

Karolina Rybicka

Częstochowa University of Technology, Częstochowa, Poland

e-mail: karolina.rybicka@wz.pcz.pl

**NEW TECHNOLOGIES – THE IMPACT
ON CONTEMPORARY MANAGEMENT ACCOUNTING**
**NOWE TECHNOLOGIE – WPLYW NA WSPÓŁCZESNĄ
RACHUNKOWOŚĆ ZARZĄDCZĄ**

DOI: 10.15611/pn.2018.515.02

JEL Classification: M41, O32, O33

Summary: Contemporary enterprises must deal with changes in turbulent surrounding. New technologies are present in all societies. One effect of the explosion in the adoption of social media technologies has been the growth of so-called “Big Data”. Social media and Big Data are changing accounting and accountability in companies, but often such changes take place outside accounting subsystems. Use of digital technologies and methods is essential to gather, store and process large amount of data. With Big Data technologies, despite some challenges, modern enterprises are able to deal with such large volume of data, provide better forecasts and business decisions. There is presented in the paper the influence of the new technologies on management accounting.

Keywords: new technologies, big data, management accounting.

Streszczenie: Współczesne przedsiębiorstwa muszą radzić sobie z wieloma zmianami w turbulentnym otoczeniu. Nowoczesne technologie są obecne we współczesnych społecznościach. Współczesne przedsiębiorstwa mogą zbierać, klasyfikować, przetwarzać i analizować wielkie zbiory danych, tzw. *Big Data*. Social media i Big Data zmieniają rachunkowość w przedsiębiorstwach, ale często takie zmiany zachodzą również poza systemem rachunkowości. Dzięki Big Data, pomimo stojących przed nimi nowych wyzwań, współcześni specjaliści rachunkowości zarządczej przedsiębiorstwa są zdolni do radzenia sobie z wielkimi zbiorami danych, dostarczają trafniejsze prognozy oraz podejmują lepsze decyzje ekonomiczne. W artykule został przedstawiony wpływ nowych technologii na system rachunkowości zarządczej.

Słowa kluczowe: nowe technologie, Big Data, rachunkowość zarządcza.

1. Introduction

The functioning of enterprises undergoes continuous processes along with changes taking place in the environment. Such processes like the globalization of economy,

constant increase in competitiveness and development of information technologies or the deepening automation of production processes are increasingly affecting business units. This leads to the uncertainty of running a business and constant risk taking. Electronic media are present in almost all societies. New technologies have contributed significantly to the so-called new quality. Not so long ago, the access to the Internet was limited by technical or economic reasons. In today's world, ubiquitous mobile phones play the role of communicators. Such continuous and dynamic digital changes lead to the transformation of mutual relations. It can be said that this is the new stage in the globalization process.

The digitization of media dispels the time and space barriers and enables mass communication. If we have been able to talk about globalization so far, then now (along with the popularization of the Internet) we should use rather the term “megaglobalization” [Łuczak 2017, p. 6]. Such dynamic development of information and communication technologies (ICT), noticeable in the last few years, has significantly influenced the functioning of modern organizations operating in the global economy.

It also means the need to adjust management methods and their development strategies to new conditions in the period of changes in the area of new technologies. The evolution of ICT has led to the spread of the so-called 3rd ICT platform, referred to as SMAC (Social, Mobile, Analytics, Cloud), which creates a system of IT solutions, allowing organizations to develop their activity with less financial expenditures and maximum impact. This can contribute to the creation of a new business model based on information generated by the economic environment. Proper acquisition, collection, processing and sharing of this information is a prerequisite for achieving business success within the e-economy [Adamczewski 2017a, p. 14].

The usage of new social media (Facebook, Twitter, YouTube, different types of blogs) has increased in the last few years, with most of the population (especially those aged under 30) using one or more technology-enabled networks every day (both at home and in their workplaces). The importance of such technology-enabled networks, as well as of the data they can generate, is obvious also at the financial level, with the entrance of social media owners in the share market.

The key feature of social media technology is the opportunity to connect with other users worldwide and to access, post and share different types of information on a regular and continuous basis. Users are now connected on the local and global stage thanks to the rapid spread of digital technologies and their ease of use. One effect of the explosion in the adoption of social media technologies has been the growth of the so-called “Big Data”. Contemporary enterprises and other users can collect, classify and analyze the mass of information made available on social networks with the aim of improving their business performance through a wide range of business functions (like marketing, innovation, HR to risk management) [Arnaboldi et al. 2017, p. 762]. Accenture [2018, p. 2] has published the results of surveys among practitioners emphasizing the need to invest in Big Data and the results already achieved: “Big Data is taking off. Users that have completed at least one project are

very satisfied with their initial forays into Big Data. The vast majorities who have completed their projects report that they are satisfied with business outcomes and that their big data initiative is meeting their needs. [...] Big Data is definitely disruptive, potentially transformational. The consensus is clear: Big Data brings disruption that can revolutionize business”.

Social media technologies may afford possibilities not only for users to exchange different types of information but also for others to collect and analyze this information online in real time. New information collected and control possibilities are created as more customer, employee and stakeholder interactions happen digitally. However, because of the new opportunities there are created new challenges for organizations and decision makers. We meet many new questions. What information is useful for us? What data can be relied upon? How can our business processes be redesigned to take into account “digital relations”? Social media and big data are likely to have wide-reaching organizational effects, not only in the manner in which decisions are made, but in terms of such processes and competences, as well as the relative power of actors both within and outside company boundaries. Accounting professionals, in many cases very slowly, are turning their attention to the probable incomes of social media and big data. Empirical research of both social media and Big Data for accounting is still at the beginning stage. However, it is observed that social media and Big Data have already changed accounting and accountability in companies. Unfortunately, these changes often take place outside accounting functions (commonly through marketing departments).

The aim of the paper is to show the essence of social media and Big Data in contemporary management accounting.

The research method used in the article is the analysis of the newest literature, both Polish and foreign, dealing with digital technologies applicable in management accounting area.

2. New technologies in management of contemporary enterprise

Contemporary enterprises wishing to be competitive on the global market are constantly confronted with new challenges, which include modern technologies. Globalization causes changes in the functioning of modern enterprises – knowledge-based smart organizations, competition based on an innovative approach to production and management processes, development of business processes support with the help of IT. The digital revolution (which is the basis for the company to maintain its market position as well as further development) redefines business processes because in the conditions of ubiquitous volatility, lack of predictability, complexity and ambiguity of economic phenomena, existing management methods (focused on stability and predictability) become no longer useful.

It is important that the role of such technologies is enabling changes that are needed and opening a business unit to new perspectives. They should be not the

aim but the instrument of transformation. The customers (and their needs) should be in the middle of such process. Digital transformation is no longer a mean for competitiveness but rather the factor deciding about market maintenance of the organization. Monitoring changes in information technology is now the obligation not only for IT industry but also for all potential market leaders. Elements of such digital transformation are [Perera et al. 2015]: SMAC technologies, Internet of Things (IoT), multi-channel models of distribution, automation. These technologies are determined by formation of mutual relationships between customers and suppliers (with introducing many channels of communication, enhancing self-service), improvement of processes inside the organization (with monitoring their efficiency), modeling production processes.

Thanks the dynamic development of ICT (Information and Communication Technologies) we can observe new technological standard – SMAC systems. They enable the realization of new business models supported by four bases [Adamczewski 2017b, pp. 12, 13]:

- Social – social media break down the information flow barriers,
- Mobile – mobile devices enhance the opportunity to reach customers,
- Analytics – understanding of behaviors and preferences of customers,
- Cloud – such technology gives instruments of data gathering and decreases costs of ICT in companies.

One of the newest innovations joining digital technology with management is Internet of Things. It is a widely used term for a set of technologies, systems, and principles of design [Höller et al. 2014, p. 14]. This is rather concept than technology, because it use different technological solutions, enabling communication processes between devices, next data analyzing due to making decisions and initiate activity of these devices or others connected to Internet. “Things” in meaning IoT are not only with physical form, because they are also data concerning, e.g. localization or temperature (gathering by a sensor or device), what’s more there can be also living organisms (e.g. animal or even people can be equipped with such sensors gathering different data) [Gonciarski 2017, pp. 45, 46].

The essence of Internet of Things (sometimes also called Internet of Future) is really not in devices but rather in data gathering, processing and analyzing. Big Data is tightly connected with IoT through strengthening its impact. This is an innovative technology allowing analysis of unstructured, partly structured and structured massive data streams flowing through different channel and coming from the organization or its surroundings.

The term “Big Data” has no clear definition. At the beginning it meant the phenomenon that the volume of the data rapidly increased and the memory of computers was not sufficient for processing such enormous quantity of data. That is why new technologies of data processing had to be created. Now the approach to Big Data is as follows: “it includes what can be realized in a huge scale, and cannot be done in a small one; in order to get a new knowledge or creation of a new value

in a way, that can change markets, organizations, relationships between governments and citizens, etc.” [Mayer-Schönberger, Cukier 2017, pp. 19, 20].

Next technological transition in management and digitalization is technology of cloud computing. By A. McAfee and E. Brynjolfsson [2012, p. 118] it is understood as data processing in a cloud, where there are digital sources and employees do not know the localization of computers, data centers, applications and databases used in their work. Such sources are somewhere in “cloud”. This solution can optimize IT costs of organization, improve costs control and safety of data [Mateos, Rosenberg 2011, p. 260].

All digital technologies (at the beginning – slowly, now – rapidly) change the economic reality and management processes. Such changes influenced by new technologies can also be observed in the accounting system.

3. Development trends of management accounting

Definition of management accounting stated by Institute of Management Accountants [IMA 2008] is following: “Management accounting is a profession that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization’s strategy.” Such definition can be useful in settlement the aim and role of management accountants nowadays and in future.

Nowadays management accounting is an efficient instrument of management that is subject to the dynamic development. The need of managers for economic information essential for decision-making processes changes rapidly. Therefore, management accounting should also take into consideration such changes taking place in the organization. This is an important prerequisite of development because of some shortcomings and limitations in traditional approach [Nowak 2011, p. 330].

Now we can observe that contemporary management accounting is more and more the main element of the management process, not only at the operational level, but also at the strategic level. Traditionally, management accounting is defined as an enterprise information subsystem whose aim is to provide information to various users within an organization for the purpose of planning, controlling and making business decisions. In a broader sense, management accounting is treated as an integral part of management that identifies, presents and interprets information used to create strategies, plan and control activities, make the right decisions, optimize the use of resources and provide them to relevant users of such information. [Nowak 2015, pp. 403, 404].

The basic task of management accounting is to provide financial and non-financial information for managers. Contemporary management accounting is focused on supporting strategic management. Therefore, it is related to the settlement of the organization’s strategy, long-term planning, strategic decision-making and strategic control. The growing importance of information flowing from the accounting system in

the strategic management process has led to the development of strategic management accounting, which is the decision-makers' use of an effective information system supporting the acquisition of competitive advantage by the company. Management accounting is based on two elements: choice of the right strategy and quality of the information system.

An important challenge facing today's management accounting is to support the achievement of strategic goals of the organization. In order to achieve goals by implementing the adopted strategy, appropriate achievements should be demonstrated. That is why it is important to properly measure the performances of the entire company.

The increase in the value of the company contributes to the increase of value for co-owners, improvement of the competitive position on the market and strengthening of the financial potential. The value creation on the background of enterprise development processes should be subject to continuous monitoring. The measurement in management accounting is also subject to the value provided by the enterprise to the customer and the value of the customer for the enterprise [Łada 2011, p. 71].

Management accounting plays an important role in risk management and securing the company's performance. Contemporary enterprises run in a turbulent environment, therefore their future results are always subject to risk. That is why it is very important to identify the risks of the company [Nowak 2015, p. 408]. Risk management includes such stages as: identification of risk factors, assessment of the scale of a given risk, monitoring of risk modeling and reacting to emerging risks. The implementation of risk management requires informational support from management accounting. An appropriate accounting system has a wide range of instruments that allow for reducing the negative effects of risk and taking advantage of opportunities inherent in this company's risk.

The role of management accounting has changed from directing primarily on budgeting, costing, variance analysis to developing and implementing strategies that promote increased company's performance while managing risk [Ramli et al. 2015, pp. 475–476]. So that is why management accountants now should know what facts about managers' performances and they also must know their information needs [Richins et al. 2017, p. 12].

At the beginning of the 20th century, management accounting specialists became business partners in decision-making processes and solving business problems. The then dominant methods of management accounting are rather traditional methods (e.g. absorption costing), although they appeared to be inadequate to the changing conditions of business activity and did not provide relevant and reliable information [Nita 2015, p. 365].

Nowadays, management accountants pay more attention to cost reduction, which seems more important than generating relevant cost information. Such results confirm a high level of expectations of management accounting, which should be focused on improving processes and efficiency in order to reduce costs [Nita 2015, pp. 365, 366]. Very important become also: implementation of ERP systems, new budgeting methods, and internal reporting.

There can be found proposals for directions of management accounting development, such as: supporting strategic management, improvement of identification and analysis of investment projects, improvement of management systems, analysis of cost-generating factors, improving planning techniques in turbulent surrounding.

In his research G. Cokins emphasized the importance of accounting management needs while supporting decision-making processes [2013, p. 23; 2014, p. 41]. He stated seven major trends in contemporary management accounting:

1) expansion from product towards channel and customer profitability analysis – the system of management accounting should be helpful for sales and marketing;

2) expansion of management accounting in enterprise performance management – important is integration of different components of management accounting system;

3) shifting to predictive management accounting – it is a transition from management accounting used for reporting different costs and profits to rather decision support and predictive analysis (with its impact on future of an organization);

4) expansion of business analytics – the competency and capabilities together with analytics can provide a competitive edge;

5) coexisting and improving methods used by management accounting – the more progressive managers and management accountants the various management needs inside the organization;

6) expansion of information technology and shared services – it is very important that IT no longer should be viewed as just a technology supplier. IT should be understood as added value to the business unit and deliver strategic competence. Costs of providing IT services have to be understood as an element of decision-making process;

7) increase of better behavioral skills and competency of management accountants – it requires change-agent management accountants to motivate mid-level managers to demonstrate that progressive management accounting should be implemented;

8) rewards and satisfaction in explaining the importance of overcoming some social, behavioral or also cultural barriers can be observed.

On these backgrounds, many scientists will try to formulate predictions about future directions of management accounting development. What will be the main future trend in management accounting? Undoubtedly, it seems to many scientists, continuous development of technologies

4. How new technologies can change contemporary management accounting

The transition from traditional management accounting (financially-oriented decision analysis, controlling of budgets) leads toward modern approach (rather strategic one, with emphasizing the identification, measurement and also management of the key drivers of shareholders value). Usage of ERP systems and new analytic instruments

allows for interpreting and analyzing different data (both internal and external, financial and nonfinancial) in order to be helpful during gaining competitive advantage [Appelbaum et al. 2017, p. 30; Nielsen 2015; Ittner, Larcker 2001, p. 32].

Nowadays, managers require more timely and accurate information, coming not only from financial statements (as backward looking). Management accounting supports management system with measurement based on internal data (measurement of company's performance) and provides decisions relying on internal and external data. Management accountants provide descriptive reports and make predictions that include consequences of uncertainty and risk. In order to fulfill such modern and rather challenging tasks (to be competitive in turbulent environment) management accounting uses modern analytical tools that allow for making prescriptive analysis to avoid risk caused by uncertainty. Choosing among raw materials suppliers leading to decrease in costs and increase in revenues is a kind of optimization model and could be allowed for management accountants in manufacturing company. Such transgress the boundaries and interaction with non-accountants to solve business problems inside the organization are suggested for contemporary management accountants. Nowadays, management accounting has extended its previous traditional focus to identifying the drivers of financial internal and external performances. Modern and innovative measures and approaches have been added, with success, to management accounting functions and this process is evaluating [Silvi et al. 2010; Birnberg 2009, pp. 3–18; Appelbaum et al. 2017, p. 30].

New IT technologies, as a tool used by management accountants, are investigated by many scientists during the last years. IT systems used by accounting are often analyzed in context of acceleration and workload reduction in financial data registering and processing.

Mass digitization of measurement different economic phenomenon facilitates proper realization of accounting processes and causes their radical transformation. There are three main trends caused by Big Data [Łada 2016, p. 203; 2017, p. 87]:

- full automation of information processes and on-line bookkeeping,
- decrease of importance of money measurement and financial reporting for, so called, “raw data” of varied character,
- change the role of previous accountants to contemporary information systems designers.

There are also changes in management accounting, like new users of information – machines that can join different and enormously huge databases, and can process them into bases of algorithmic business decisions.

The usage of more data can increase the power of analysis but it fails to remove inaccuracies or biases occurring in big data. Additionally, while obtaining sufficiently large databases, it is unsurprising to find spurious correlations. Although data analysts have skills to carry out the exploratory analyses identifying correlations and algorithms, management accountants' ability to understand the language of business provides them with the capability to identify and interpret relevant data that can be processed

into strategies. Using big data analytics, management accountants can broaden their controlling and monitoring techniques to include unstructured data providing the power to identify areas of improvement and some opportunities. Sentiment analytics, for instance, based on social media data (like Facebook) can be merged with existing accounting data in order to develop sophisticated models [Richins et al. 2017, pp. 12–15].

Big Data technologies can support management accountants to generate proper and usable information to improve decision-making processes. The requirement to handle increasing amount of data can significantly change contemporary management accounting. After analysis it can be stated that main opportunities with new technologies (like Big Data) for management accounting are the following: integration of new data channels, unstructured data, automatic generation of data, cost and time optimization, real-time data, improvement of operational and strategic planning, as well as improvement of decision support for highest level on managers. On the other hand, there are some challenges for management accountants because of big data phenomenon: large volumes of data, overload of information, changing cost structure, faster false decisions, lack of resources (insufficient knowledge of personnel) [Gärtner, Hiebl 2018, pp. 5–10].

5. Conclusions

As can be observed, we are now (with the expansion of Internet use) in the center of a technological revolution that will radically change the way in which enterprises operate and make different decisions. Usage of appropriate digital technologies and methods will be essential to gather, store and process large amount of data. With Big Data technologies, despite some challenges, modern enterprises are able to deal with such large volume of data, provide better forecasts and business decisions. There is a close connection between information systems and management accounting. Management accountants very often have experience in handling large datasets. Important information for management accountants can be gained not only from ERP systems, but also from Big Data. It is inevitable that, so called, “new technologies” (like Big Data) can no longer be understood as a really new trend. We are now surrounded by many various data, so that is why we should obtain the knowledge how to deal with them to make better decisions. And what will be the next step of digital transformation in business life? Probably, because of rapid changes, we will find the answer in near future.

References

- Accenture, 2018, *Big Success With Big Data*, https://www.accenture.com/sa-en/_acnmedia/Accenture/ConversionAssets/DotCom/Documents/Global/PDF/Industries_14/Accenture-Big-Data-POV.pdf (22.03.2018).

- Adamczewski P., 2017a, *Adaptacje systemów ICT nowoczesnych organizacji w procesie transformacji cyfrowej*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, no. 475, pp. 11–22.
- Adamczewski P., 2017b, *Organizacje inteligentne wobec wyzwań transformacji cyfrowej*, Ekonomiczne Problemy Usług, no. 1/2017.
- Appelbaum D., Kogan A., Vasarhelyi M., Yan Z., 2017, *Impact of business analytics and enterprise systems on managerial accounting*, International Journal of Accounting Information Systems, vol. 25, pp. 29–44.
- Arnaboldi M., Busco C., Cuganesan S., 2017, *Accounting, accountability, social media and big data: Revolution or hype?*, Accounting, Auditing & Accountability Journal, vol. 30, no. 4.
- Birnberg J.G., 2009, *The case for post-modern management accounting: Thinking outside the box*, Journal of Management Accounting Research, vol. 21, no. 1, pp. 3–18.
- Cokins G., 2013, *Top 7 Trends in Management Accounting*, Strategic Finance, no. 12, December, pp. 21–29.
- Cokins G., 2014, *Top 7 Trends in Management Accounting. Part 2*, Strategic Finance, no. 1, January, pp. 41–47.
- Gärtner B., Hiebl M.R.W., 2018, *Issues with Big Data*, [in:] Quinn M., Strauss (eds.), *The Routledge Companion to Accounting Information Systems*, Routledge, Abingdon, pp. 5–10.
- Gonciarski W., 2017, *Koncepcja zarządzania 2.0 jako konsekwencja rewolucji cyfrowej*, Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, no. 338.
- Höller J., Tsiatsis V., Mulligan C., Karnouskos S., Avesand S., Boyle D., 2014, *From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence*, Elsevier, Amsterdam.
- IMA, 2008, *Definition of Management Accounting*, Institute of Management Accountants, Montvale, NJ, imanet.org (23.03.2018).
- Ittner C.D., Larcker D.F., 2001, *Assesing empirical research in managerial accounting: A value-based management perspective*, Journal of Accounting and Economics, vol. 32, no. 1.
- Łada M., 2011, *Pomiar ekonomiczny zorientowany na relacje z klientami we współczesnej rachunkowości*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice.
- Łada M., 2016, *Automatyzacja procesów rachunkowości zarządczej*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, no. 440.
- Łada M., 2017, *Od konsekwencji do antecedencji – zmiana orientacji pomiaru we współczesnej rachunkowości*, Zeszyty Teoretyczne Rachunkowości, t. 92 (148).
- Łuczak M., 2017, *Rola nowych technologii w ewolucji globalizacji*, Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, no. 317.
- Mateos A., Rosenberg J., 2011, *Chmura obliczeniowa. Rozwiązania dla biznesu*, Helion, Gliwice.
- Mayer-Schönberger V., Cukier K., 2017, *Big data – efektywna analiza danych. Rewolucja, która zmieni nasze myślenie, pracę i życie*, transl. M. Głatki, MTBiznes, Warszawa.
- McAfee A., Brynjolfsson E., 2012, *Big Data. The Management Revolution*, Harvard Business Review, no. 90.
- Nielsen S., 2015, *The Impact of Business Analytics on Management Accounting*, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2616363 (22.03.2018).
- Nita B., 2015, *Stan i perspektywy rozwoju rachunkowości zarządczej w XXI wieku w praktyce*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, no. 399.
- Nowak E., 2011, *Rachunkowość zarządcza w przedsiębiorstwie*, CeDeWu, Warszawa.
- Nowak E., 2015, *Tendencje rozwoju systemów rachunkowości zarządczej*, Zeszyty Naukowe Uniwersytetu Szczecińskiego, nr 873, Finanse, Rynki Finansowe, Ubezpieczenia, nr 77.
- Perera C., Ranjan R., Wang L., Khan S.U., Zomaya A.Y., 2015, *Big Data Privacy in the Internet of Things Era*, IT Pro, May/June, pp. 32–39.
- Ramli A., Sulaiman S., Zainuddin Z.N., 2015, *Factors Driving Change in Management Accounting Practices: Malaysian Survey Evidence*, Springer, Singapore.

-
- Richins G., Stapleton A., Stratopoulos T.C., Wong C., 2017, *Big data analytics: Opportunity or threat for the accounting profession?*, Journal of Information Systems, vol. 31, no. 3, pp. 63–79.
- Silvi R., Moeller K., Schlaefke M., 2010, *Performance Management Analytics – The Next Extension in Managerial Accounting*, [https://papers.ssrn.com/sol3/papers.cfm?abstract_id= 1656486](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1656486) (23.03.2018).