

# DETERMINANTS OF METHOD TRIANGULATION IN MANAGEMENT SCIENCES

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## Introduction

Triangulation as a combination of various research methods was initiated by D.T. Campbell and D.W. Fiske in 1959 in the concept of psychological tests (Campbell, Fiske, 1959). Since then, triangulation has been used in research as a set of different, independent methods, which aims to minimize measurement error (Greene et al., 1989).

Knowledge of the management sciences methods and the ability to select them correctly, and then their applications, have played and still play a crucial role not only in the scientific work of organization researchers, but also in the decision-making process of management practitioners, taking into account the complexity of management dictated by changing market and economic conditions (Gorzeń-Mitka, Okręglika, 2015). The use of a specific research method in a given situation affects the quality of research results, thus setting the limits of knowledge of the organizational reality studied (Michalak, 2014). Selection of the right research tool is primarily determined by the purpose and subject of the study, but also by the specificity of management processes taking place in the organization being the subject of the study (Kafel, 2016). The multitude of organizational theories, the complexity and multiplicity of organizations equally affect the perception of organizational reality and determines the selection of appropriate research instrument. And so classical organization theory includes key observation and historical analysis as well as personal reflection on experience as key research methods (Ferdous, 2016). Modernist theory, in turn, points to descriptive methods and the correlation of standardized methods as the basic methods of testing an organization (Hatch, 2002). Supporters of the symbolic-interpreting theory, who see participant observation and ethnographic interviews among the important research methods, point out quite different tools. On the other hand, deconstruction and criticism of theoretical research practices appear among research methods postulated by supporters of postmodern theory (Hatch, 2002). Therefore, an important task becomes to scientifically reflect on the possibility of using specific research methods in specific conditions, as well as to consider the possibility of their triangulation.

The use of triangulation relates to the use of several methods, research approaches, theories or data sources in one research project in order to obtain a more reliable

and fuller picture of the examined reality. Each of the research methods has its own specificity and application, because they can be used to obtain a different type of data (Kędzior, Karcz, 2007; Stolecka-Makowska, 2016), therefore the results obtained through the use of triangulation give a chance to present phenomena in a panoramic and comprehensive manner (Hageman, 2008). The growing popularity of combining methods in research is the result of mutual integration of fields and disciplines of science (Stanisławski, 2017).

When deciding to use triangulation in research, it should be noted in which part of the research process it will be carried out. The use of triangulation requires very advanced knowledge, not only in the methodological field, but also a rational assessment of the accuracy of selected methods. Six types of triangulation are distinguished in the literature (Jick, 1979; Kimchi et al., 1991; Guion 2002):

- triangulation of methods – combining several (at least two) methods to verify one problem;
- triangulation of researchers – combining observations made by at least two researchers/ observers of the phenomenon;
- data triangulation – research and interpretation of the problem based on data obtained from various sources;
- triangulation of data analysis – conducting analysis using various tools and techniques based on the same data set;
- triangulation of theory – interpretation of results in relation to various approaches and theories;
- triangulation of the environment – carrying out the same research process in different locations.

Moreover, the literature on the subject also describes the division into four types of triangulation: methodological, data, theoretical, and investigator (Denzin, 1978; Humble, 2009; Joslin, Müller, 2016).

Triangulation of methods is applicable in management studies, which allows comparison of obtained results and drawing conclusions resulting from their application. It also provides an opportunity to identify the problem more widely, increase the quality of research and reduce measurement errors (Dźwigoł, 2018). The use of method triangulation can take place in two ways: two-phase and parallel one. A two-phase (sequential) procedure occurs when testing by means of subsequent methods takes place

one after the other as an outcome of the results obtained. The parallel procedure is based on the simultaneous use of quantitative and qualitative methods to find answers to research hypotheses (Stańczyk, 2015).

Currently, triangulation of methods is of interest to many scientists and is used in an increasing number of research projects. Frequently, scientific papers emphasise the fact that this method has its advantages and disadvantages (Jick, 1979; Repstad, 1987; Carvalho, White, 1997; Thurmond, 2001; Bryman, 2008; Hornowska et al., 2012).

The aim of the article is to present the possibilities and limitations of method triangulation in management sciences but from experts' points of view. Having analyzed the notion of triangulation we utilized the results of the analysis of articles in which triangulation of methods was used.

The article discusses the results of empirical research conducted in the form of qualitative research (survey among experts) regarding the positive and negative effects of using triangulation in management sciences<sup>1</sup>.

## Literature review

**T**oday's organizations are forced to operate in conditions of high dynamics of the environment and strong development pressure, which is driven by the increase in competition and increased expectations of customers. These conditions impose a variety of new management issues and require managers to use comprehensive information in decision-making processes (Nesterak, 2015, p. 24). In addition to the use of traditional research techniques (observation, interview, textual analysis), methods that require utilisation of IT tools are gaining more and more approval. The rightness of their use is associated with the requirements for managers regarding the perception of organization's activities from different points of view simultaneously (Nesterak, 2004, p. 215) and the

less time-consuming research, limiting their costliness as well as greater precision and versatility of the calculations made.

The study of organizations, despite the diversity in defining the concept of organization, usually boils down to examining the communities functioning within it (Sułkowski, 2012). Among the research approaches used to learn about social reality observed within the organization, three basic ones are distinguished: quantitative, qualitative and mixed (Table 1).

The described research approaches are alternative to each other and useful in relation to certain issues, but inadequate in other contexts, i.e. they are used in different research situations, but they can often be perfectly complementary (Michalak, 2014) and for the above reasons, the competition between supporters of qualitative and quantitative research for the primacy of one of the paradigms is fundamentally unfounded and ineffective (Czakon, 2011). Evidence of the validity of this claim may be an increasing number of attempts to create mixed research methods based on both quantitative and qualitative methods (Collins et al., 2017; O'Halloran et al., 2018) and an increasing interest in this phenomenon of scientists, as evidenced by the growing number of scientific papers associated with the patching of mixed methods (McKim, 2017). Certainly, however, qualitative research methods allow more precise (compared to quantitative research methods) grasping the specifics of phenomena and relationships within human systems, especially those hard to measure (Stocki, 2012). The growing recognition of the accuracy of qualitative research methods in recent years has meant that they have become an alternative to conventional methodological approaches derived from positivist approaches used in management sciences (Ćwiklicki, Pawlina, 2015).

The discipline of management science is complex due to the multitude of management resources. The collected

Table 1. Research approaches in social sciences

	Objective	Research methods	Result
Qualitative approach	Exploratory (diagnostic) research aimed at insight and understanding the phenomenon	Projection methods and tools in the field of sociology and psychology (interview, observation) focused on the study of the individual. Case studies and narrative studies. Methods referring to ethnography, phenomenology and grounded theory	Theory explaining your data. Cooperation with research participants leading to organizational learning
Quantitative approach	Explanatory research, the purpose of which is to check objective theories by searching for causal relationships between various variables	Statistical methods, econometric methods Surveys and experiments	Data verifying the theory. Repeatable results that can be generalized to the entire study population. Confirmed or refuted hypothesis
Mixed approach	The use of various, mutually correcting and verifying research methods (the principle of methodological triangulation)	Integration and / or synergization of methods used in the qualitative and quantitative approach	The wider context of the studied phenomenon (reduction of measurement errors resulting from the use of only one method)

Source: own elaboration based on: Creswell, 2013, p. 29; Sułkowski, 2012, pp. 57-66; Paluchowski, 2010, p. 9; Michalak, 2014, pp. 142-145; Matejun, 2013; Czakon, 2011, p. 78

data should explain issues regarding situations that take place in economic and market realities (Dźwigoł, 2018). Management, due to its complexity, is a problem of research of scientists, hence the multitude of research methods used in scientific works. Generally, the management field, due to its multi-faceted and practical interpretative approach related to a given organization, requires the use of complex research methods. Moreover, management faces increasingly complex problems as required by an interdisciplinary approach (Marais, 2012). Hence the trend to use multidisciplinary methods in management sciences (Erro-Garcés, Alfaro-Tanco, 2020).

The key stage of the research process, right after defining the problem, should be the choice of methodology, i.e. the correct choice of method to be used in the study. The methodology therefore determines the process of knowledge gathering (Niemczyk, 2015). The management sciences research uses a set of methods that collect material that is the basis for discussion and inference. It stands out among others the following methodological approaches (Dźwigoł, 2018; Tran, 2015):

- qualitative methods – they use explanatory tools and interpretation of phenomena, e.g. SWOT analysis, observation, interview;
- quantitative methods – allow measurements of the phenomena tested, e.g. statistical analysis, the Delphi method, multi-criteria decision analysis;
- mixed methods – are both qualitative and quantitative, use the features of both groups, e.g. a questionnaire, experiment, case study.

Table 2 presents the crucial features describing qualitative and quantitative research.

The use of mixed research methods, i.e. a combination of qualitative and quantitative approaches, has long been of interest to scientists when it comes to their use in the areas of finance (Jackson, 2018) and management accounting (Otley, 1978). Moreover, the changing economic conditions in which organizations are located mean that interest in triangulation in accounting giving management information is constantly growing (Brown, Brignall, 2007; Hopper, Hoque, 2006). Combining research methods has been studied in the area of financial management. Interviews conducted at the West Pomeranian University of Technology on the use of triangulation in management accounting show that the decision to combine research methods is mainly influenced by: the nature

of the research problem; scope and purpose of the study; need to complete information; knowledge in the field of quantitative and qualitative methods and the concept of the researcher (Nadolna, 2017).

The undertaken literature review indicated that among the advantages of using triangulation, a multi-faceted approach to the research problem, a reduction in the risk of measurement error and an increase in the value of research as a result of complementarity of methods have been distinguished, which is important especially in the matter of management accounting (Hoque et al., 2013). All these factors mean that the method triangulation can be an effective solution, for example, when determining the value of an enterprise for shareholders or shareholders (Lloyd, 2011) or in assessing the quality of the management system and organizational culture of the enterprise (Manning, 2018), because of the panoramic and multi-faceted nature of this assessment.

The main problem associated with the practical use of method triangulation is the proper era of research methods and techniques. The use of qualitative methods in research, according to respondents, can lead to subjective results, the lack of representativeness of results or to overlooking important observations (Modell, 2009). In addition, there is a risk that a triangulation scientist may freely use different methods of approaching the problem in order to match the research results to his theory (Modell, 2015).

Combining the methods also has supporters among researchers dealing with the quantitative approach to research problems. Forecast models are widely used in many areas, including management. The use of hybrid methods, i.e. using several models, at least one of which is a descriptive model and at least one is a prognostic model, is considered valuable by researchers due to the complementary methods. Thanks to this, the results obtained can be considered more reliable and relevant (O’Cathain et al., 2010). Considered by some as a disadvantage of combining methods in research, time consumption allows for greater accuracy of predictions and reduction of the problem of data readability in complex structures (Łapczyński, 2011). Nevertheless, there is a group of scientists who maintain an unambiguous approach to mixed methods and believe that the division of techniques into qualitative and quantitative is arbitrary, deceptive and uncharacteristic (Bernard, 2013; Gorard, 2010).

Table 2. Differences in qualitative and quantitative research

Qualitative research	Quantitative research
What? How?	How much? How many?
Results cannot be generalized	Results can be generalized
Elastic	Structured
Greater influence of the researcher on the group	Less influence of the researcher on the group
Subjective interpretation	Objective interpretation

Source: own elaboration based on: Dźwigoł, 2018

Another area of management in which research is based on the strategy of triangulation, is marketing. There are two basic paradigms in marketing research: constructivist one and positivist one. These paradigms differ from each other due to the relationship between the researcher and the subject of the study, the value of the cognitive process, the nature of reality in the study, the ability to determine causality and generalization. For triangulation in marketing research to be applicable, they must meet the assumptions of both patterns (Chlipała, 2014). All types of triangulation apply in marketing research of consumer behavior on international markets: data, researchers, theories and research methods. In this type of research, combining different methods requires knowledge of different methodological approaches and awareness of the limitations arising from them (Mazurek-Łopacińska, Sobocińska, 2014).

The difficulty of using triangulation in consumer behavior research arises from the numerous contexts of the research problem. It can refer to the needs and values of consumers, but also to present changes in the structure of the market (Schroeder et al., 2013). The presented examples of research are on the one hand an expression of the desire to make fuller use of available methods, on the other hand, they recognize the difficulties associated with the simultaneous use of many methods.

## Research method

The conducted literature review shows that despite the huge amount of research conducted in the field of management using method triangulation, there are still barriers and limitations to the application of this research approach.

Taking into account the lack of specific variables describing the limitations of method triangulation in management sciences, the authors decided to conduct a preliminary study that would allow to define the scope and characteristics of factors limiting the use of triangulation in scientific research in various areas of management.

The main aim of the study was to know the opinion of scientists dealing with management and related disciplines whether in practice they were actually affected by the problem of limitations in the use of triangulation.

The following research assumption was adopted: triangulation is used in research conducted in the field of management.

Additionally, a research question was posed:

RQ. Scientists see limitations in implementing method triangulation in management sciences, both in quantitative and qualitative research.

In order to answer the research question, it was decided to conduct a survey among academics at the Cracow University of Economics, employed at the Management Institute of the College of Management and Quality Sciences.

The scheme of conduct in the study on the presence of limitations in the use of triangulation in management sciences is presented in the Figure 1.

In order to analyze the limitations of triangulation in management sciences, surveys were conducted among experts in the field of economic sciences and management sciences, with the help of which the following information was collected: the fact of using triangulation in research; field of research; pros and cons of triangulation and the limitations of triangulation.

The survey was qualitative and the questions asked to the respondents were open-ended.

The survey questionnaire consisted of five questions:

1. Have you ever used method triangulation in research?
2. In what discipline of science was the research conducted?
3. Please list the advantages of using method triangulation in scientific research?
4. Please list the disadvantages of using method triangulation in scientific research?
5. Please describe the limitations of using method triangulation encountered in the conducted research.

The inquiry for participation in the study was sent to 20 researchers and teaching staff of the Cracow University of Economics, holders of postdoctoral and/or professor degree. The study used purposeful selection of the research sample.

Experts who agreed to participate in the study were asked a filtering question as to whether they had ever used triangulation of research methods in their research, which allowed for selection of experts who could share their observations on the limitations of this approach. Out of

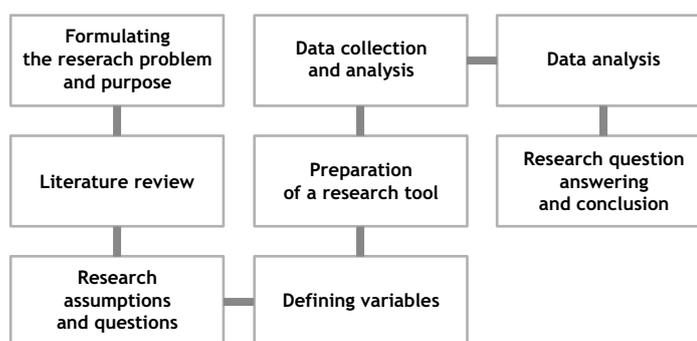


Figure 1. Research methodology process  
Source: own elaboration

the 17 professors examined, 10 answered the question positively (each of them used triangulation at least once), while the remaining 7 experts indicated that they had never used triangulation in their research.

Experts who did not triangulate in the study were not asked to answer the remaining questions. Experts using triangulation were asked to: indicate the discipline of the research in which triangulation took place, describe the advantages and disadvantages of using triangulation in researches and barriers encountered in the researches in studies that used triangulation.

### Research results

The professors participating in the study (N=10) provided subjective extensive answers to the questions. Answers to open-ended questions provided by the respondents were entered into a spreadsheet for analysis and comparison. The responses were repeated or very similar, therefore they were divided into categories when presenting the results. Typically, the responses referred to examples of research and past experiences of surveyed professors. These data (e.g. advantages and disadvantages of using triangulation) have been generalized for the use of triangulation in management research.

Areas identified by experts: market and marketing (20%), mathematical sciences in management (20%), project management (20%), human resources management (20%), quality management (10%), management systems (10%).

Experts who implemented triangulation in their research were asked to indicate the positive and negative effects of such an action. The advantages and disadvantages of using triangulation most often cited by the respondents are presented in the Table 3.

In the last part of the survey, experts were asked to indicate the limitations resulting from the use of triangulation in management studies. The respondents' answers show that:

- triangulation requires devoting more time to research – the use of two or more methods in a research project, the use of several different approaches or the involvement of several independent researchers or data sources is associated with the extension of the research project time, the need to spend additional time searching for methods, data and researchers, and comparing the results of triangulation;

- restrictions result from the lack of access to several researchers / different types of data / several research tools at the same time – the use of different data sources can be problematic, especially if one research project would need to gather empirical material from different groups or use a different tool; moreover, it may not be possible to involve several researchers of a given field in the same research project due to constraints, e.g. time and geography;
- triangulation requires knowledge of many research methods and approaches – in order to implement triangulation correctly, you must have sufficient knowledge, e.g. in the field of many research methods, however, many experts who conduct research projects in their fields may not know all the methods;
- the methods used often do not meet common assumptions – the use of different methods for different purposes may not meet the triangulation assumptions of higher quality of research and reduction of the measurement error.

The indicated restrictions largely reflect the disadvantages of triangulation previously described by respondents. Half of the researchers who declared the use of triangulation in management studies did not indicate any restrictions from practicing this method, again citing the advantages discussed above and defining them as opportunities for greater success of scientific projects.

### Conclusions

The results of expert opinions show that triangulation in management sciences has limitations, however, as experts emphasize, it also provides opportunities for research development and increases the success of explaining research hypotheses. Triangulation gives researchers the opportunity to gain more valuable results and achieve study goals if it is properly planned and methodologically developed. The disadvantages of triangulation most often include time consuming tests and difficulties in choosing the right methods.

A summary of our findings, connected to the research assumption and research question, is presented below.

Implementation of triangulation: Triangulation of research methods is used in scientific research in the disciplines of management, quality, and market research. Taking into account that 10 out of 17 surveyed respondents have used method triangulation at least once, the correctness of the research assumption has been

Table 3. Advantages and disadvantages of triangulation

Advantages of using triangulation	Disadvantages of using triangulation
<ul style="list-style-type: none"> <li>• possibility to compare the results</li> <li>• a broader view of the analyzed problem from different points of view</li> <li>• obtaining high quality results</li> <li>• useful when studying very complex phenomena</li> <li>• greater transparency of the data received</li> </ul>	<ul style="list-style-type: none"> <li>• not sure which method gives the correct results</li> <li>• requires more time, tools and people</li> <li>• lack of researcher's experience in using alternative methods</li> </ul>

Source: own elaboration

confirmed. Moreover, it should be taken into account that the study was preliminary and limited by a relatively small research sample.

**Constraints of triangulation:** Based on the responses of the surveyed respondents on the advantages and disadvantages, as well as limitations related to the implementation of method triangulation in scientific research on management, it can be assumed that the scientists of the Cracow University of Economics see barriers in the use of method triangulation. Additionally, the multitude of research areas represented by the surveyed experts confirms that barriers to the use of triangulation occur both in quantitative and qualitative research.

This paper contributes to the research on method triangulation in management science by pointing out to the limitations and characteristics of methods' triangulations in management sciences. Thanks to our research it is possible to indicate the future agenda on this issue. Future research on triangulation should focus on profound characteristics of each distinguished feature and preferable indicating such an approach that would reduce the impact of limitations on triangulation of methods. Guiding the direction of future research can be considered as paper's contribution to research on triangulation in management sciences.

The analysis of the effectiveness of triangulation strategies in the cognitive process are a complex issue, which undoubtedly requires further research. In addition to the broader analysis of the cases pertaining to the use of triangulation described in the literature, undoubtedly a valuable source of knowledge can be the results of in-depth and more extensive interviews with people using this research strategy.

Triangulation is more and more often used in the field of organization and management (Campbell et al., 2020; Gibson, 2017) and public administration (Hendren et al., 2018). Triangulation is recognized for its innovative interpretation of phenomena and better understanding of the problem; elimination of measurement errors and elimination of methodological errors as well as the possibility of combining quantitative and qualitative methods (Stańczyk, 2015). Triangulation critics in the research say, however, that triangulation can cause doubts in comparing results obtained using various methods. The combination of methods is also emphasized, it may not be justified due to the lack of commensurability of paradigms, and triangulation may result in incompatibility of researchers and too much data. The purpose of its use is, among others, to increase the effectiveness of research and the ability to compare results, which allows you to define more relevant conclusions and recommendations for further research. It should be emphasized that the most effective use of data is key in the management process (O'Leary, 2019). The motive for this approach is striving to use more fully – often ambiguous and difficult to obtain – data in the research process.

In the research presented in the article by Nadolna, the author emphasized that triangulation can be used to its full extent only in large research projects – otherwise, the scope of the tests makes it impossible to cover the costs of the test. Among other limitations resulting from the use

of triangulation, there is a statement that young scientists are not sufficiently well trained in the field of qualitative methods. The issue of restrictions resulting from reviews of scientific papers that require transparency and methodological uniformity (Nadolna, 2012) was also raised. The arguments cited above, for and against triangulation, provide general opinions that may be useful during the research design stage and selection of methods. The rightness of using combined methods in research takes place in the case of: the complexity of research questions; data diversity; low quality data; lack of sufficient empirical material; trend research; the need for alternative and population studies (*An Introduction to Triangulation*, 2009).

Despite the fact that management sciences is a relatively young research area, their methodology is very developed. The complex nature of the field necessitates combining research methods.

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## Uwarunkowania triangulacji metod w naukach o zarządzaniu

### Streszczenie

Obecnie triangulacja metod jest przedmiotem zainteresowania wielu naukowców i jest wykorzystywana w coraz większej liczbie projektów badawczych. Oczywiście jest, że jak każde podejście badawcze ma swoje wady i zalety, co wielokrotnie podkreśla się w dotychczas opublikowanych pracach naukowych. Celem artykułu jest przedstawienie możliwości i ograniczeń triangulacji metod w naukach o zarządzaniu. Po analizie pojęcia triangulacji posłużono się wynikami analizy artykułów, w której wykorzystano triangulację metod. W artykule omówiono wyniki badań empirycznych przeprowadzonych w formie badań jakościowych (ankiety wśród ekspertów) dotyczących pozytywnych i negatywnych skutków stosowania triangulacji metod w naukach o zarządzaniu. Głównym celem badań było poznanie opinii naukowców zajmujących się zarządzaniem i dyscyplinami pokrewnymi, czy w praktyce rzeczywiście dotknął ich problem ograniczeń w stosowaniu triangulacji.

### Słowa kluczowe

triangulacja, metody mieszane, możliwości, ograniczenia