the problem of efficiency in the organization.

The purpose of TD ABC was to simplify the process of ABC implementation and operation. It was achieved through the use of single measure resource capacity (time) and quantity-based resource-activity cost drivers (activity pools

were removed from the model). Kaplan and Anderson (2004) maintain that TD ABC could provide more relevant cost calculations while making employee surveys unnecessary to maintain the allocation model, and enabling the separation of unused capacity costs. The TD ABC approach to cost management could be beneficial for organizations with standardized, homogenous operations, especially for these with a large proportion of employee costs in their cost structure (e.g., service organizations with a lot of human costs).

RCA was the second method which was developed in response to the shortcomings of ABC. The method was based on the principles of the traditional ABC model and also the German GPK (focusing on resource cost management and quantity-based modelling in the environment of ERP systems, e.g., SAP). In contrast to TD ABC, the purpose of RCA was to recognize the complex relationships between resources and cost objects by relying on the integration with ERP models to capture organizations' complex processes. RCA is thus a more universal system suitable for use in organizations with heterogeneous resources driven by multiple drivers and not only by time, e.g., in complex manufacturing organizations where time is only one of the resource drivers.

Although there are some differences between the models (TD ABC and RCA), the most important difference being the separation of unused capacity costs, there are also some similarities, as they are built on the ABC fundament. Both models do not allocate costs of unused capacity to cost objects (products, clients, market segments, etc.) but they separate and present them in the profitability reports. The difference between TD ABC and RCA allocation of the resources is that in the TD ABC model, resource cost allocations are driven by activity levels, which, in turn, are driven by the output level. In RCA, resource cost allocation is driven by the use of each resource separately (the use of resources is not necessarily related to the level of output). RCA users can manage unused capacity at the level of individual resources. A comparison of the TD ABC and RCA systems is presented in Table 2.2.

As far as the time frame of the decisions is concerned, TD ABC (just like traditional ABC) could provide useful information for long-term decisions, but it may not be suitable for short-term decisions. In contrast, for this kind of decisions (short term), RCA seems most appropriate; it is suitable for all situations when a distinction between proportional and fixed cost could be made. RCA could also provide meaningful information in the long-term horizon. Those kinds of decisions rely on capacity requirements, and RCA is suitable in such situations as it provides insights into resource capacity.

Table 2.2. Comparison of TD ABC and RCA

Feature	TD ABC	RCA
Relationship with other information systems	system independent	ERP-compliant
Organization of resource pools	cost-based resource pools	technology-based resource pools
Composition of resource pools	all resource costs are variable	resource costs can be either fixed or variable
Cross-allocation of resource costs among resource pools	no cross allocation among resource pools	cross allocation among resource pools is allowed
Allocation of resource costs to cost objects	activity-based cost allocation	both activity-based and volume-based cost allocation are allowed

Source: Tse, Gong (2009, p. 45)

Advanced cost management methods like TD ABC or RCA may not be suitable in a simple production environment, e.g., in companies using lean management. In these organizations sophisticated cost accounting methods are not necessary, but when complexity increases, information from TD ABC or RCA may meet the cost/benefit criterion and may enhance companies' efficiency. When an organization makes a decision to choose an appropriate cost management system, managers should understand what alternatives are available (see Figure 2.4), what strengths and weaknesses each alternative has, and what conditions must be met for successful implementation of a chosen system. To choose correctly, an understanding of these concepts and the mechanics of each system is necessary.

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CHAPTER 3

PREVIOUS STUDIES ON THE FUNCTIONING OF ACTIVITY-BASED COSTING

At the turn of the 20th and 21st centuries, there were many academic publications on the system of ABC. The publications mainly related to the degree of its diffusion and the characteristics of the system, as well as factors influencing the process of ABC implementation (Wnuk-Pel, 2011). The paradox is that, in spite of the high degree of interest in the system, the scale of its application seems rather small, or at least out of proportion compared to its benefits. This chapter presents the results of previous studies on the diffusion of the ABC system around the world and in Poland, and it points out the benefits and barriers related to its implementation and maintenance. The research on ABC can be divided into three groups:

- descriptive, i.e., determining the degree of diffusion of ABC in a given country, business, etc., and describing the characteristics of the ABC system in practice;
- investigating the relationship between factors (such as the intensity of competition, cost structure, company size) and the scope of ABC implementation;
- evaluating the success of ABC implementation and investigating the influence of ABC implementation on a company's performance.

These three research areas are briefly presented below.

3.1. Studies on the use of activity-based costing

One of the first major studies on the use of ABC was conducted by Innes and Mitchell (1995) who, in 1994, carried out a study on a population of more than 1,000 of the largest companies in the UK. The survey was sent to 1,000 non-financial companies and 60 financial companies listed in the financial sector of

The Times. 33.2% of responses were received, of which 21% of the companies used ABC, 29.6% considered its implementation, 13.3% had withdrawn from the implementation after initial investigation of its benefits, and 36.1% of the surveyed companies did not take ABC's implementation into account. According to the users, the main areas of ABC application included: inventory valuation, the measurement and evaluation of performance, and control and reduction of costs.

The largest proportion of studies on the use of ABC relate to the percentage of surveyed companies that used ABC. Hollister *et al.* (2004) conducted a study on 159 international companies from different countries. The results show that the highest percentage of companies using ABC was identified in the UK (80% of surveyed companies), whereas the smallest degree of ABC implementations was identified in European countries[1] and Japan (47% of companies). According to the study, the percentage of companies in the world which applied ABC was 64% (Hollister *et al*., 2004). The most important studies on the degree of ABC application in the 1990s and early 2000s are presented in Table 3.1.

Table 3.1. The level of ABC application according to current studies

Authors	Sample	ABC application
Innes, Mitchell, 1991 Great Britain	720 members of CIMA, 187 questionnaires were returned	6% were implementing ABC
Drury, Tyles, 1994 Great Britain	260 responses from production companies	4% used ABC, 9% intended to implement ABC
Innes, Mitchell, 1995 Great Britain	1,000 companies listed in *The Times*, 352 questionnaires were returned	21% used ABC, 30% considered implementation
Lukka, Granlund, 1996 Finland	production companies	5% were implementing ABC
Gosselin, 1997 Canada	production companies	30.4% was implementing ABC
Björnenak, 1997 Norway	132 largest production companies	40% used or planned to implement ABC
Van Nguyen, Brooks, 1997, Australia	350 production companies, 120 responses	12.5% used ABC, 8.3% intended to implement
Clarke *et al*., 1999 Ireland	204 production companies listed in the 1,000 largest companies in *Business and Finance*	12% used ABC, 20% evaluated possibility of implementation

[1] Companies from Germany, Portugal, France, Italy, Switzerland and Finland took part in the study.

Authors	Sample	ABC application
Cinquini *et al*., 1999 Italy	controllers of 132 large and mid-sized companies from the *National Association of Chambers of Commerce* database	10% used ABC, 27% intended to implement
Groot, 1999 USA, Holland	564 American companies, 96 questionnaires were returned; 480 Dutch companies, 117 responses	18% of American companies, 12% of Dutch companies used ABC
Innes *et al*., 2000 Great Britain	companies from the 1,000 list by *The Times*, 23% response rate	17.5% used ABC, 20.3% were considering implementation
Chongruksut, 2002 Thailand	101 companies listed on the Thai stock exchange	11.9% used ABC, 23% considered its implementation
Bescos *et al*., 2002 France	122 companies	23% used ABC, 23% were implementing ABC
Cotton *et al*., 2003 New Zealand	300 companies	20.3% used ABC, 11.1% considered its implementation
Pierce, Brown, 2004 Ireland	127 largest production, service and financial companies, response rate was 23% out of 550 questionnaires sent	28% used ABC, 9% considered its implementation
Cohen *et al*., 2005 Greece	177 companies, 88 (50%) questionnaires were returned	40.9% used ABC
Sartorius *et al*., 2007 South Africa	companies listed on the stock exchange	11.6% used ABC
Krumwiede 2007 Germany, USA	148 German companies, 130 American companies	19% Germany, 21% USA
Askarany *et al.*, 2007 Australia	101 responses (20%)	20% were implementing ABC, 9% tested it, 11% used ABM
Rahmouni, 2008 France	66 companies	33.3% used ABC, 18.2% were implementing ABC
Novak, Popesko, 2008 Czech Republic	153 companies	5% used ABC
Askarany, Yazdifar, 2008 Great Britain, New Zealand, Australia	2000 members of CIMA, 584 responses	15.2% Great Britain, 22.5% New Zealand, 23.4% Australia

Table 3.1. (cont.)

Authors	Sample	ABC application
Jinga *et al.*, 2010 Romania	–	6–12% used ABC
Fadzil, Rababah, 2012 Jordan	92 companies, 82 responses	8% used ABC
Rundora, Selesho, 2014 South Africa	80 companies, 48 responses	20% used ABC

***** American companies apply activity-based costing more often (31% – production companies, 69% – non-production companies) than German companies, respectively 20% and 23% of surveyed companies use ABC in Germany

Source: own research

The analysis of the above results shows that there was a significant interest in ABC at the beginning of the 1990s, however, the percentage of companies applying ABC was still minor at that time. In the late 1990s, the number of companies implementing ABC was steadily growing, but not as fast as expected. There were also cases of giving up the implementation of ABC after prior analysis of its usefulness. At the beginning of the 21st century, one could observe a decline of interest in this system in highly-developed countries, while there was an increase in the number of implementations in developing countries, although the percentage of ABC implementations in these countries was still relatively low.

The popularity of ABC among companies cannot be assessed on the basis of survey research conducted in various countries, at different times, with the use of different questionnaires and different methods of sampling. Thus, studies involving several countries seem more reliable. Horngren *et al.* (2000) conducted a study on the implementation of ABC in the US, Canada, UK, New Zealand and Ireland. In 162 US companies, the main reasons for implementation included cost reduction and quality improvement of processes. The respondents claimed that ABC was particularly useful for making pricing decisions, process management, and shaping product structure. In Canada, 14% of the surveyed companies had already implemented the ABC system, whereas 15% were considering such a possibility. The main advantages of ABC implementation in Canadian companies included: obtaining more accurate information for the purpose of making pricing decisions, analysis of factors affecting financial results, learning the causes of cost occurrence, and using ABC for measuring performance. In 24% of cases, the ABC system replaced existing systems, and in the case of 76% of companies, it constituted an additional information system. In the UK, 20% of 251 companies implemented ABC. The main areas of application of ABC in

that country included: cost management, measurement of performance, pricing, and cost reduction. In New Zealand, the surveyed companies mentioned similar advantages of ABC and, additionally, pointed out two problems related to the system; the problems involved the difficulty in obtaining data and the lack of support of middle management. Irish companies which had already implemented ABC expected that this system would allow them to obtain accurate information about costs and the causes of their occurrence, and it would be used for making pricing decisions and measuring performance. The biggest problems for Irish companies included: identifying activities and cost pools, as well as identifying cost drivers (Horngren *et al.*, 2000).

Askarany and Yazdifar (2008) conducted a study on the diffusion of innovative methods of management accounting in the UK, Australia, and New Zealand. The questionnaire was sent to 2,000 members of CIMA in those countries. As a result, 584 responses were returned. The results relating to the application of ABC are presented in Table 3.2.

Table 3.2. Diffusion of ABC in selected countries (%)

Specification	Great Britain	New Zealand	Australia
ABC implementation was not considered	34.8	45.1	39.6
ABC implementation was abandoned	18.2	15.5	13
Possible implementation of ABC in the future	19.7	12.7	18.8
ABC was implemented on a trial basis	12.1	4.2	5.2
ABC was implemented and approved	15.2	22.5	23.4

Source: Askarany, Yazdifar (2008)

Innes *et al*. (2000) once again conducted a study in 1999 (it was only repeated), which was supposed to determine changes in the degree of ABC application over five years. The questionnaire was sent to 1,000 of the largest companies in the UK. The response rate was 22.9%. The number of companies using ABC had fallen from 20.3% to 17.5%, and the number of companies planning implementation had also fallen, from 29.5% to 21.0%. However, the number of companies that had abandoned implementation after a preliminary assessment rose from 13.3% to 15.3%. The number of companies that had never considered implementing ABC also grew, from 36.1% to 46.9%. According to the survey, the

biggest advantages of using ABC included: better information about the costs and profitability of products and customers, better cost control, and the provision of information for decision-making and measurement of performance. Both studies showed that there was a higher rate of ABC application in financial firms than production and service companies. The main objectives of ABC application in the surveyed companies included: cost reduction, pricing, performance measurement, budgeting, customer profitability analysis, making decisions about the production output, and development of new products (Innes *et al*., 2000).

The study carried out by Novak and Popesko (2008) in the Czech Republic on a sample of 153 enterprises showed that only 5% of companies applied ABC. However, a significant number of respondents (26%) were not satisfied with the traditional system of cost accounting, and 20% of respondents claimed that their current system did not provide reliable information about costs. According to the survey, 43% of companies were familiar with ABC but only 21% knew the system very well, and it indicates that the main barrier to the diffusion of ABC in that country was the lack of experience and knowledge in terms of ABC. Most companies (71%) had never dealt with ABC, 10% answered that they had considered implementing ABC but, after assessment, they abandoned the project. The main reason behind implementing ABC was the need to reduce costs and improve information about costs (Novak, Popesko, 2008).

Byrne *et al*. (2009) conducted a survey on the use of ABC in Australia. The questionnaire was sent by e-mail, and 65 responses were sent back (39.7%). The results indicated that companies using ABC were satisfied with it because it was more accurate and reliable than a traditional cost accounting system, it had a positive impact on the quality of work, and it increased the quality of decisions. However, the study did not explain the low scope of ABC use, despite the benefits of its application.

Wegmann (2011) conducted a study on the diffusion of ABC in China. The research revealed that ABC was most popular in Hong Kong. The main reason behind the interest in this system was the need for more credible information about costs. In mainland China, the diffusion of ABC was far less. The biggest difficulty in designing and implementing ABC was the lack of training staff and satisfaction with the existing system. Su *et al*. (2007) conducted empirical research on factors influencing decisions about the implementation of ABC in the country. The factors included: company size, management system, competition, cost structure, type of business, and corporate strategy. The size of the company, degree of management centralization, and share of indirect costs in total costs had a significant influence on the decision to implement ABC. In contrast, competitiveness did not influence the decision about ABC implementation in the surveyed companies. According to a study by Parkinson (2009), the main areas of ABC implementation in China, included: pricing, decision making, and risk assessment. ABC was barely used to calculate indirect costs.

A survey carried out in South Africa by Rundora and Selesho (2014) related to the barriers of ABC implementation. The questionnaire was sent to the owners, managers, and employees of financial departments of small production companies. The sample involved 80 companies; 48 (60%) companies responded. ABC was used by 16 (20%) companies. The main barriers to implementation of ABC included: lack of knowledge on ABC, structural problems (identification of activities and cost drivers), financial constraints, or other priorities. The respondents agreed that the benefits of ABC are higher than costs incurred in its implementation. The lack of ABC implementation in the surveyed companies was usually justified by high implementation costs, lack of IT resources, high labor input, the great detail of the system, and the lack of knowledge about ABC (Rundora, Selesho, 2014).

The summary of areas where ABC is used, and the problems and barriers related to its implementation and maintenance according to existing studies is presented in Tables 3.3 and 3.4.

Table 3.3. Main areas of ABC application according to existing studies

Areas	Authors
Control and reduction of costs	Innes, Mitchell (1995), Clarke *et al.* (1997), Innes *et al*. (2000), Horngren *et al*. (2000, 2005), Chongruksut (2002), Novak, Popesko (2008), Fadzil, Rababah (2012)
Measurement and assessment of performance	Innes, Mitchell (1995), Foster, Swenson (1997), McGowan, Klammer (1997), Clarke *et al*. (1997), Groot (1999), Innes *et al*. (2000), Horngren *et al*. (2000)
Provision of more reliable information about costs of products/services	Clarke *et al*. (1997), Innes *et al*. (2000), Horngren *et al.* (2000), Chongruksut (2002), Novak, Popesko (2008), Wegmann (2011)
Profitability analysis of products/services and customers	Clarke *et al*. (1997), Groot (1999), Innes *et al.* (2000), Cotton *et al*. (2003), Pierce, Brown (2004), Sartorius *et al*. (2007)
More accurate calculation of indirect costs	Clarke *et al.* (1997), Pierce, Brown (2004), Sartorius *et al.* (2007), Hashim (2014), Fadzil, Rababah (2012)
Making pricing decisions	Horngren *et al*. (2000), Cotton *et al.* (2003), Parkinson (2009)
Designing new products	Innes *et al*. (2000), Cotton *et al.* (2003)
Budgeting, streamlining of budgeting	Innes *et al.* (2000), Chongruksut (2002)
Usefulness for decision-making	Gosselin (1997), Byrne *et al.* (2009)

Source: own research

Table 3.4. Problems and barriers related to the implementation and maintenance of ABC

Problems and barriers	Authors
Lack of experience in terms of ABC	Clarke *et al.* (1997), Groot (1999), Pierce, Brown (2004), Askarany *et al.* (2007), Novak, Popesko (2008), Wegmann (2011), Rundora, Selesho (2014)
System structuring (identification of activities, cost pools, cost drivers)	Clarke *et al.* (1997), Groot (1999), Horngren *et al.* (2000), Pierce, Brown (2004), Cohen *et al.* (2005), Sartorius *et al.* (2007), Rundora, Selesho (2014)
Inadequate computer software	Clarke *et al.* (1995), Cohen *et al.* (2005), Jinga *et al.* (2010), Rundora, Selesho (2014)
Lack of resources, financial constraints	Clarke *et al.* (1997), Anderson, Young (1999), Wegmann (2011), Rundora, Selesho (2014)
Resistance of staff, reluctance to change	Anderson, Young (1999), Pierce, Brown (2004), Cohen *et al.* (2005), Dragija, Lutisky (2012)
Other priorities (e.g., ISO, ERP implementation)	Groot (1999), Askarany *et al.* (2007), Rundora, Selesho (2014)
Lack of support and interest of management	Horngren *et al.* (2000), Cohen *et al.* (2005), Jinga *et al.* (2010)
Lack of software	Pierce, Brown (2004), Cohen *et al.* (2005), Askarany *et al.* (2007)
Satisfaction with existing system	Pierce, Brown (2004), Cohen *et al.* (2005), Jinga *et al.* (2010), Wegmann (2011), Dragija, Lutisky (2012)
High costs of implementation and maintenance	Cohen *et al.* (2005), Askarany *et al.* (2007), Jinga *et al.* (2010), Rundora, Selesho (2014)
Perceiving ABC as complicated	Pierce, Brown (2004)

Source: own research

Despite high interest in ABC, the degree of its use is relatively low. The percentage of companies using ABC varies from zero to several dozen per cent, which may stem from the following (Wnuk-Pel, 2011):

1. The inadequacy of ABC in some companies – adoption of ABC in many companies may not provide significantly better results than other traditional cost accounting systems in such areas as: time saving, labor input, and implementability (people making decisions about ABC implementation are not convinced that this method is better than other, traditional techniques). Such an interpretation complies with the Chenhall and Langfield-Smith's conclusions, who suggest that benefits resulting from implementation of modern methods of management accounting still do not surpass the benefits resulting from implementing traditional methods. Such an

interpretation also explains the behavior of companies which began implementing the innovation but at some point abandoned it (Innes, Mitchell, 1991).

2. A different understanding of ABC – the results of all the research into the diffusion of ABC should be analyzed carefully because there is no single and commonly accepted definition of ABC, either in theory or in practice. Gosselin (1997) and Baird *et al.* (2004) emphasize that respondents are not exactly sure what ABC really is. The conclusions are also mirrored in the research of companies using ABC – the research proves that the ABC systems functioning in those companies are significantly different (Gosselin, 2007).

3. The level of management accounting development – in general, in countries which are economically more developed, the use of management accounting methods is higher than in countries which are less developed or are still developing.

4. Sampling method – the studies into the diffusion of ABC were carried out among both large and small companies, manufacturing and non-manufacturing companies, financial institutions, etc.

5. When the information was collected – in general, earlier studies show a significantly lower percentage of companies using ABC. In all the countries where the research into the diffusion of ABC was carried out, the percentage of companies using ABC increased until the end of the 20th century, and it later stabilized in the first decade of the 21st century.

In general, the presented research into the diffusion of ABC may overestimate the percentage of companies using ABC because there was a lower percentage of answers among companies which were not using ABC. Companies that do not adopt ABC tend not to respond to survey research in comparison to companies which do use ABC. The overestimated percentage of companies using ABC may also stem from the fact that the majority of the research was carried out among management accounting specialists – their perception of ABC might vary from that expressed by other managers.

3.2. Studies on the factors influencing the implementation of activity- -based costing

Some of the research into the diffusion of ABC aimed to analyze the impact of various factors on the implementation of ABC in individual stages of the process – the most important research in this area includes works by Anderson (1995), Krumwiede (1998), and Gosselin (1997). Based on the implementation of ABC in a large American company operating in the automotive industry, Anderson (1995) developed a model which explained the process of ABC implementation. The model, based on the work of Kwon and Zmud (1987) and Cooper and Zmud (1990),

listed the following stages of implementation: initiation, adoption, adaptation, acceptance, implementation into everyday practice, and infusion. Observations and interviews with managers of various levels conducted by Anderson helped to identify 19 factors that affect (in a positive or negative manner) the implementation of ABC in the first four stages of the model by Cooper and Zmud (1990). The analysis made it possible to observe that some of the factors affect implementation of ABC only in some phases. Depending on the phase, differences were evident in terms of influence on the implementation of the following factors: intensity of competition, suitability for decision-making, compatibility, support of senior management, training, and satisfaction with the current system.

According to Anderson (1995), the following factors have a positive impact on the implementation of ABC at the initiation stage: competition, differentiation of demand, uncertainty of environment, openness to change, functional specialization, training, complexity for users, compatibility with existing systems, perceived benefits in relation to existing systems, and responsibilities of employees. In this phase, the implementation is negatively affected by centralization. In the second stage of implementation, i.e., adoption, the following factors have a positive impact on the process of implementation (Anderson, 1995): uncertainty of the environment, openness to change, familiarity with the process, degree of commitment, training, complexity for users, benefits in relation to existing systems, suitability for decision-making, and compatibility with corporate strategy. In the adoption phase, three factors had a negative impact on the implementation of ABC: internal communication, uncertainty and lack of clarity of goals, and autonomy of employees. In the next two phases of implementing ABC, there are already fewer factors influencing the implementation than in the initiation and adoption stages. In the adaptation phase (phase three), the process of implementation is positively affected by such factors as competitiveness, openness to change, centralization, internal communication, training, and compatibility with existing systems. It was noted that in the fourth phase (acceptance), only three factors have a positive impact, i.e., internal communication, training, and diversity. The model developed by Anderson (1995) analyzed only four of the six phases of implementation, since the analyzed company had not completed all stages of the implementation process.

Although Anderson's model does not allow us to analyze the factors affecting implementation at all phases, and it was based on an example of one company, it has become a foundation for many other studies on the implementation of innovative methods of management accounting. Krumwiede (1998) was one of the authors who empirically tested the model developed by Anderson. Krumwiede acquired data using a questionnaire sent by e-mail to members of the Chartered Institute of Management Accountants in the USA, and with their help he analyzed

the influence of various factors on the implementation of ABC. The results, in line with the conclusions of Anderson (1995), show a positive influence of several factors on the process of implementing ABC (Krumwiede, 1998), see Table 3.5.

Table 3.5. Factors influencing ABC implementation

Steps of implementation	Positive factors
Initiation	seeing distortion of costs; size of company
Adoption	seeing distortion of costs; size of company
Adaptation	seeing distortion of costs; support of senior management; suitability for decision-making
Acceptance	suitability for decision-making; information technology; time of implementation
Routinization	seeing distortion of costs; support of senior management; time of implementation; number of applications
Infusion	suitability for decision-making; information technology; training; using ABC not only by accountants

Source: Krumwiede (1998)

The analysis of previous studies allows us to identify potential factors influencing companies' decisions about adopting ABC. The research by Björnenak (1997), Krumwiede (1998), and Alsaeed (2005) showed a positive correlation between product differentiation and use of ABC. In contrast, Van Nguyen and Brooks (1997), Ahmadzadeh *et al.* (2011), and Brown *et al*. (2004) indicated no such influence. According to the literature, the degree of product differentiation should have an impact on the implementation of ABC, however, having a variety of products may not be a sufficient factor to initiate the process of ABC implementation. Previous studies did not indicate clearly whether variety of products is a decisive factor in terms of ABC implementation. In companies which manufacture a small number of products by means of less complex processes, it would be better to hold back with the decision about ABC implementation.

The increase of indirect costs meant that their accounting and control became more important, and calculations performed in a traditional manner are not acceptable due to the fact that they do not determine the costs of products and services in a reliable way. For that reason, the study also investigated the correlation between the structure of indirect costs and the degree of ABC adoption. Björnenak (1997), Su *et al.* (2007), and Ahmadzadeh *et al.* (2011) in their studies showed a positive correlation, whereas Van Nguyen and Brooks (1997), Brown *et al.* (2004), Alsaeed (2005), and Khalid (2005) did not demonstrate that the share

of indirect costs had an influence on the degree of ABC use. In addition, Cohen *et al.* (2005), and Askarany *et al.* (2007) did not come to a conclusion that companies using and not using ABC differed significantly in terms of indirect cost structures. Yet, Booth and Giacobbe (1998) found that a higher level of indirect costs was relevant at the initiation stage of ABC implementation, but this did not affect the evaluation and adaptation phases.

The research by Akinyomi (2014) mainly investigated the influence of company size on the decision to implement ABC. The results confirmed a positive correlation between the size of a company and the degree of ABC adoption. The research conducted by Gosselin (1997), Van Nguyen and Brooks (1997), Björnenak (1997), Pierce and Brown (2004), Su *et al.* (2007), and Ahmadzadeh *et al.* (2011) revealed the same findings, which may stem from the fact that the process of ABC implementation is expensive, and larger companies have significantly greater financial resources and better access to information, thus, these companies are more likely to adopt innovations.

According to studies carried out by Björnenak (1997) and Van Nguyen and Brooks (1997), companies operating in a more competitive environment often make decisions about ABC implementation. However, not all studies confirmed this relationship. Su *et al.* (2007) noted that the level of competition was not a statistically significant factor which influenced the degree of ABC adoption.

Drury (1998) thought that the scope of management accounting depends on the type of business. He claimed that production companies have more powerful tools of management accounting in comparison to non-production companies. Innes and Mitchell compared the degree of ABC application in production and non-production companies. The survey showed that the degree of ABC application in manufacturing companies was only slightly higher (27%) than in financial firms (24%). Interesting conclusions can be drawn from the study carried out by Clarke *et al.* (1999), who noticed that ABC was particularly popular in the health sector. Conversely, Pierce and Brown (2004) indicated a much higher degree of ABC use in production companies – 23.5%, than in service companies – only 12%.

Brown, Booth and Giacobbe (2004) studied the impact of organizational and technological factors on the degree of interest in the concept of ABC. Support of management and directors was a key factor influencing the decision about ABC implementation. The same conclusions were found in the research conducted by Foster and Swenson (1997), McGowan and Klammer (1997), Anderson and Young (1999), and Sartorius *et al.* (2007).

Most of the studies confirmed the positive effect of ABC implementation on operational and strategic decisions. It was also found that ABC is a very important tool in the management of modern companies; it allows better measurement of costs and helps companies learn what the causes of cost formation are, it is a source of information for other methods of management accounting (e.g., TQM,

BSC, value chain management), and that confirms that the slow diffusion of ABC does not result from the lack of satisfaction with ABC. However, ABC has some flaws. The system is costly to implement and maintain, and identifying activities and cost drivers seems difficult.

3.3. An evaluation of implementation success of activity-based costing and the influence of implementation on the company's performance

As mentioned before, at the turn of 20th and 21st centuries, a significant percentage of companies from different countries made an effort to implement ABC. These companies experienced major problems during the implementation process, and in some extreme cases the satisfaction from ABC implementation was doubtful. One of the main problems related to the implementation was the fact that companies focused on technical aspects (determining activity and driver dictionaries and selecting software) and did not take behavioral and organizational factors into account (Argyris, Kaplan, 1994). In many companies, ABC is not treated as an administrative innovation (although it is such an innovation) but as a technical innovation. The ABC literature also focuses on the technical aspects of innovation; although they are important, they are not enough in terms of successful implementation of ABC. The behavioral and organizational aspects of the implementation process are as important as technical ones.

Shields (1995) conducted one of the first studies that focused on identifying behavioral and organizational factors affecting the success of ABC implementation. This study was carried out on a population of 143 companies which adopted ABC, and showed that the degree of satisfaction with the system functioning in companies was varied (the success of implementing ABC was rated as moderate, and companies using ABC assessed its implementation as beneficial in terms of finance). Furthermore, the survey showed that the success of ABC implementation was affected by both behavioral and organizational factors, such as support of the management board, relationship with the competitive strategy, relationship with systems of performance and remuneration evaluation, training, having accountants carry out the implementation, and the availability of appropriate resources. Shields (1995) concluded that successful implementation of ABC is not significantly dependent on such technical variables as type of software, participation of consultants, or implementation in terms of integrated systems or domain systems.

Foster and Swenson (1997) completed their study in the same year as Shields (1995). Their study aimed to analyze satisfaction of financial and operational managers in terms of ABC (the survey was conducted on a population of 25

companies). In general, this study showed that the degree of satisfaction with ABC was higher than with the previous system. However, the author emphasized that the results should be interpreted with caution because the respondents were the people responsible for the implementation of ABC in their companies. Foster and Swenson (1997) improved the evaluation of ABC implementation success; they suggested the following four measures: using information from ABC in decision-making, taking decisions and actions based on information from ABC, perceived financial influence of ABC implementation, having managers assess the success of the implementation.[2]

McGowan and Klammer (1997) carried out another important piece of research which analyzed factors determining the success of ABC implementation. The authors analyzed the relationship between the factors determining the implementation of ABC and employees' satisfaction with the system. The main finding of the study was that the degree of satisfaction depends on most of the factors which were previously identified by Shields (1995) in an earlier study, i.e., support of the management, degree of involvement in the implementation process, correlation with the performance measurement system, and training. The study (McGowan, Klammer, 1997) showed that, in general, employees perceive the implementation of ABC as a success, yet it should be stressed that the satisfaction was higher among daily supervisors of the system rather than users of information from ABC. The involvement of employees in the implementation process, and the evaluation of quality of information generated by ABC, had a positive influence on the perception of success.

Anderson and Young (1999) conducted a study that analyzed the relationship between employees' satisfaction with ABC and factors determining the implementation. The study, based on two companies, allowed them to conclude that overall assessment of ABC largely depends on the quality of the previous system of cost accounting, and the precision of information from ABC mainly depends on the need for changes seen by the respondents and the application of appropriate resources. The use of information generated by the ABC system was, in turn, primarily dependent on the support of management, the availability of adequate resources, and the involvement of the respondents in the design and organization of the implementation. The basic variables used in the key studies into the success of ABC implementation are presented in Table 3.6.

[2] The study carried out by Foster and Swenson (1997) aimed to analyze factors influencing the success of implementing management accounting methods determined by activity. The study involved 166 cases of implementations in 132 companies. It showed, in accordance with previous research, that support of the management and relation to the system of performance measurement were two key factors determining implementation success. The analysis also showed that there is a significant positive relationship between the success of activity-based costing implementation, the time of using the system, and the number of various applications of the system.

Table 3.6. Variables used for the purpose of the study on ABC implementation success

Study	Method	Variables
Anderson, 1995	case study of one company	success as transition to another stage of implementation
Shields, 1995	questionnaire research involving 143 companies using ABC	perceived implementation success; financial effects of implementation
Swenson, 1995	telephone interviews with 50 people from 25 companies	satisfaction with current system of product cost calculation; satisfaction with product cost calculation by means of ABC
Innes, Mitchell, 1995	questionnaire research involving 21 production and non-production companies	success as transition to another stage of implementation
Gosselin, 1997	auestionnaire research involving 161 business units in manufacturing companies	success as transition to another stage of implementation
McGowan, Klammer, 1997	a study of 53 employees from 4 companies	perceived degree of satisfaction related to ABC implementation
Foster, Swenson, 1997	questionnaire research involving 166 users of ABC from 132 companies, visits in 15 companies	use of information from ABC in decision-making; taking decisions and actions based on information from ABC; perceived financial effects of ABC implementation; evaluation of implementation success by managers
Anderson, Young, 1999	questionnaire research and case studies in 21 ABC projects in 2 companies	perceived value of ABC; perceived accuracy of ABC; perceived utilization of information from ABC

Source: own research

To sum up the analysis of studies on factors determining the successful implementation of ABC, it should be emphasized that these studies were mainly based on the opinions of management members and employees (usually managers and employees were asked to provide a subjective assessment of the implementation success on a scale from 1 to 5). As a result, the evaluation of the success of ABC implementation included in the analyzed studies can be subjective to such an extent that it is difficult to assess. Thus, measurement of success is not an easy task, even though subsequent studies (Shields, 1995; Anderson, Young, 1999) applied improved measures.

Although ABC has been known and used in companies around the world since the 1980s, one can wonder whether the extent of its diffusion results from fashion and trends or whether it results from its genuine usefulness. Despite the fact that both theoreticians and practitioners are convinced about the usefulness of this concept, there are relatively few studies which analyze the impact of ABC implementation on the performance of companies around the world. A study conducted by Kennedy and Affleck-Graves (2001) is one of the few exceptions. The authors attempted to explain the contradiction between the perceived benefits resulting from the implementation of ABC and the low diffusion of this concept by analyzing the impact of ABC implementation on the company value. The study was based on British companies. Kennedy and Affleck-Graves found that in the three years after implementation, the achievements of companies using ABC on average exceeded the achievements of companies not using this approach (achievements were measured by means of accounting and market measures) by 27%. A more detailed analysis showed that ABC increases the value of companies by allowing better control of costs, an improvement of resource utilization, and greater use of financial leverage. Companies using ABC created value by making rational decisions based on information from ABC. On the one hand, the study conducted by Kennedy and Affleck-Graves (2001) confirmed the results obtained by Malmi (1999), who claimed that decisions about ABC implementation are taken rationally (companies implement ABC because it increases their value). On the other hand, this study does not explain the paradox of ABC, but it even emphasizes it – why, despite the proven value of ABC, do so few companies implement the concept?

Another study on the influence of ABC implementation on company performance was conducted on a large population of production companies by Ittner *et al.* (2002). The study aimed to evaluate the relationship between the use of ABC and the operational and financial performance of companies. As measures of performance, Ittner *et al.* (2002) applied return on assets, shortening delivery time, and improvement of product quality and cost reduction. The authors confirmed a positive, yet not very strong relationship between the adoption of ABC and an improvement of both financial and operational achievements. Gordon and Sylvester (1999) approached the problem of analyzing the influence of ABC on company's performance in a slightly different manner – they analyzed the impact of information about implementing ABC on stock prices. The study found that information about the implementation of ABC has no impact, neither positive nor negative, on the stock prices of companies that implement ABC.

The last analyzed study into the influence of ABC on company performance was carried out by Cagwin and Bouwman (2002). The authors investigated the improvement of a company's achievements resulting from ABC implementation in the context of the conditions necessary to achieve such results. The study showed

that positive financial results from implementation of ABC are more probable when ABC is used jointly with such methods as JIT inventory management or TQM (the study showed that financial results of JIT and TQM implementation without simultaneous use of ABC were smaller than in the case when JIT or TQM was used jointly with ABC). Cagwin and Bouwman (2002) demonstrated that the implementation of ABC has a positive impact on the return on invested capital in organizations which:

- are complex and diversified;
- employ a cost strategy;
- operate in a competitive environment;
- use advanced IT and technology;
- have fully utilized resources.

To sum up the analysis of the research on the impact of ABC implementation on company performance, it should be emphasized that the results of previous studies are not conclusive. These studies are rare and, although they mostly confirm the positive impact of ABC implementation on companies, they do not explain the disparity between the concept's usefulness and its less-than-expected diffusion.

The implementation of innovative methods of management accounting, such as ABC, is not always a result of a fully deliberate, rational decision. According to the theory of fashion and trends (Abrahamson, 1991; Abrahamson, Rosenkopf, 1993), companies often decide to implement an innovation, or they abandon implementation, because other companies from the same sector have implemented or abandoned implementation of this innovation. The pressure of companies from the same sector, or pressure of professional organizations or consulting firms, may have a significant (and sometimes decisive) influence on both the implementation of a useless innovation or the rejection of a very useful innovation. Abrahamson (1991) noted that the implementation of innovations in organizations may be a result of a conscious choice but also a result of fashion. In other words, some organizations implement some innovations mainly because these innovations are being implemented by other organizations (e.g., competitors) and not because this innovation has been assessed as effective.

Fads and fashions may affect the diffusion of ABC in two ways. Firstly, there is an institutional pressure, mainly from consulting firms and IT companies, professional associations of management accountants, but also universities; it may persuade managers in many organizations to implement ABC (what is more, uncertainty about the effects of implementation and usefulness of the concept may persuade managers to implement ABC when other companies from the sector are also working on implementation). Secondly, according to the theory of fads and fashions, an organization may reject implementation of ABC due to the fact that other organizations in the sector have chosen not to implement it. Studies related to

the dissemination of ABC from the perspective of the theory of fads and fashions are rare, but at least two of them need to be mentioned briefly. Gosselin (1997), who analyzed the diffusion of ABC, drew attention to the fact that decisions about implementing ABC, or decisions about abandoning implementation, are mainly taken under pressure from competitors, suppliers, or customers, and of course consulting companies. Malmi (1999), who investigated the diffusion of ABC in Finnish companies, analyzed the causes of diffusion in different phases of the process by conducting interviews with employees of consulting companies, representatives of IT companies, and people from academia. He noticed that the companies which first implemented ABC had taken a rational decision about its implementation. On the other hand, organizations that decided to implement ABC later were mainly following the fashion. The influence of fashion and trends on ABC gradually lessened, and subsequently implementations were a result of rational choices. Interestingly, Malmi noticed that in the first years of ABC dissemination, smaller companies engaged in its implementation, while larger companies took such decisions later.

As already mentioned, studies showing the positive impact of ABC implementation on company performance and research based on the theory of fads and fashions are both rare. Thus, it is difficult to clearly decide to what extent the diffusion of ABC results from following fashion or managers making rational decisions. Therefore, these studies should be continued in order to explain the process of making business decisions about adopting or abandoning the implementation of innovative methods of management accounting such as ABC. Whatever the answer to the question about the influence of fashions and trends on the diffusion of ABC and the genuine usefulness of this concept (the truth probably lies somewhere in the middle) it must be noted that the diffusion of ABC has had a significant impact on the development of both the theory and practice of cost accounting and management accounting.

3.4. Studies on the use and functioning of activity-based costing in Poland

The first study on the use of ABC in Poland was conducted by Sobańska and Wnuk (2000). It was a study which showed that ABC was present in the practice of Polish companies. The research, carried out between 1990 and 2000 on a sample of 92 companies, revealed that only two companies with foreign capital adopted ABC. Arthur Andersen, a consulting company, in 1999 revealed that a complete system of ABC in Poland was used by 10% of respondents, 20% of companies used only certain elements of ABC, and 70% of respondents were planning

implementation in the future. The study involved mainly large companies which employed more than 500 people, thus its results may seem inflated. [3]

A study conducted in 1998 by Radek and Schwarz (2000) involved 200 companies and showed that none of the companies used ABC.

Between 1998 and 1999, Szychta (2002) carried out a study which, among other issues, examined the use of ABC. A questionnaire was sent to 290 companies located in the center and south of Poland; 60 questionnaires were filled in and sent back (20.7%). The survey showed that only 3 companies out of 60 used certain elements of ABC and 1 company with foreign capital was planning implementation of ABC in the future. A study carried out by Szadziewska (2002) involved 246 companies based in northern Poland; it showed that none of the respondents used ABC. The companies were implementing new methods of cost accounting due to a reduction of costs and increased competition. As the main barriers to implementing modern methods of management accounting, the respondents recognized the small scale of operations and lack of sufficient financial resources, as well as little knowledge about new methods of cost accounting (only in the case of small businesses). The study also showed that the size of an organization and intensified competition constituted a significant factor contributing to the implementation of innovative methods of management accounting.

Karmańska (2003) analyzed the popularity of ABC implementations in Poland. The author asked 500 people to fill in a questionnaire. 396 people responded (79%). 342 questionnaires (68%) were qualified for the study. Almost half of the respondents were familiar with ABC with the rest claiming they had never heard about ABC before. According to the study, only one company had adopted ABC and three other companies were in the process of implementing the system. The author also identified factors that facilitated the implementation of ABC, i.e., the need to examine core business activity, highly qualified staff, sufficient financial resources, openness to change, and ambitious staff. The study revealed that respondents who considered implementing ABC expected the following problems: lack of knowledge of ABC, reluctance to change, financial restraints, and satisfaction with current cost accounting system. A significant number of respondents recognized the implementation of ABC as unrealistic, and the reasons for that included the lack of both financial resources and staff with adequate qualifications.

Januszewski and Gierusz (2004) conducted a study which involved 101 large companies located in northern Poland. 40% of respondents claimed that they knew the system of ABC very well, 48% stated that they heard about the system but they did not know how it worked, and only 9% of respondents were

[3] A report from a study on Polish companies, *Zarządzanie finansami – szanse i bariery*, Arthur Andersen, Warszawa 1999, [in:] Januszewski, Gierusz, 2004.

unfamiliar with the ABC system. As far as usefulness of the system is concerned, the highest rating came from companies with foreign capital, whereas Polish companies were the most skeptical. The respondents stated that ABC could be useful in the following areas: measuring process and activity effectiveness, cost measurement, analysis of product profitability, streamlining budgeting, and identifying non-value adding activities. 56% of companies claimed that chances of ABC implementation were realistic, 38% claimed that chances were slim, and only 13% of people perceived it as unrealistic. According to the respondents, factors encouraging implementation included: openness of the board to innovation and the need to find ways to reduce costs. The most frequently mentioned barriers included: satisfaction of the management board with information about costs, lack of expertise and resources, and resistance of staff. The author also claimed that privately-owned companies with foreign capital more frequently adopted ABC (Januszewski, Gierusz, 2004). The reasons for abandoning ABC in the surveyed companies included high implementation costs, high-labor input, lack of sufficient knowledge, lack of support from the management, and lack of appropriate software. Over 50% of respondents stated that ABC would be useful in terms of management. The companies which had never considered implementing ABC provided the following arguments: satisfaction with the current system, lack of sufficient knowledge of ABC, and financial restraints. According to one method of assessing ABC's usefulness, in the case of 50% of companies, implementing ABC was recommended.

According to the authors of the study, factors which facilitated implementation of ABC included (Januszewski, Gierusz, 2004):

- dissatisfaction with existing cost accounting system, which does not provide sufficient information;
- management's dissatisfaction with existing information about costs and the profitability of products/services;
- the need to reduce costs;
- sufficient financial resources;
- management's openness to change;
- well-identified processes and activities;
- appropriate expertise and experience in terms of complicated projects.

According to the study (Januszewski, Gierusz, 2004) the implementation of ABC was recommended mainly due to the demand for accurate information used for the purpose of product and customer analysis.

Szychta (2006) conducted a survey among 320 companies located in central Poland, 90 responses were obtained. The study mainly focused on the scope of methods of management accounting in Polish companies. The results showed that 10% of the surveyed companies used ABC. The general conclusions from this study were that in Poland, the number of companies using modern methods

of cost accounting is slowly growing, but full costing is still the prevailing system (Kawczyńska, Wnuk-Pel, 2017). The slow diffusion of new systems of cost accounting in Polish companies was caused by an underdeveloped "process of investment and strategic management" and the dominance of operational management accounting. The surveyed companies gave reasons for introducing new methods of management accounting. The reasons included the need to reduce costs and improve results. According to the respondents, changes in the system of management accounting in the near future should include, inter alia, the implementation of ABC, BSC and Economic Value Added, as well as streamlining budgeting and cost control (Szychta, 2006).

While analyzing six implementations of ABC, Wnuk-Pel (2006) identified the following problems related to the implementation and maintenance of ABC (in order of importance): high expenditures related to implementing and maintaining the system, difficulties with modeling the system (identification of activities, cost drivers, etc.), insufficient knowledge of staff on ABC, lack of support from the management, other priorities, and lack of computer software. Borowski *et al.* (2008) conducted a study on "the impact of the implemented cost accounting model on the scope of obtained management information." The survey was conducted by means of a telephone survey and involved 612 companies. The authors managed to get 173 responses, of which 44 (25%) claimed that their companies used ABC. The main barriers to developing ABC in Poland related to problems with the implementation of this system.

Wnuk-Pel (2009) investigated the functioning of ABC Poland. His study was conducted on a group of 33 companies using ABC. The main objective of the study was to "analyze problems with the implementation of ABC, and to determine the structure of the system and methods of information use." Over half of the surveyed companies claimed that implementation of ABC had been initiated by the company's headquarters. The surveyed companies perceived implementation of ABC in their companies as a moderate success. The results indicated that the most significant problems were related to high-labor input during the implementation of ABC, resistance of employees, and problems with model development. In most cases, the system operated in a spreadsheet or database, which confirms that lack of appropriate software is a major problem related to the implementation of ABC in Poland. Information from ABC was primarily used for making investment decisions, reducing costs, making pricing decisions, budgeting, and measuring performance. The companies which adopted ABC also used other modern methods of management accounting such as benchmarking, BSC, Continuous Improvement, Business Process Reengineering, Economic Value Added, and TC (Wnuk-Pel, 2009).

Wnuk-Pel (2010) measured satisfaction resulting from the implementation of ABC on a sample of 71 companies. Average satisfaction was 1.43 (on a five-point

scale, where 1 – the highest rating, 5 – the lowest rating). The respondents also confirmed that the quality, accuracy, and reliability of information obtained from ABC was higher than in the case of the previous system. Information from ABC had a positive impact on their work (it improved quality, control, productivity, and efficiency). The implementation of ABC also had a positive influence on companies, in particular on "improving the quality of decision-making and increasing the focus on objectives." The study confirmed the hypothesis that ABC is useful for both managers and employees. Yet satisfaction with the system was higher among the preparers of information from ABC than among the users. The author also claimed that management accounting innovations in Poland are delayed in comparison to Western countries, but are heading in a similar direction (Wnuk-Pel, 2010).

The survey by Dynowska and Cygańska (2010) into the degree of ABC implementation in the Warmia-Masuria province was conducted in 2009. The study aimed to determine conditions of ABC implementation. The survey was sent to 159 companies employing more than 50 people. 8% of respondents declared that they used ABC, 13% of companies were considering implementation, and 78% of respondents had never considered implementing ABC. The main reasons behind the use of ABC was a desire to reduce costs and improve financial results. As far as barriers are concerned, the surveyed companies that were planning implementation of ABC in the future indicated huge labor input related to the implementation and maintenance of the system, insufficient knowledge of ABC, and difficulty in developing a model. On the other hand, companies which had never planned implementation of ABC mentioned such barriers as satisfaction with the existing system, insufficient knowledge of ABC, and low indirect costs. The final conclusions indicated that ABC was mainly used by private companies with foreign capital which employed more than 1,000 people.

Another study on the use of ABC (Wnuk-Pel, 2011) involved 1,267 enterprises. 531 completed questionnaires were obtained and 495 questionnaires (39.07%) were qualified for further study. The results indicated that as many as 65% of companies had never considered implementing ABC, 4.1% had rejected implementation after evaluation, 9.3% of companies had adopted ABC, and 20.9% planned to implement ABC in the future. The key reasons behind implementing ABC identified by the study included: the pricing of non-standard products, the implementation of ABC by competitors, reducing costs and improving performance, information needs of management, improvement of control. The lack of interest in the ABC system and the rejection of its implementation were justified by: insufficient knowledge among employees, high labor input in the implementation and maintenance of ABC, high costs of implementation, and lack of computer software. The main problems expected by companies which were considering ABC implementation included: insufficient knowledge of ABC among employees, high labor input during implementation, and problems with model

construction. As far as problems with implementation of ABC are concerned, the respondents most frequently mentioned the following: insufficient knowledge of ABC among employees, problems with model construction, and lack of computer software. None of these problems was identified as very significant; the majority of problems were rated as moderate or little. The causes of implementing ABC most frequently included the need to reduce costs and improve results, the information needs of managers, increased control, and dissatisfaction with the current cost accounting system (Wnuk-Pel, 2011).

An outline of previous studies related to the scope of ABC in Polish companies is presented in Table 3.7.

Table 3.7. The use of ABC in Polish companies

Author	Year	Population	Index
Sobańska, Wnuk, 2000	1990–2000	92	2
Arthur Andersen (Consulting company), 1999	1999	–	10% use entire ABC; 20% use elements of ABC
Radek, Schwarz, 2000	2000	200	0
Szychta, 2002	2002	60	3 companies use ABC; 1 company is planning implementation
Szadziewska, 2002	2002	246	0
Karmańska, 2003	2003	396	1company uses ABC; 3 companies are implementing ABC
Januszewski, Gierusz, 2004	2004	101	3 companies use ABC, 5 use elements of ABC, 1 company is implementing ABC, and 29 companies are considering implementation of ABC
Szychta, 2007	2006	90	10%
Borowski *et al.*, 2008	2008	173	44 (25%)
Dynowska, Cygańska, 2010	2010	159	8% use ABC; 13% are considering implementation
Wnuk-Pel, 2011	2011	495	9.3% use ABC; 21% are planning implementation of ABC

Source: own research

The studies suggest that the practice of management accounting in Poland (in particular, ABC) is heading in the same direction as in more developed countries

of Western Europe and North America, yet the pace of its development is slower (that is why the majority of Polish companies use traditional cost accounting systems). The concept of ABC in Poland has been known since the 1990s, when the first studies which identified the system in Polish companies emerged. The largest number of publications and empirical research appeared in the early 21st century. Conclusions from the analysis of research on the diffusion of modern methods of accounting confirm the low level of ABC adoption, however, the knowledge of the concept is extensive, especially among companies with foreign capital. Most of the surveyed companies claimed that ABC was useful in their company, but that resulted from the need to improve cost management in the company rather than from having the appropriate resources, knowledge, or skills that facilitated the implementation of ABC.

Companies considering the implementation of ABC must be aware of certain factors and problems related to the process of its implementation and adaptation. In order to counteract difficulties that may occur during the implementation of ABC, companies must make sure that the process has the support of the management board, that the company has adequate resources, and that employees are sufficiently trained and committed. The process of ABC implementation should be planned and integrated with the information system of a company. What is more, companies should not create systems that are too complicated and incomprehensible for employees. Companies should not be convinced that simply having the ABC system will make their company strengthen its competitive advantage and will significantly improve their financial results. That will certainly not happen if ABC is not used in the proper way for making operational and strategic decisions and if it is not regularly updated. Companies must also be aware that not all businesses should implement ABC: small companies with low indirect costs which manufacture highly profitable products can hold back on making a decision about implementing ABC. The general conclusions from the analysis of the studies are:

1. According to the literature and existing research, ABC should be implemented by large companies that manufacture diversified products, operate in competitive environments, and companies whose indirect costs have a large/growing share in total costs.

2. The factors which facilitated the implementation of ABC were, in particular: cost reduction, improvement of results, growing competition, growing indirect costs, and dissatisfaction with the existing system.

3. The studies showed numerous barriers that companies considering implementation were afraid of; the problems included: lack of sufficient knowledge of the system, high labor input related to implementing and maintaining ABC, problems with model construction, staff resistance, and lack of appropriate software.

4. The reasons behind non-implementation of ABC or abandoning implementation after earlier evaluation mainly included: satisfaction with the existing system, the high costs of implementation and maintenance, and lack of management support.

5. The basic areas where ABC is used included: profitability analysis, cost reduction, budgeting, pricing, and measurement of achievements.

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CHAPTER 4

RESEARCH METHODOLOGY OF THE STUDY ON THE BARRIERS TO ADOPTING ACTIVITY-BASED COSTING IN POLISH COMPANIES

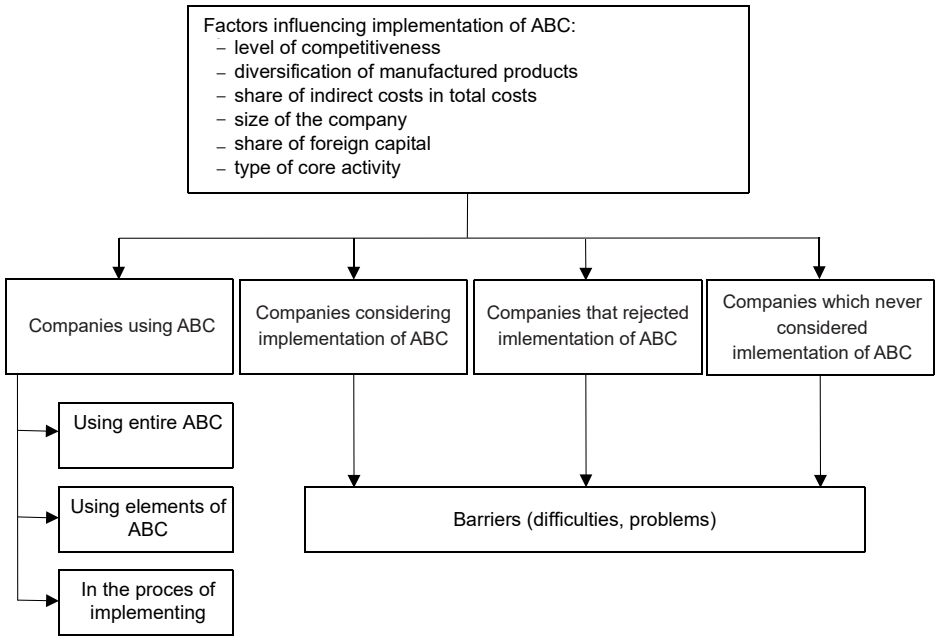
Proper methodological analysis of the study is necessary to obtain correct and consistent data, and to ensure the required quality, usefulness, and reliability of the research. Thus, Chapter 4 contains an analysis of the conducted study. In particular, it contains the problem and research objective, as well as research hypotheses. It also analyzes the research tools and techniques applied by the authors, as well as methods of data collection and methods which ensure the credibility and reliability of the study (Chojnacki, Cieślarczyk, 2003). The study was preceded by an analysis of the literature on ABC. Statistical analysis with the SPSS, including structural analysis and correlation analysis, was applied for the purpose of developing quantitative data. Stages of the study are generally compliant with the stages of empirical research in management accounting (Ryan *et al.*, 2002) and are presented in the next sections of this chapter.

4.1. Research objectives

Most studies related to ABC which were conducted globally mainly focused on the diffusion of ABC, and they analyzed the influence of numerous factors (behavioral, organizational, technical, systematic) on the success of ABC implementation. The results of previous studies were not always clear, and none of them explained in a sufficiently convincing way why the degree of ABC diffusion remains low. As for existing empirical studies carried out in Poland, their scope was small. The studies mainly focused on determining the number of companies using ABC, and to a small extent they determined the manner of ABC's

functioning and the difficulties associated with its implementation and use. The only wider research addressing the problems of ABC in Poland was conducted by Karmańska (2003), Januszewski and Gierusz (2004) and Wnuk-Pel (2006, 2009, 2011). More detailed analysis of ABC's functioning in Polish companies has been presented in the form of case studies (e.g., Wnuk-Pel, 2014).

Figure 4.1. Research model



Source: own research

In the light of the above facts, the identified research gap needs filling, i.e., an analysis of ABC's scope and the difficulties encountered in the process of ABC implementation in Polish companies. The main objective of this study is to determine the extent of ABC diffusion and to identify barriers to its adoption in Polish companies. Apart from the main objective, a number of specific objectives was formed, in particular:

1. The development of the ABC concept and its diffusion in the world as a reference for further detailed studies examining systems of ABC functioning in Polish companies.

2. The scope of ABC implementation in Polish companies at the beginning of the 21st century related to its diffusion around the world.

3. The factors which have a positive influence on the implementation of ABC in Polish companies.

4. Ways of using information from ABC in companies.

5. Key reasons for the lack of interest in ABC implementation from the perspective of companies which rejected its implementation or never considered it.

6. The key problems related to ABC implementation from the perspective of companies which are considering ABC implementation.

The first specific objective was realized in Chapter 2, objective no. 2 was partially realized in Chapter 3, and it will also be realized together with objectives 3–6 in a form of research, whose model is presented in Figure 4.1.

4.2. Research hypotheses

The implementation of an appropriate system of cost accounting which supports decision-making is extremely important for companies functioning in conditions that are characterized by globalization, shortened product life cycles, hyper competition, and technological and information technology development. In order to rationalize operational and strategic decisions, and increase competitive advantage and operational flexibility, companies are forced to adapt their cost accounting system to changing conditions. ABC is one of the innovative methods of management accounting that was developed in response to the needs of modern and process-controlled companies. Interest in this system in Poland increased significantly in the first decade of the 21st century, mainly due to numerous publications and the organization of many training sessions and conferences on ABC. However, the degree of its application in Polish companies is still lower than expected.

The first publications on ABC in Poland emerged in the mid-1990s (Jaruga, Szychta, 1994), i.e., during intensive changes taking place in the Polish economy. Polish companies had to change the way they functioned. They had to adapt to the rules of the market economy and change their approach to management, which became sales-oriented. Since the transition from a centrally-planned economy to a market economy, there has been a diffusion of management accounting methods in the practice of Polish companies (Szychta, 2007). Current research shows that the degree of innovation adopted by Polish companies (including ABC) is systematically growing, yet the process is slower than in Western countries. Researchers point out that there are few cases of ABC use (Szychta, 2002; Karmańska, 2003; Januszewski, Gierusz, 2004; Szychta, 2006; Wnuk-Pel, 2009; Dynowska, Cygańska, 2010), although the number of companies implementing ABC is increasing, there are also cases of companies which rejected the system (Wnuk-Pel, 2011). The percentage of companies using ABC varies widely between countries. It is higher in developed countries than in developing countries, but the

popularity of ABC is increasing in these countries, whereas some companies in the West have abandoned the system or limited its scope (Wnuk-Pel, 2011). On the basis of current research on the diffusion of ABC, hypothesis 1 was formulated:

H1: *The diffusion of ABC in Polish companies is low.*

In the context of the lower diffusion of ABC than is suggested in the literature, it seems interesting to examine what factors influence the decision about implementing ABC. ABC is not optimal for all companies and different factors condition its implementation. Some studies analyzed the relationship between the **type of business** and the degree of ABC use (Innes *et al.*, 2000; Cotton *et al.*, 2003; Drury, 2008; Wnuk-Pel, 2011). Drury (2008) noticed that production companies have more developed tools of management accounting, thus, the degree of ABC use in production companies should be higher than in non-production companies. Cotton *et al.* (2003) obtained similar results to Drury. On the other hand, Innes *et al.* (2000) and Wnuk-Pel (2010) did not identify any statistically significant relationship between the type of business and ABC implementation. Since the results of previous research have not been clear in terms of the influence of business activity on the decision to implement ABC, this study attempts to analyze whether the type of business has a statistically significant impact on the implementation of ABC.

Company size is another factor influencing the use of ABC which will be investigated in this study. The majority of studies outlined in the third chapter confirmed that a large **size of the company** positively influenced the use of ABC (Armitage, Nicholson, 1993; Innes, Mitchell, 1995; IMA, 1996; Lukka, Granlund, 1996; Björnenak, 1997; Gosselin, 1997; Clarke *et al.*, 1997; Van Nguyen, Brooks, 1997; Krumwiede, 1998; Clarke *et al.*, 1999; Innes *et al.*, 2000; Hoque, 2000; Joshi, 2001; Baird *et al.*, 2004; Khalid, 2005; Kallunki, Silvola, 2008; Brierley, 2008; Raeesi, Amini, 2013; Rundora, Selesho, 2014; Akinyomi, 2014). However, there are also studies which did not observe such a relationship (Booth, Giacobbe, 1998). In general, in large and very large companies, due to the greater complexity of processes performed, there is a need to apply more advanced systems of cost accounting. Under certain circumstances, however, it is reasonable to implement ABC also in small companies (e.g., Jänkälä, Silvola, 2012).

According to the literature, companies **with foreign capital** more often adopted ABC or considered its implementation than companies with only domestic capital. Clarke *et al.* (1999), while researching Irish firms, found that a company's international status (capital) was the most important variable determining the implementation of ABC. Joshi (2001), who researched Chinese companies, as well as Januszewski and Gierusz (2004) who surveyed Polish companies, obtained similar results.

Companies that produce a wide variety of products should apply ABC calculations because traditional costing distorts manufacturing costs (Hutchinson, 2010; Brierley, 2011). According to previous studies, **variety of products** was an important factor influencing the adoption of ABC (Brierley, 2011), as product differentiation increases the amount of indirect costs, and that diminishes the reliability of traditional costing. According to the subject literature and existing publications, diversity of products should influence the implementation of ABC, however, diversity of products may not be a sufficient factor to initiate the implementation of ABC. Companies that manufacture a small number of products by means of less complicated processes should put off the implementation of ABC (Wnuk-Pel, 2010).

Increasing competition has caused a need for greater accuracy in cost estimation. Sartorius *et al.* (2007) found that an increase in competition reduced the margin of error and allowed for the calculation of manufacturing costs. Cagwin and Bouwman (2002) noticed a positive correlation between the degree of competition and the use of ABC, and Ahmadzadeh *et al.* (2011) observed that the main reason for the low level of ABC application in Iran is the lack of strong competition among companies in that country. Since not all studies have confirmed the correlation (Su *et al.*, 2007; Velmurugan, 2010), it was necessary to determine to what extent this factor influences the diffusion of ABC in Polish companies.

Previous studies did not indicate clearly whether the level of indirect costs influenced the use of ABC. For example, Björnenak (1997), who investigated factors conditioning the implementation of ABC in Norway, found that cost structure was the only variable which had a statistically significant impact on the implementation of ABC. Similar results were obtained in a study on the diffusion of ABC in Saudi Arabia (Khalid, 2005). However, some studies did not observe any significant relationship between cost structure and the implementation of ABC (Van Nguyen, Brooks, 1997; Booth, Giacobbe, 1998; Clarke *et al.*, 1999). The increase of **indirect costs** made their accounting and control more important, and traditional cost accounting seemed unacceptable due to the fact that it does not determine the costs of products and services in a reliable way. Therefore, this study attempts to analyze the influence of this factor on the implementation of ABC. To test the influence of various factors on ABC implementation, hypothesis 2 was formulated:

H2: *The implementation of ABC is* ***positively influenced*** *by such factors as the manufacturing character of the company, company size, foreign capital, the degree of competition, the variety of manufactured products, and the share of indirect costs in total costs.*

Armstrong (2002) and Kee (2003) argued that budgeting in ABC increased transparency and control of planned costs, and it was also easier to identify areas where savings could be made. ABC was used for making both operational (Kee, 2003) and strategic decisions. ABC should be related to the company's competitive strategy, which would favor its use for pricing decisions and eliminate non-value-adding activities (Velmurugan, 2010). With a more accurate calculation of indirect costs, ABC facilitates a more accurate determination of product costs (Pierce, Brown, 2004; Fadzil, Rababah, 2012). ABC allows one to look at costs from the perspective of processes and activities, and focuses on their causes, therefore, it improves cost management (Friedman, Lyne, 2000). Combined with TC, it can be used to design cost-effective products (Wnuk-Pel, 2011). Profitability analysis was very often indicated as an area where ABC was applied (Innes *et al.*, 2000; Sartorius *et al.*, 2007; Wnuk-Pel, 2011). The research also indicated that ABC was often used for making pricing decisions (optimization of product/service portfolio, customers) (Innes, Mitchell 1991; Parkinson, 2009; Byrne *et al.*, 2009). ABC is also used to evaluate the performance of the entire company, responsibility centers, and employees (Wnuk-Pel, 2011). On the basis of the literature analysis and existing research, hypothesis 3 was formulated:

H3: *Companies* ***use information*** *from ABC for calculating product costs, streamlining budgeting, preparing profitability analyses, activity cost and processes analyses, pricing, performance evaluation, designing new products, and reducing non-value-adding activities.*

The lack of interest in the ABC system was studied by Innes and Mitchell (1998), Clarke and Mullins (2001), Askarany and Yazdifar (2007), and in Poland by Januszewski and Gierusz (2004) and Wnuk-Pel (2014). All these studies indicated similar reasons for the slow diffusion of ABC. The most frequently mentioned barriers to implementation included the high costs of implementation and maintenance (Innes, Mitchell, 1991; Wnuk-Pel, 2005) and insufficient knowledge of ABC among employees (Wnuk-Pel, 2014). The same reasons were identified by Januszewski and Gierusz (2004), who claimed that the main reasons for abandoning ABC included high implementation costs, high labor input, and lack of sufficient knowledge on the system. Managers must fully understand the concept and the design of the ABC model so that the system can be successfully implemented in their company. The lack of IT resources and other priorities were indicated as barriers in a study by Askarany and Yazdifar (2007). The ABC system should be implemented in a special, dedicated IT environment that allows quick data updates (Zieliński, 2008). A small number of companies using ABC made other companies, which were considering implementation, uncertain about the benefits of implementing ABC. Another problem was the lack of support from the

management board (Cohen *et al.*, 2005; Jinga *et al.*, 2010). The implementation of ABC is a complex and time-consuming process that requires dedication of the entire company, so the lack of understanding of ABC's complexity by the highest level of management can be one of the main causes of failure (Zieliński, 2008). According to existing research, companies in Poland were mostly satisfied with traditional cost accounting systems that largely ignored the changing information needs of managers. Full costing was the most frequently used system of cost accounting, which is used for both management and reporting (Januszewski, Gierusz, 2004; Cygańska, Dynowska, 2010). On the basis of current research analysis, hypothesis 4 was formulated:

> H4: *The* ***lack of interest*** *in ABC results from satisfaction with current cost accounting, staff resistance, the high costs of ABC implementation and maintenance, problems with model design, the lack of management support, inadequate computer software, and uncertainty about the benefits resulting from ABC implementation.*

Companies which are considering implementing ABC do not have practical experience with ABC, and they can enrich their knowledge by means of courses and training sessions, by reading publications on ABC, and by using the experience of companies who have already implemented the system. The implementation of ABC is not easy due to the fact that ABC ignores traditional functional structures (divisions, plants), and focuses on processes and activities. Most studies have shown that companies were concerned about the expenses required to implement and maintain the ABC system (its implementation is time-consuming, involves the entire organization, training staff, and setting up a project team). The aspects related to the system design, e.g., the identification of activities, or the determination of cost drivers, especially in small firms, seemed problematic (Innes, Mitchell, 1998, Cohen *et al.*, 2005, Sartorius *et al.*, 2007). Akyol *et al.* (2005) claimed that appropriate IT resources constituted an important factor influencing the success of ABC implementation. Staff's resistance to change (Pierce, Brown, 2004; Cohen *et al.*, 2005) and insufficient knowledge of ABC (Novak, Popesko, 2008; Wegmann, 2011) also caused concern among companies. One of the key factors that conditions the success of ABC implementation is the understanding of the concept by employees at all levels, therefore, the implementation of this system must be accompanied by management's support and a training and promotion process (Daly, Freeman, 1997; Zieliński, 2008). The lack of involvement and support from the board puts organizations at risk of wasting both effort and any chances of improvement in the company's competitiveness. Analysis of current research in this area allowed us to formulate hypothesis 5:

H5: *The **difficulties related to implementation of ABC** expected by companies which are considering ABC included problems with model construction, high expenses during implementation and maintenance of the system, staff resistance, and insufficient IT resources.*

4.3. Research techniques and tools

The study applies a technique called desk research, which is based on the analysis of already existing source materials. The technique aims to show the analyzed problem in a broader perspective, which complements the empirical research. The publications used in this study came from the following platforms:

- Emerald Business Management and Economics eBook Series collection, http://www.emeraldinsight.com;
- Central and Eastern European Online Library – C.E.E.O.L., http://www.ceeol.com;
- Scientific Research Publishing, An Academic Publisher, SCIRP, http://www.scirp.org;
- Social Science Research Network, SSRN, http://www.ssrn.com/en;
- IBUK Libra, http://libra.ibuk.pl;
- Business Source Complete – EBSCOhost, http://www.ebscohost.com;
- and others.

A detailed analysis of secondary sources can be found in Chapter 3. For the purpose of this study of primary sources, a research instrument was developed – a two-part survey questionnaire. The first part relates to the general characteristics of companies. The second part of the questionnaire contains questions about ABC. The questionnaire consists of 17 questions, including 3 tabular (ranking) questions based on a 5-point Likert scale, 10 "cafeteria-style" single choice questions (one answer only), 3 "cafeteria-style" multiple choice questions (more than one answer possible), and 1 open question. The first part of the survey was designed to obtain general knowledge about a company. The questions related to such issues as type of business, the number of employees, the degree of competition, indirect costs, origin of capital, number of offered products, expectations about changes in indirect costs, and the most important objectives of indirect cost calculation. The first part of the questionnaire containing factors influencing the decision about the implementation of ABC was used to verify hypothesis H2. The second part of the questionnaire was designed to elicit information about the knowledge of ABC, factors influencing the decision about its implementation, the main reasons for its implementation, areas of ABC application, reasons for the lack of interest in ABC, and difficulties related to its application, as well as the respondents' opinions on the feasibility of ABC implementation. This part of the survey was

used to verify hypotheses H1, H3, H4 and H5. The study focused to a small extent on the functioning of ABC; it only pointed out the main areas of its application. Questionnaire research does not allow a more detailed analysis of the structure of ABC in companies; a case study method would be more reliable in this respect. Different categories of variables used for the purpose of analyzing the present study's results are shown in Table 4.1.

Table 4.1. Analyzed variables

Category	Variables	Questions
1	Variables related to respondents – company characteristics: – type of business – company size – cost structure – business characteristics – degree of competition – origin of capital	1–9
2	Variables related to respondents – use of ABC: – knowledge about ABC – degree and scope of ABC's diffusion	10–12
3	Variables related to companies favoring ABC: – area of application – reasons for implementation – difficulties expected by companies which are planning implementation of ABC	 13 14 17
4	Variables related to companies which are negative towards ABC: – causes underlying the lack of interest of ABC or abandoning ABC – future plans related to ABC application	 16 15

Source: own research

The first category of questions refers to the characteristics of the company, i.e., type of business activity, number of employees, diversity of products/services, degree of competition, cost structure (indirect costs, their change over 5 years, the purpose of indirect cost allocation), and the share of foreign capital. The second category of variables refers to the application of ABC: knowledge about the system, reasons for its implementation, possibilities of using ABC and problems expected by companies planning implementation of ABC. The third category includes companies that abandoned implementation or had never considered implementing ABC. The last variable refers to plans about any future implementation of ABC (the survey questionnaire can be found in Appendix 1).

Due to the properties of the investigated characteristics, one can distinguish qualitative (nominal, ordinal) and quantitative scales (interval, ratio) of measurement.

Questions 2, 3, 5, and 8 are based on an ordinal scale. Questions 4, 9, 14, and 17 apply a quantitative scale (interval). The remaining questions apply a nominal scale.

Since the study aimed to analyze the perception of the ABC system, selected questions are based on a Likert scale. The response scale included the following categories of answers: "not important," "low importance," "moderately important," "important," and "very important" for questions referring to factors influencing ABC implementation and the objectives of indirect costs calculation. Questions related to difficulties during implementation of ABC applied the following scale: "not a problem," "minor problem," "moderate problem," "serious problem" and "very serious problem." Questions were coded from 1 to 5. The form of the questionnaire is short and concise because respondents are reluctant to fill in long and overly detailed surveys, which may result in poor quality answers.

4.4. Process of the study

The analyzed information came from survey questionnaires which were delivered in person or by e-mail. The questionnaires were distributed between December 2014 and May 2015. Prior to that, a pilot study was conducted to ensure that the final version of the questionnaire was clear and lacking errors. In total, 167 questionnaires were returned. 24 surveys were rejected due to being incomplete and/or inconsistent (e.g., a respondent replied that his company used ABC, whereas in later questions he predicted that implementation of ABC was not probable). As a result, the study involves 143 questionnaires. In the first stage of the study, data was collected by means of anonymous surveys sent by e-mail to companies listed on the Warsaw Stock Exchange and the NewConnect market. However, obtaining complete questionnaires via e-mail turned out to be very difficult and in most cases companies had to be asked again to complete the survey. Companies answered questions about their activities with a certain distrust and aversion. The companies provided such excuses as lack of time due to different projects being implemented, violation of corporate policy, etc. The questionnaire was additionally posted on goldenline.pl – a social networking site for business people. The questionnaire was posted in a discussion group for finance, accounting, and controlling specialists. However, the majority of questionnaires were obtained by means of direct distribution of surveys among postgraduate students of management accounting and controlling, MBA programs, and practitioners working in controlling and accounting departments in companies from the Lodz and Mazovia provinces. The survey is not representative, due to its distribution method, thus, its results cannot be generalized in terms of the entire population of Polish companies. Another limitation of the study is its relatively short time, and the complex subject matter, as well as the wide range of data necessary for analysis.

Due to the way the survey was distributed, it was not possible to accurately determine the response rate. The highest frequency of responses was when the survey form was posted on the goldenline.pl website and when companies were reminded to fill in the form. Authors of previous studies on the use of ABC encountered similar problems related to collecting data for analysis. Surveys conducted by means of e-mail were usually ineffective unless the authors knew the respondents personally. A comparison of methods and response rates of other studies conducted in Poland is presented in Table 4.2.

Table 4.2. Sampling method in existing research

Author	Specification	Population	Number of completed questionnaires	Response rate
Szychta, 2001	Surveys provided in person or by mail + direct interviews with employees from 10 companies	290	60	20.7%
Karmańska, 2003	Direct surveys distributed among students of postgraduate courses and MBA programs, and candidates for registered auditors + selected companies	500	342	68%
Januszewski, Gierusz, 2004	Random sampling (at first) + non-random sampling, so called convenience sampling	60 101	1 66	1.67% 65%
Szychta, 2006	By mail + in person	272	78	28.68%
Świderska, 2008	Telephone survey	612	174	28.43%
Dynowska, Cygańska, 2010	Non-random sampling, so called convenience sampling; members of the Board, financial directors, chief accountants, managers and staff of controlling departments listed in the statistical office of the Warmia-Masuria Province	1,286	159	12.4%
Wnuk-Pel, 2011	By e-mail (at first) + direct surveys distributed among students of postgraduate courses, MBA programs, candidates for registered auditors	3,000 1,267	15 495	0.5% 39.07%

Source: own research

4.5. Ensuring reliability of the study

Validity and reliability are fundamental elements of a credible study. To ensure validity and credibility, specific quality of data should be provided. Validity allows one to measure certain specifications in such a way that the obtained value is consistent with the true value. Reliability, on the other hand, refers to the accuracy and repeatability of a research tool which has been applied. The most commonly used methods of testing reliability include correlation methods with a general score and statistical analysis of test positions, for instance Cronbach's *alpha* coefficient (Rubacha, 2013).

In order to ensure reliability of the study, the author, prior to carrying out the research, analyzed the subject literature and existing studies related to ABC. To ensure internal reliability, the survey was addressed to people who had knowledge of the subject. What is more, the test results were compared with results of other research conducted in Poland and around the world. However, due to non-random sampling, the results cannot be generalized in terms of all companies in Poland (Wnuk-Pel, 2011).

To understand the problem in more detail and to improve the quality of the study, methodological triangulation was applied. The method involves gathering data by means of different research methods and techniques. The study applied desk research and quantitative research (the survey questionnaire).

In order to ensure the reliability of the questionnaire, it was ascertained that the questions were comprehensible and not suggestive. During the research, anonymity was provided and the survey was addressed to respondents who had appropriate knowledge of ABC. Appropriate study procedures and documentation methods were established, and the results were gathered in an electronic database. A statistical reliability analysis was also performed to assess the reliability of the scale. Cronbach's *alpha* is the most popular type of reliability estimate. If the items are unreliable, the index is 0, but if all the items are reliable, Cronbach's *alpha* is 1. The limit of the coefficient is 0.7, but some authors consider the 0.5 value to be sufficient, especially when the scale is short and when nonhomogeneous properties are tested. A sufficient number of respondents is necessary for this method to be applied, thus, the *alpha* coefficient was calculated for one of the three questions based on the scale, since it was the only question which could be answered by all respondents. Due to the small number of responses, it was impossible to use the reliability testing by means of *alpha* statistics in terms of the remaining questions. Statistics of the scale's reliability are presented in Table 4.3.

Table 4.3. Reliability statistics

Cronbach's *alpha*	No of items
.836	6

Source: own research

Cronbach's *alpha* is higher than the limit, so the scale can be considered reliable, i.e., it measures one property. The value of this estimate is satisfactory, so there is no need for factor analysis. Table 4.4 shows how items correlate with the scale (total item correlation) and Cronbach's *alpha* after removing one item.

Table 4.4. Total item statistics

Specification	Mean scale after removing one item	Scale variance after removing one item	Total item correlation	Cronbach's *alpha* after removing one item
Product cost control	19.73	16.128	.529	.798
Making pricing decisions	19.47	17.514	.548	.791
Inventory valuation	18.92	18.301	.414	.848
Performance evaluation	20.08	18.789	.459	.834
Planning production/sales structure	19.90	16.676	.620	.783
Product/service profitability assessment	19.31	18.463	.615	.796

Source: own research

Item 3 has a negative influence on the internal consistency of the scale. Removing the item would increase the scale's reliability, but only slightly (by 0.012, i.e., 1.43%), and omission of this variable could weaken the whole scale and further analysis, thus it was decided to leave all the items on the scale.

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CHAPTER 5

BARRIERS TO ADOPTING ACTIVITY-BASED COSTING IN POLISH COMPANIES BASED ON THE EMPIRICAL RESEARCH

Chapter 5 constitutes the last stage of the research procedure. It aims to analyze the responses from the survey questionnaire and verify by means of statistical tests (*t*-distribution (for one sample), *chi*-squared test, Mann-Whitney *U* test, Kruskall-Wallis *H* test) the hypotheses which were formulated in Chapter 4. The basic assumption of applying the *t*-distribution test related to measuring the dependent variable on a qualitative scale was fulfilled. The Shapiro-Wilk test was carried out to verify the assumption about normal distribution of variables since $N < 100$ did not confirm normal distribution. However, due to the small sample size, it was found that deviations from the normal distribution do not have a significant influence on the results of the *t*-test, as the *t*-distribution test is resistant to disturbances relating to this assumption. The assumption concerning independence of observation (number of observations < number of surveyed people) was also fulfilled. Dependent variables were measured by means of a dichotomous scale (0-1) which is a nominal variable and an ordinal variable at the same time, thus, it was reasonable to apply the Mann-Whitney *U* test for hypothesis H4. The assumptions of normal distribution and homogeneity of variance (F Levene (56, 83) = 26.030; $p < 0.05$) required the application of the ANOVA test, thus, it was decided to carry out the Kruskall-Wallis *H* test. On the basis of the survey questionnaire, the respondents were classified as:

- companies using ABC;
- companies using certain elements of ABC;
- companies considering the implementation of ABC;
- companies that had abandoned implementation of ABC;
- companies which had never considered implementing ABC.

This chapter covers the characteristics of the surveyed companies, the degree of ABC implementation, knowledge of the concept and areas of ABC application, analysis of factors conditioning the implementation of ABC, opinions about chances of implementing ABC in the future, reasons for abandoning the implementation and lack of interest in the system, problems related to ABC implementation, and assessment of the reasons for the low diffusion of ABC in Polish companies.

5.1. Characteristics of the studied companies

The study involved different types of businesses, with different numbers of employees, different degree of competition in the industry, different origin of equity, different structure of indirect costs, and different number of offered products/services. Variables that characterized the surveyed companies were used to analyze the influence of these factors on the use of ABC.

The characteristics of the surveyed companies by type of activity, number of employees, degree of competition, origin of capital, and number of offered products/services, are presented in Table 5.1.

Table 5.1. Characteristics of the surveyed companies

Specification	*N*	%
Type of activity:		
– production	69	48
– trading	28	20
– service	46	32
Number of employees:		
– 1–50	38	27
– 51–100	20	14
– 101–200	18	13
– 201–500	21	15
– 501–1,000	12	8
– more than 1,000	34	24
Degree of competition:		
– slight	16	11
– average	50	35
– strong	77	54

Specification	*N*	%
Origin of capital:		
– domestic	77	54
– foreign	65	46
Number of offered products / services:		
– 0–10	20	14
– 11–50	32	22
– 51–100	18	13
– 101–1,000	47	33
– more than 1,000	26	18
Total	143	100

Source: own research

Production companies (48%) constituted the largest group of respondents, followed by service companies (32%), while trading companies constituted the smallest groups of respondents (20%). As far as the number of employees is concerned, the largest groups of respondents employed up to 50 people (27%) and more than 1,000 people (24%). In terms of the degree of competition, the majority of respondents rated it as strong (54%) while 35% of respondents claimed that competition in their sector was average. Growing competition forces companies to be more customer-oriented, and that results in the increased role of marketing and a growing diversity of products. The results of the study show that contemporary companies operate in a competitive environment, thus, in order to survive and develop, they need tools that will improve business performance, and optimize and increase the elasticity of the organization. Companies with domestic capital constituted more than half of the respondents (77), while 65 companies were comprised of mainly foreign capital. Growing competition forces companies to manufacture more diverse, high-quality products, so companies have a wider product range. Analyzing the number of offered products/services, companies that manufactured 101 to 1,000 products constituted the largest group of respondents. The structure of indirect costs, their change over the past 5 years, and their expectations towards the amount in the future are presented in Table 5.2.

Table 5.2. Characteristics of indirect cost structures

Specification	*N*	%
Indirect costs in total costs:		
– up to 10%	13	9.8
– 10%–20%	43	30.1
– 20%–50%	72	50.3
– more than 50%	14	9.8
Change of indirect costs over the past 5 years:		
– indirect costs lowered	24	16.7
– indirect costs slightly grew	86	60.1
– indirect costs grew significantly	33	23.1
Expected change in indirect costs in the future:		
– costs will grow significantly	13	9
– costs will grow slightly	52	36
– costs will remain on a similar level	50	35
– costs will be slightly lower	8	6
– costs will be significantly lower	2	1
– difficult to determine	18	13
Total	143	100

Source: own research

In 72 surveyed companies, indirect costs ranged from 20% to 50%, while 43 companies determined that indirect costs accounted for 10% to 20% of the total costs in their companies. There were 14 companies with indirect costs higher than 50%. Companies with indirect costs which accounted for less than 10% constituted the smallest group of respondents. Previous studies have shown that widespread use of modern technology has led to an increase in indirect costs (up to 70%) and a decrease in the share of direct costs in total costs. The results of the questionnaire confirm such a trend in Polish companies, although the percentage of indirect costs in total costs is not as high as in more developed countries. Most respondents noted a slight increase in indirect costs over the past 5 years (60%). A growing percentage of indirect costs may lead to a situation when the application of a traditional cost accounting system seems unreasonable due to the fact that it averages their level by accounting costs in proportion to the volume of production and neglects the causes

of their formation. A traditional system can be used for the purpose of financial reporting, however, it should not be used in decision-making, as it provides distorted information about costs, and that can result in erroneous decisions, for example, in the case of profitability assessment or launching new products. 36% of respondents believed that indirect costs would increase in the near future and 35% claimed they would remain at a similar level. 9% of respondents expected significant growth, while only 1% of respondents expected the indirect costs to decrease in the future. A growing percentage of indirect costs along with a very wide variety of products and services leads to a situation when cost calculation prepared by means of a traditional system generates distorted results and does not allow for correct profitability analysis of products, customers, distribution channels, etc., and simultaneously it is one of the reasons to implement ABC.

The respondents were also asked to indicate the most important reasons for allocating indirect costs on a 5-point Likert scale, where 1 – not important, 2 – low importance, 3 – moderately important, 4 – important, 5 – very important. The results are shown in Table 5.3.

Table 5.3. Evaluation of reasons for indirect costs calculation

Specification	Mean	Median	Dominant	Standard deviation	Range	Coefficient of variation*
Profitability analysis of products/ services	4.34	5	5	0.878	3	20%
Pricing decisions	4.15	4	5	1.014	4	24%
Product costs control	3.95	4	5	1.209	4	31%
Planning structure of production/ sales	3.91	4	5	1.162	4	30%
Performance evaluation	3.76	4	4	1.128	4	30%
Inventory valuation	3.36	4	4	1.258	4	37%

* $V < 35\%$ low variance

Source: own research

According to the respondents, the most important reason for allocating indirect costs was profitability assessment of products and services, pricing decisions, and cost control. Less important reasons included performance evaluation and inventory valuation. The results confirm that it is important for companies operating in a competitive environment to correctly determine profitability and set correct prices. To strengthen the company's position on the market, organizations must properly control both current and future costs. Companies need methods that will reduce costs without lowering the quality of products and services they offer. Correct pricing is the key factor that guarantees success for a company operating in a very competitive environment. Bearing in mind that the ability to dictate price terms is limited and is still decreasing, businesses should focus more on the effective management of resources. Process-oriented ABC is a tool that assists managers in making the right decisions. According to the respondents, inventory valuation, which is used for the purpose of financial reporting and not for decision-making, was the least important reason.

In conclusion, it can be stated that modern companies operating in a highly competitive environment should seek solutions that will strengthen their position on the market. The use of traditional cost accounting systems, due to proportionally accounting costs for the volume of production and ignoring the cause and effect relationships between costs and cost object, leads to erroneous decisions. Therefore, tools based on process analysis, such as ABC, which eliminates the downsides of traditional systems, are more reliable. The ABC system allows managers to calculate more reliable costs, determine the most optimal product range, plan and verify pricing policies, budget processes and activities, and analyze profitability, not only across products, but also customers, main markets, distribution channels, etc.

5.2. Activity-based costing in the studied companies

The second part of the questionnaire related to the use of ABC in Polish companies. In the first question, the respondents had to assess their familiarity with the system of ABC; the results are presented in Table 5.4.

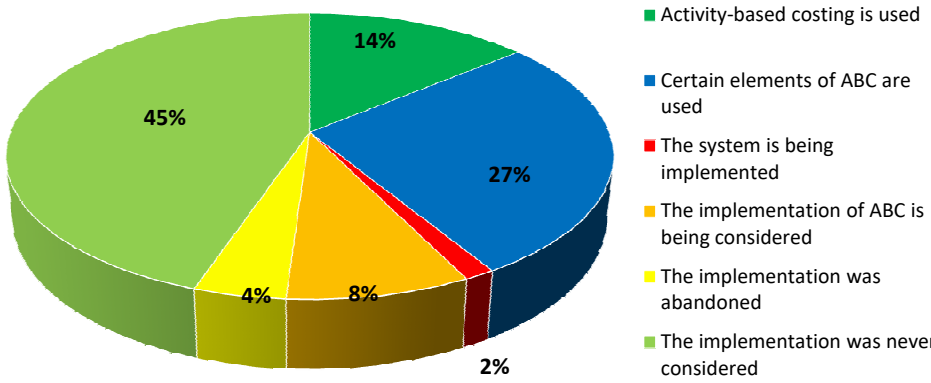
Table 5.4. Familiarity with ABC

Specification	*N*	%
Not familiar	12	8.4
Familiar with general aspects	56	39.2
Familiar	47	32.9
Extremely familiar	28	19.6
Total	143	100

Source: own research

The results confirm conclusions from previous studies concerning familiarity with the system of ABC in Polish companies (Karmańska, 2003, Januszewski, Gierusz, 2004). Most companies were familiar with ABC, but only 20% knew ABC very well, 33% were just familiar with it, and almost 40% were familiar with the general concepts of ABC. According to the survey results, most respondents got to know the system of ABC during university studies (105 respondents, 73%), during training sessions and conferences (39 people, 27%) and from other sources (25 respondents, 17%). The relatively high level of familiarity with the concept of ABC was a result of incorporating ABC into university curricula and, to a lesser extent, the organization of training sessions and conferences devoted to this concept. The next question was related to the level of application of ABC in Polish companies; the results are presented in Figure 5.1.

Figure 5.1. The application of ABC



Source: own research

The use of ABC was declared by 20 respondents, 39 companies used certain elements of ABC, and two firms were in the process of implementing ABC. 64 companies had never considered implementing ABC, 6 companies had considered such an implementation but eventually abandoned the idea, while 12 companies were considering implementation in the near future. The *chi*-squared test revealed that there was a correlation between being familiar with ABC and its use: $\chi^2(15) = 59.52$; $p < 0.05$. The coefficients of correlation between the use of ABC and knowledge of ABC were the following: Kendall's W 0.359, Spearman's coefficient 0.412 ($p < 0.05$), which means that as the knowledge of ABC expanded, the use of ABC increased (and vice versa). However, the correlation between variables was relatively low. On the basis of the above results of the survey, H1 hypothesis was verified and it was found that:

The diffusion of ABC in Polish companies is low. The knowledge of the concept of ABC was relatively high in relation to its prevalence in Polish companies, which is growing but it is still low. There was a positive correlation between knowledge of the concept of ABC and adoption of the system of ABC.

The study showed that a growing number of companies are implementing ABC. When the results of this study are compared to other research (Januszewski, Gierusz, 2004; Szychta, 2007; Wnuk-Pel, 2011), it can be observed that the number of companies using ABC has grown. However, it should be stated that management accounting in Poland is still developing and a lot of companies still adopt the system of traditional cost accounting. The changes which are taking place in cost accounting systems in Polish companies are much slower than in Western countries due to historical factors (Szychta, 2007). Only after switching from a centrally planned economy to a market economy did Polish companies begin to change and we were able to observe the beginning of the development of management accounting. The process of privatization, legal changes, and increased competition in the market initiated changes in existing systems of cost accounting. Thus, it can be concluded that historical conditions in Poland are one of the main barriers to the delayed adoption of modern systems of cost accounting, in particular, ABC.

According to the study model presented in Chapter 4 of this paper, in order to test whether the implementation of ABC depends on certain selected characteristics of companies, a *chi*-square test was applied; it tests the independence of non-measurable (qualitative) features. If the results revealed a correlation between the tested feature and the use of the ABC, Cramer's V was also calculated; it measures the strength of this dependence. The results of the statistical test and the characteristics of the surveyed companies according to their attitude to ABC (positive/negative) are presented in Table 5.5.

Companies that have a positive attitude to ABC are those which implemented ABC, use certain elements of the system, are already implementing, or are considering implementation of ABC in the future. These companies are mostly production companies employing between 100 and 500 workers, or more than 1,000 employees, with a slight majority of companies whose capital is mostly of foreign origin. The surveyed companies identified the degree of competition as strong and average. The share of indirect costs in total costs was between 20% and 50%, and the number of offered products was over 100. The results showed that implementation of ABC was conditioned by: the percentage of indirect costs in total costs, the number of offered products/services, the number of employees, a change of indirect costs, the degree of competition, and the type of core business ($p < 0.1$). However, the Cramer's Vs indicate weak correlations. The Krusskal-Wallis H test showed that there were statistically significant differences between

Table 5.5. The use of ABC in relation to selected characteristics of the surveyed companies

Specification	ABC is used		Certain elements of ABC are used		ABC is being implemented		ABC implementation is considered		ABC implementation was abandoned		ABC implementation was never considered		Total		*chi*-squared	*P*	*V*
Type of activity:	N	%	N	%	N	%	N	%	N	%	N	%	N	%	24.390	0.07	0.293
– production	14	70	21	54	0	–	8	67	4	67	22	34	69	48			
– trading	2	10	12	31	0	–	–	0	–	0	14	22	28	20			
– service	4	20	6	15	2	100	4	33	2	33	28	44	46	32			
Number of employees:															46.772	0.05	0.256
– 1–100	5	25	7	18	0	–	8	67	4	67	30	47	58	41			
– 100–500	7	35	19	50	0	–	4	33	–	0	12	19	39	27			
– 500–1,000	2	10	2	5		–	–	0	–	0	8	13	12	8			
– more than 1,000	6	30	10	26	2	100	–	0	2	33	14	22	34	24			
Degree of competition:															24.728	0.06	0.294
– slight	0	0	0	0	0	–	2	17	–	0	14	22	16	11			
– average	8	0.4	18	46	0	–	2	17	–	0	22	34	50	35			
– strong	12	0.6	21	54	2	100	8	67	6	100	28	44	77	54			
Origin of capital:															8.228	0.116	
– domestic	10	50	20	51	0	–	8	67	6	100	32	50	76	53			
– foreign	10	50	19	49	2	100	4	33	0	0	32	50	67	47			
Indirect costs in total costs:															56.273	0.001	0.362
– up to 10%	0	0	0	0	0	–	2	17	–	0	12	19	14	10			

Table 5.5. (cont.)

Specification	ABC is used		Certain elements of ABC are used		ABC is being implemented		ABC implementation is considered		ABC implementation was abandoned		ABC implementation was never considered		Total		*chi*-squared	*P*	*V*
– 10–20%	8	40	17	44	0	–	–	0	2	33	16	25	43	30			
– 20–50%	12	60	22	56	0	–	10	83	4	67	24	38	72	50			
– more than 50%	0	0	0	0	2	100	–	0	–	0	12	19	14	10			
Number of offered products/ services:															49.467	0.014	0.263
– 1–50	2	10	6	15	2	100	–	0	4	67	14	22	28	20			
– 11–50	6	30	12	31	0	–	6	50	2	33	16	25	42	30			
– 51–100	0	0	2	5	0	–	4	33	–	0	12	19	18	13			
– 101–1,000	6	30	12	31			2	17	–	0	6	9	26	19			
– more than 1,000	6	30	7	18	0	–	0	0	–	0	13	20	26	19			
Total	20	100	39	100	2	100	12	100	6	100	64	100	143	100	–	–	–

* $p < 0.1$

Source: own research

groups of different types of business, the structure of indirect costs, employment, degree of competition, number of offered products, and the level of ABC adoption ($p < 0.1$). The surveyed companies do not differ in terms of origin of equity. In order to examine the differences among the groups, all pairs of variables were compared to each other by means of the Mann-Whitney *U* test with Bonferroni correction for significance level, i.e., $p = 0.1$/number of comparison pairs. Implementation of ABC was more popular among production companies than in service companies. Firms employing between 101 and 500 employees more frequently used ABC than those employing up to 100 employees. Companies that rated competition as strong and average used ABC more often than companies operating in less competitive environments. The highest percentage of ABC implementations was observed in companies offering 101–1,000 products/services and in companies with indirect costs between 20% and 50% of total costs. On this basis, hypothesis H2 was verified and it was found that:

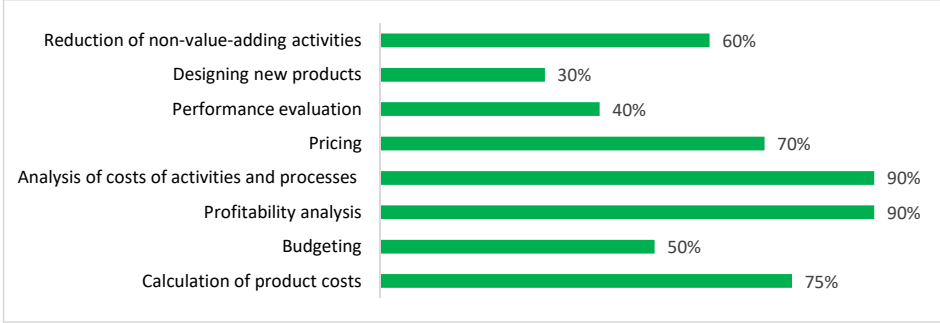
> *Implementation of ABC is positively influenced by such factors as: company size, the degree of competition, the variety of manufactured products, the share of indirect costs in total costs, and the production type of company. The study revealed that capital of foreign origin did not influence the use of ABC.*

ABC is more often implemented in production companies than in non-production ones, which is consistent with the conclusions by Drury and Tyles (2005). Company size is also a statistically significant factor in studies conducted by such authors as Brierley (2008), Hall and McPeak (2011), and Akinyomi (2014). The sample also included small companies that adopted ABC, which is consistent with studies by Hall and McPeak (2011) and Jänkälä and Silvola (2012), where they proved that under certain circumstances, implementation of ABC in small and medium-sized companies is recommended. Unlike the study by Januszewski and Gierusz (2004), this study did not show that the percentage of foreign capital had an influence on the decision about implementation of ABC. The positive correlation between diversity of products and prevalence of ABC is confirmed by previous results obtained by Brierley (2008), Sartorius *et al.* (2007). The study has shown that greater competition affects the diffusion of ABC. This confirms the results of some research (Cagwin, Bouwman, 2002), but contradicts others (Su *et al.*, 2007; Velmurugan, 2010). All the studies and subject literature directly pointed out that the increase of indirect costs, which results in increased accuracy of their calculation and control, was a decisive factor determining the implementation of ABC.

Another question was related to current or future areas in which ABC could be applied; the results relate to companies that used an entire system of ABC or those that adopted only certain elements of the system (Figure 5.2 and 5.3).

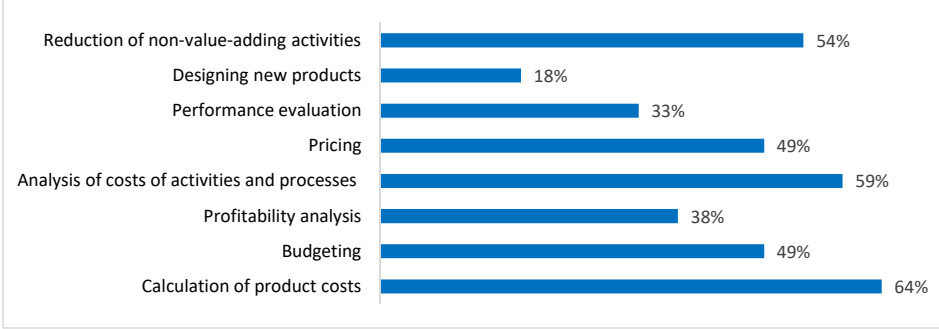
Companies which adopted ABC indicated analysis of costs of activities and processes, profitability analysis, calculation of product costs, and pricing as the main areas of ABC's application.

Figure 5.2. Areas of ABC's application – companies which adopted the entire ABC



Source: own research

Figure 5.3. Areas of ABC's application – companies using certain elements of ABC



Source: own research

According to the survey, a relatively large number of respondents (39 respondents – 27%) used selected elements of ABC. These companies indicated that they use ABC for product costing, analysis of costs of activities and processes, the reduction of costs of non-value-adding activities, profitability analysis, and pricing. ABC, to a slightly lesser degree, was used for cost planning and performance evaluation. In addition, 21 respondents (54%) that used selected elements of ABC declared that the implementation of ABC was possible in their company in the near future. The Mann-Whitney *U* test was conducted. It showed statistically significant differences ($p < 0.1$) between tested groups for

the following variables: profitability analysis, and analysis of costs of activities and processes (companies that had already implemented ABC more frequently used this system for profitability analysis and activity analysis than companies which adopted only selected elements of ABC). The results allowed us to verify hypothesis H3 and allowed us to state that:

> *Companies which adopted ABC used the information from ABC mainly for analysis of costs of activities and processes, profitability analysis, calculation and planning product costs, pricing, and the reduction of non-value-adding activities. The information was used, to a lesser degree, for performance evaluation and designing new products.*

Similar results in terms of the areas of ABC's application were obtained in previous studies on the use of ABC. As studies by other authors revealed (Wnuk-Pel, 2011), the most important aspects for companies were cost reduction, pricing decisions, and activity-based budgeting. According to Parkinson's (2009) study, they were: pricing, decision-making, and risk assessment. Analysis of profitability and portfolio optimization of products/services and customers were indicated as areas of ABC's application by Innes *et al.* (2000), Sartorius *et al.* (2007), and Byrne *et al.* (2009). The system of ABC allows managers to look at a company from the perspective of activities and processes, and takes into account the cause-and-effect relationships between costs and their costs objects, thus, it improves the process of cost management (Friedman, Lyne, 2000). According to the survey results, the ABC system was less applicable in performance evaluation and the design of new products, which is not consistent with the results of the study conducted by Wnuk-Pel (2011).

5.3. Barriers related to adopting ABC

According to the results of the *chi*-squared test, the implementation of ABC was positively influenced by: the degree of competition, the diversity of products, the share of indirect costs in total costs, company size, and the type of business. In the latter part of this study, companies which have not adopted ABC were analyzed in terms of the above criteria, and barriers to adopting ABC were indicated. A detailed analysis of individual characteristics of the investigated companies is shown in Table 5.6.

Table 5.6. Characteristics of companies which have not adopted ABC

Specification	ABC implementation is considered		ABC implementation was abandoned		ABC implementation was never considered		Total	
	N	%	*N*	%	*N*	%	*N*	%*
Type of activity:								
– production	8	67	4	67	22	34	34	49
– trading	–	0	–	0	14	22	14	50
– service	4	33	2	33	28	44	34	74
Number of employees:								
– 1–100	8	67	4	67	30	47	42	72
– 100–500	4	33	–	0	12	19	16	41
– 500–1,000	–	0	–	0	8	13	8	67
– more than 1,000	–	0	2	33	14	22	16	47
Degree of competition:								
– slight	2	17	–	0	14	22	16	100
– average	2	17	–	0	22	34	24	48
– strong	8	67	6	100	28	44	42	55
Indirect costs in total costs:								
– up to 10%	2	17	–	0	12	19	14	100
– 10%–20%	–	0	2	33	16	25	18	42
– 20%–50%	10	83	4	67	24	38	38	53
– more than 50%	–	0	–	0	12	19	12	86
Number of offered products/services:								
– 1–50	–	0	4	67	14	22	18	64
– 11–50	6	50	2	33	16	25	24	57
– 51–100	4	33	–	0	12	19	16	89
– 101–1,000	2	17	–	0	6	9	8	31
– more than 1,000	0	0	–	0	13	20	13	50
Total	12	100	6	100	64	100	82	57

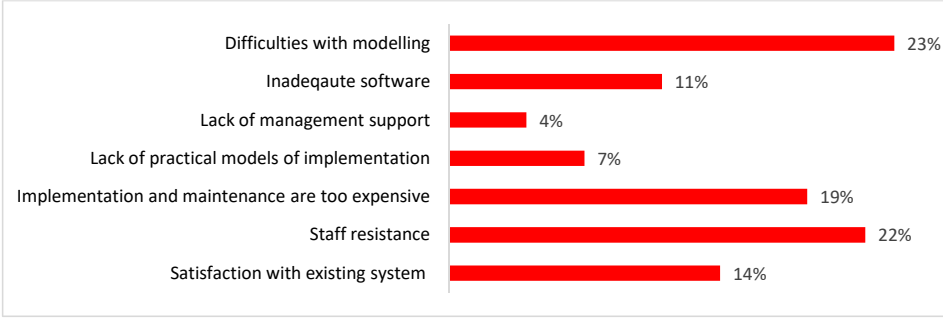
Source: own research

Service and trading companies which employ less than 100 people constituted the majority of companies that did not adopt ABC. All the companies in the sample which rated the degree of competition as slight expressed a negative attitude to

ABC. The majority of companies indicated that indirect costs accounted for more than 50% of total costs, and the average number of products offered by these companies was between 1 and 100.

The companies which had never considered implementation of ABC or, after analyzing the pros and cons, abandoned its implementation, were asked to specify the reasons for their lack of interest in ABC implementation, as well as the causes of abandoning ABC – they are presented in Figure 5.4. and in Table 5.7.

Figure 5.4. Causes of abandoning and lack of interest in ABC



Source: own research

Table 5.7. Causes of abandoning and the lack of interest in ABC in terms of companies which abandoned implementation or never considered implementing ABC

Specification	Implementation was abandoned		Implementation was never considered		Total		Mann-Whitney *U* test*	
	N	%	*N*	%	*N*	%	*U*	*P*
Satisfaction with existing system	4	67	24	39	28	41	134	0.187
Staff resistance	4	67	39	63	43	63	179	0.856
Implementation and maintenance are too expensive	2	33	35	56	37	54	143	0.281
Lack of practical models of implementation and use	2	33	12	19	14	21	160	0.422
Lack of management support	0	0	8	13	8	12	162	0.352
Inadequate software	2	33	20	32	22	32	184	0.957

Table 5.7 (cont.)

Specification	Implementation was abandoned		Implementation was never considered		Total		Mann-Whitney *U* test*	
	N	%	*N*	%	*N*	%	*U*	*P*
Difficulties with modelling	4	67	42	67	46	68	184	0.957
Total	6	100		100		10%	-	-

* Mann-Whitney *U* test; $p < 0.05$

H0: *No statistically significant differences between surveyed groups*

Source: own research

Unsuccessful implementation of ABC does not necessarily imply that the system is unsuitable for a particular organization; it may be due to difficulties related to its implementation. Respondents abandoned implementation of ABC due to problems with model structuring (determining costs of resources, separation of activities and processes, proper identification of cost drivers), and employees' resistance (unwillingness to change, insufficient knowledge of ABC). Four companies also recognized that their current cost accounting system was appropriate and did not require any changes. Two companies indicated that implementation costs were too high and ABC implementation was not possible due to inadequate software. However, none of the respondents indicated the lack of management support as a reason for abandoning ABC implementation. In order to analyze the causes of problems related to the implementation of ABC, a more in-depth study, for example, in the form of case studies, should be conducted.

The companies that had never considered implementation were most seriously concerned about model construction, as well as staff resistance, and the high costs of implementation and maintenance. 40% of respondents declared they were satisfied with the existing cost accounting system. This group of respondents indicated the lack of management support as the least serious problem related to ABC implementation. On the basis of the survey responses, hypothesis H4 was verified, and it can be stated that:

The lack of interest in ABC, or giving up the concept, mostly results from: difficulties with model construction, staff resistance, the high costs of ABC implementation and maintenance, as well as satisfaction with the current cost accounting system. To a lesser degree, abandoning ABC and the lack of interest in the system resulted from inadequate software and lack of support from the management board. According to the Mann-Whitney U test, there were no statistically significant

(p > 0.05) differences in the evaluation of the lack of interest in ABC and giving up the system between the companies which had never considered implementing ABC and those enterprises which had given up ABC implementation.

Similar causes of abandoning ABC or disinterest in the system were revealed in previous studies. In Poland (Wnuk-Pel, 2011), the main causes of abandoning ABC or disinterest in the system included: insufficient knowledge of ABC among employees, high costs of implementation and maintenance of the system, as well as problems with model design. The study by Januszewski and Gierusz (2004) showed that the causes included: high costs of implementation, high labor consumption, and lack of sufficient knowledge of ABC among employees. Studies conducted in different countries (Rundora, Selesho, 2014) revealed such causes as high costs of implementation, lack of information resources, high labor consumption, and the great detail of the system, as well as lack of adequate knowledge of ABC. The lack of IT resources, which was indicated by Askarany and Yazdifar (2007) as an important barrier to implementation, was a less significant reason for abandoning ABC or the lack of interest in the system. The lack of support from the board and their involvement was not identified as a serious problem by the respondents, which does not confirm the results of research conducted by such authors as Cohen *et al.* (2005) or Jinga *et al.* (2010).

The next part of the study was devoted to companies considering implementing ABC in the future; Table 5.8 contains the difficulties expected by these respondents during the implementation of ABC.

Table 5.8. Problems related to the implementation of ABC

Specification	Mean	Dominant	Standard deviation[a]	Coefficient of variation[b]	t[c]	*P*
Staff's resistance to change	4.67	5	0.492	11%	11.726	.001
Implementation and maintenance are too expensive	4.50	4	0.522	12%	9.950	.001
Difficulties with modelling	3.67	4	1.435	39%	0.352	.136
Insufficient IT resources	3.17	4	1.642	52%	1.609	.732

[a] scale's responses: 1 – not important, 2 – low importance, 3 – moderately important, 4 – important, 5 – very important; [b] coefficient of variation < 35% little variation; [c] *t*-Student test for one sample; criterion scores – scales' median

$H_0 : \mu_1 - \mu_2 = 0 \quad H_1 : \mu_1 - \mu_2 \neq 0 \quad p < 0{,}05$

Source: own research

The reluctance of employees to change and large amounts spent on the implementation and maintenance of the system were indicated as the most frequent problems expected by companies which were considering ABC implementation. All companies identified these problems as important or very important. Four companies recognized the problem related to designing the model as moderately important, and four other companies perceived it as important and a very important problem. For two companies, isolating resource costs, identifying activities and processes, and determining cost drivers were not a problem. According to the survey, the lack of sufficient IT resources is the least expected difficulty; for 33% of respondents it was not a problem, however, it should be pointed out that the coefficient of variation in the case of this question was high ($V > 50\%$). The analysis of respondents' responses was used to verify hypothesis H5 and it allowed us to state that:

The difficulties related to the implementation of ABC expected by companies which are considering implementing ABC included: staff's reluctance to changes and high expenses during implementation and maintenance of the system. Problems related to the model's construction and insufficient IT resources were perceived as less important difficulties.

Existing research conducted in Poland (Wnuk-Pel, 2014) showed that the most important difficulties expected by companies which were considering implementing ABC included insufficient knowledge of ABC among employees, high labor input during implementation and maintenance of the system, and problems with the model's construction. Similar problems were revealed in the study by Karmańska (2003); the key three problems included the lack of knowledge of ABC among employees, reluctance to change, and lack of financial resources. Research carried out in other countries indicated that expected difficulties included the lack of training staff and satisfaction with the existing system (Wegmann, 2011), and lack of knowledge of ABC, problems with identifying activities and determining cost drivers, financial constraints, and other priorities (Rundora, Selesho, 2014). According to Akyol *et al.* (2005) and Nassar *et al.* (2009), appropriate IT resources were an important factor conditioning successful implementation, however, according to the companies investigated in this study, the impact of this factor is not a difficulty which influences the implementation of ABC.

The respondents were also required to assess the chances of ABC implementation in the future. The results are presented in Table 5.9.

Table 5.9. The possibility of ABC's implementation in the future

Specification	Only certain elements of ABC are used	ABC implementation is considered	ABC implementation was abandoned	ABC implementation was never considered	*N*	%
Yes, it is possible	23	12	0	10	45	37
Little possibility	14	0	4	48	66	55
Not possible	2	0	2	6	10	8
Total	39	12	6	64	121	100

Source: own research

For more than 37% of the respondents who did not use ABC, the implementation of ABC in their company is a real possibility. However, more than half of the respondents (55%) felt that this was rather unrealistic, and 8% claimed that implementation of ABC was unrealistic in their company. On the basis of the responses to this question, it can be expected that the number of companies that will use ABC or its components may increase in the near future. The companies which claimed that implementation of ABC was possible were mainly firms in which the percentage of indirect costs in total costs was large/growing and it was anticipated to grow further in the future.

The problems expected by companies which considered implementing ABC and those that have abandoned ABC implementation seem justified because the process of implementation of ABC is a serious project that involves the entire enterprise. In addition, ABC ignores the traditional structure of organizations, as it is process-oriented. Any changes in the processes must be reflected in the model which is adopted, so the system of ABC should be constantly updated, and that results in additional costs. The proper functioning of the system requires appropriate identification of processes and activities and cost drivers, so employees from all departments must be involved in the implementation process. Implementing ABC seems to be a good solution in only certain and selected parts of an organization. Such a "pilot" implementation would allow employees to familiarize themselves with the principles of the system and help them to assess the real suitability of ABC implementation in the entire organization. A significant difficulty in the implementation of modern systems of management accounting was the need to involve large labor input and the financial resources required to design, implement and maintain the system. Even if an enterprise has sufficient financial resources to hire consultants, it is also necessary to involve employees, who are very often

reluctant to make any changes due to work overload. Staff resistance may also result from a lack of knowledge about ABC. Introducing changes raises concerns among employees, because it forces them to abandon their habits and get used to a new way of working. The staff's negative attitude may result in a lack of cooperation during implementation, thus, prior to implementation of the system, a training and educational process, which will familiarize employees with ABC, should be carried out. As Major and Hooper (2005) showed, staff reluctance may be a major barrier to ABC's implementation. In their study, employees were reluctant to implement ABC and they input incorrect data, with a delay, into the system; their "boycott" stemmed from misunderstanding ABC's usefulness and fears that the new system would cause layoffs. The perception of ABC as a project that involves only the accounting and/or controlling department, which results in less interest and involvement of other employees, is yet another problem. It must be kept in mind that successful implementation is possible when the entire organization is involved and understands the concept. Involvement and support from senior management is also important, as it gives the project an appropriate level of importance and increases the efficiency of the implementation. Due to the complexity of the ABC model, a dedicated project team should be set up; it should comprise employees from different departments who would coordinate the implementation of the system in the company. It is also important that managers are aware of the limitations of the traditional cost accounting system. A further barrier to the implementation of ABC is that information in financial and accounting systems is classified by cost type and by cost centre, whereas in the system of ABC, information must be collected in the cross-section of activities and processes. Therefore, prior to the implementation of ABC, a company should reorganize the information about costs, so that it can be analyzed in terms of activities and processes. A simplified version of ABC, which is less detailed, with fewer activities, and has simplified procedures of data collection, may be an answer to those who are concerned about the high costs of ABC implementation.

It should be stressed that ABC is a system which is not suitable for all companies. It may turn out that the costs incurred during its implementation and maintenance are greater than the benefits. Due to substantial expenses related to the implementation of ABC, the decision about its implementation should be taken when:

- the share of indirect costs in total costs is high and still growing;
- there is a wide variety of products, a high diversity of customers, and complex economic processes;
- the organization has modern IT resources.

The more complex and detailed the analysis of the activities and processes, the more accurate the calculation of ABC. Therefore, if the goal is to learn the cost of a product, it may be pointless to spend a great deal of expenses on the

implementation of such a very complex system. However, if the company wants to improve the efficiency of activities and processes, then a more accurate analysis by means of ABC will provide expected results. Small companies, with a lower percentage of indirect costs, and profitable and less varied products, should not implement ABC. It should also be borne in mind that implementing ABC will not improve competitiveness or financial performance. Strengthening of the competitive position is only possible if information from ABC is used to make the right operational and strategic decisions.

In order to minimize the problems encountered during the implementation of ABC, it is necessary to provide adequate resources, engage the appropriate employees in the implementation, not just employees of the controlling department, and it is also important not to create a complicated system that is difficult and expensive to update. According to the survey, staff resistance was a very important barrier to the development of modern systems of cost accounting. In order to overcome this resistance and increase the involvement of employees, companies should consider some organizational changes, e.g., they should increase the scope of teamwork or delegate powers. The ability to motivate employees to achieve success as an entire organization is a key factor in a successful enterprise. In addition, in order to be able to implement ABC, managers must be aware of the limitations of a traditional system of cost accounting.

CONCLUSIONS

At the end of the 20th century, companies around the world experienced changes in technology, the organization of production, product life cycles, and they witnessed increased customer demand. Products and processes became more complex and their reliability became a decisive factor conditioning the success of any organization. From the perspective of managers, traditional cost allocating does not meet management requirements, as it averages costs by accounting them proportionally to the volume of output, providing unreliable information for decision-making. The use of modern technology led to an increase of indirect costs, thus, calculating costs in the traditional way became unreasonable. Companies in Poland and around the world began to seek solutions that would allow them to adapt to their changing internal and external conditions. ABC, which leads to the optimization of manufacturing processes and an improvement of the organization's decision-making processes, is one of the concepts that reflects these changes. It draws attention to the complexity of an organization and allows managers to look at costs from the perspective of processes and activities instead of just cost centers. ABC draws attention to the importance of drivers which are not only a derivative of production and sales, it introduces a hierarchy of activities that provides information about costs and activities, not only at the level of the product, but also at the level of the batch, type of product, and company.

The literature studies and the results of our own research presented in this monograph confirm the low but increasing diffusion of ABC in Polish companies. The analysis of our own survey results allowed us to verify hypotheses and formulate the following conclusions:

1. The diffusion of ABC in Polish companies is low. Familiarity with the concept was on a relatively high level in relation to the diffusion of ABC in Polish companies, which is growing, yet remains at a low level. There was a positive correlation between knowledge of the system of ABC and its use.

2. The implementation of ABC is positively influenced by such factors as: company size, degree of competition, diversity of manufactured products, percentage of indirect costs in total costs, and manufacturing type of business.

According to this study, a share of foreign capital did not have any impact on the implementation of ABC.

3. Companies which adopted ABC used information from the system mainly to analyze the costs of activities and processes, prepare profitability analyses, calculate and plan product costs, determine prices, and reduce non-value adding activities. To a lesser degree, the information from ABC was used to evaluate performance and design new products. Companies which implemented ABC more often used the system for the purpose of profitability analysis and analysis of activities and processes.

4. The lack of interest in ABC or abandoning the implementation mainly resulted from: difficulties with the model's construction, staff resistance, the high costs of implementation and maintenance, as well as satisfaction with the already existing system of cost accounting. To a lesser degree, ditching ABC or disinterest in the concept stemmed from inadequate software and lack of support from the management board. According to the Mann-Whitney U test, there were no statistically significant ($p > 0.05$) differences between the assessment of a lack of interest in ABC and abandoning the system for companies which had never considered implementing ABC and those which abandoned implementation of ABC.

5. The difficulties related to the implementation of ABC expected by companies which were considering implementing ABC included: staff reluctance to change and the high expenses related to the implementation and maintenance of the system. Less important problems indicated by the respondents included difficulties with the model's construction and insufficient IT resources.

Due to a number of limitations, the conducted questionnaire survey cannot constitute a comprehensive source of knowledge about the barriers to adopting ABC in Polish companies. The first limitation of this study is non-random sampling, which means that the results of the questionnaire survey cannot be generalized over the entire population of enterprises in Poland, since the sample is not representative. The sample size is also not satisfactory, however, it was not possible to carry out the survey on a larger population as companies were reluctant to participate in the study. The form of a survey is a limitation itself; it does not allow us to comprehend the barriers to implementation of ABC in the investigated companies in a complete and detailed manner. Research conducted in the form of case studies would allow a better understanding of the barriers to implementing ABC, thus this study may be continued in more detail in the future. It would be also interesting to investigate if companies in Poland implement and apply other modern accounting management systems, such as TC, BSC, Kaizen, or Lean accounting.

The study has both practical and theoretical applications. Conclusions from the study may be helpful in assessing the suitability of implementing ABC for companies that do not use the system yet, or which use only certain elements of

the system. Identifying problems that may occur during implementation, as well as identifying possible benefits resulting from ABC, may be useful for companies which intend to implement ABC in the future. The study also allows us to assess whether ABC is able to help organizations improve their performance and lead to making better business decisions, and thus help them make the right decision about implementing ABC. In terms of theoretical significance, the study shows the changes that have taken place in Polish companies in terms of the application of ABC and changes in business conditions which should force companies to use more effective tools of management accounting. The results of the study indicate that the development of management accounting in Poland, including the implementation of modern cost accounting systems such as ABC, is consistent with global trends.

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TABLES AND FIGURES

GLOSSARY OF ABBREVIATIONS

ABC – activity-based costing
ABM – activity-based management
ABRP – activity-based resource planning
BSC – balanced scorecard
CAM-I – Computer Aided Manufacturing International
CIM – computer integrated manufacturing
CIMA – The Chartered Institute of Management Accountants
CMS – Cost Management System
ERP – Enterprise Resources Planning
GPK – *Grenzplankostenrechnung*
IT – information technology
JIT – just in time
LCC – life cycle costing
MBA – Master of Business Administration
RCA – resource consumption accounting
SPSS – Statistical Package for Social Sciences
TC – target costing
TD ABC – time-driven activity-based costing
TOC – theory of constraints
TQC – total quality control
TQM – total quality management

APPENDIX 1

Questionnaire designed for the purpose of the empirical research

I. Company characteristics

1. Core type of operational activity (please mark one answer):
   □ production □ trading □ service

2. Number of employees:
   □ 1–50 □ 101–200 □ 501–1,000
   □ 51–100 □ 201–500 □ more than 1,000

3. Degree of competition:
   □ slight □ average □ strong

4. Origin of capital (please determine the share in %):
   foreign……..…
   domestic……..

5. Share of indirect costs in total costs:
   □ up to 10% □ 20%–50%
   □ 10%–20% □ more than 50%

6. Have indirect costs changed over the last 5 years?
   □ indirect costs have fallen
   □ indirect costs have slightly increased
   □ indirect costs have grown significantly

7. Do you think that, in the future, indirect costs will:
   □ grow significantly
   □ slightly grow
   □ remain on a similar level
   □ slightly decrease
   □ decrease significantly
   □ hard to say

8. Number of offered products/services:
   □ 1–10
   □ 11–50
   □ 51–100
   □ 101–1,000
   □ more than 1,000

9. Please asses the importance of allocating of indirect costs for (1 – not important, 2 – little importance, 3 – moderately important, 4 – important, 5 – very important):

control of cost of products	1-2-3-4-5
taking pricing decisions	1-2-3-4-5
inventory valuation	1-2-3-4-5
evaluation of performance	1-2-3-4-5
planning production/sales structure	1-2-3-4-5
evaluation profitability of products/services	1-2-3-4-5

II. Attitude to ABC

10. How would you describe your knowledge of ABC?
    □ I do not know it/I have never heard of it
    □ I know its basic principles
    □ I know it well
    □ I know it very well

11. How did you learn about ABC (you can select more than one answer)?
    □ university studies
    □ training sessions, conferences
    □ other sources (professional books, business magazines/journals, etc.)

12. Your company:
    □ uses ABC
    □ uses only certain elements of ABC
    □ is implementing ABC
    □ is considering implementation of ABC
    □ abandoned implementation
    □ never analyzed the suitability of ABC's implementation

13. In what areas is/could be ABC used? (you can select more than one answer):
□ calculation of costs of products/services
□ activity-based budgeting
□ profitability analysis of products/services
□ analysis of costs of activities and processes
□ product/service pricing
□ performance evaluation
□ designing new products/services
□ reduction of non-value-adding activities
□ other, please elaborate……..……

14. If ABC is used in your company, please determine the most important factors which had an influence on its implementation (1 – not important, 2 – little importance, 3 – moderately important, 4 – important, 5 – very important):

unreliable information from previous system of cost accounting	1-2-3-4-5
growing number of products/services	1-2-3-4-5
increase of indirect costs	1-2-3-4-5
increase of competition	1-2-3-4-5
headquarters' requirements	1-2-3-4-5
other reasons, please elaborate	1-2-3-4-5

15. In your opinion, is implementation of ABC possible in your company?
□ yes, it is possible
□ there is little possibility
□ totally not possible
□ ABC is used

16. If your company analyzed the suitability of ABC's implementation, and implementation was rejected, or your company never considered its implementation, please determine the reasons for the lack of interest in this system (you can select more than one answer):
□ satisfaction with existing system
□ resistance of staff (lack of familiarity with ABC)
□ implementation and maintenance of ABC is too expensive
□ lack of practical models of implementation and application
□ lack of management support
□ inadequate computer software
□ difficulties related to the model's construction
□ uncertain benefits from the implementation of ABC

17. If your company is considering implementing ABC, what problems related to its implementation are expected? (1 – not a problem, 2 – minor problem, 3 – moderate problem, 4 – significant problem, 5 – very significant problem):

difficulties related to the model's construction	1-2-3-4-5
high costs of implementation and maintenance	1-2-3-4-5
staff's reluctance to change	1-2-3-4-5
insufficient IT resources	1-2-3-4-5
other……	1-2-3-4-5