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PRIMARY RESEARCH USING QUANTITATIVE METHODS IN SOCIAL SCIENCES

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ABSTRACT

Empirical processes based on data from secondary or primary sources are characteristic of research in social sciences in the discipline of economics and finance. The difference between the two forms lies in the use of extraneous or so-called proprietary, or author's data in the analysis. Primary research is a research process in which the author of the study conducts research using proprietary measurement tools created for the study and with reference to the adopted research method. In the field of economics, mainly quantitative methods are used and the most egalitarian method is the survey method, while the research technique - survey questionnaires. In this publication, the authors presented a typology of quantitative research methods used in the discipline of economics and finance.

KEYWORDS

quantitative survey, primary research, quantitative methods, survey method, survey questionnaire.

INTRODUCTION

Methodology is a set of obvious research directives, related to theoretical and practical assumptions, which are necessary for scientific purposes. The research procedure follows logical thinking framed in research steps and the writing standard of an impersonal style of expressing thoughts. The analysis of facts (statistical data) always precedes the assumption, theoretical explanation, and the research concepts, methods, techniques, and tools used in the research. The collected and grouped scientific facts (data), on the other hand, constitute actual (statistical) quantitative or qualitative source material subject to explanation (analysis) and presentation in the form of description[1]. One of the most popular divisions of research methods distinguishes the following methods: comparative, historical, dialectical, functional, structural, and systemic. Another division distinguishes between survey, interview, observation, experiment, and document analysis methods [2]. In scientific research, methodology is a set of obvious research directives, related to theoretical and practical assumptions, which are necessary for scientific purposes, and the research procedure is a consequence of logical thinking included in research stages.

In the era of the development of digital economy, information acquisition is not a problem at all. We are flooded with, available and mostly free information every day, enabling synthetic analysis of specific phenomena. The conducted research, based on available data, is more and more often quantitative in nature. This means that in the process of analysis, universal mathematical and statistical methods are used. Knowledge of at least some of these methods and their conscious application is one of the foundations of the rational functioning of economic entities and economic achievements.

For the scientific world, the importance of disseminating research results is important as highlighted in the National Science Center Code [3] on research integrity and seeking research funding: „Publishing and presenting research results are essential for generating discussion in the scientific community [...] Scientists themselves are expected to strive to make the results of their research available to the general public in such a way that they are understood." The need to disseminate research results is also reinforced in the European Charter for Researchers [4], as stated in the Charter: „All researchers should ensure that the results of their research are disseminated and exploited, e.g. published, communicated to other research communities or, where appropriate, commercialised. In particular, senior researchers are expected to take the lead in ensuring that research is fruitful and that its results are commercially exploited and/or made available to the general public at every opportunity."

Consideration of quantitative research is important because quantitative research is one of the most widely used in the social sciences. After all, one of its purposes is to generate knowledge and create an understanding of the social world. Its popularity is due, among other things, to the potential benefits of precision in defining operational variables, making research assumptions and implementing measurements and testing results, describing reality in quantitative terms, and capturing quantitative relationships between observed phenomena.

This study aims to introduce the concept of quantitative analysis, explain what it is and what it does, indicate the research methods, explain what indicators occur in quantitative analysis, what stages of analysis we most often encounter, and where quantitative analysis has been applied. It also presents the advantages that quantitative methods offer to researchers of various economic conditions. It can, therefore, enhance those readers who are looking for a practical and simple way to learn about quantitative methods and, through their use, improve their decision-making processes.

2. Material and methods

In scientific studies, we often come across the terms „research" and „analysis". This interchangeable use of terms is most often associated with colloquial speech. Many interested parties find that distinguishing between the two usually makes little sense. When we are required to use scientific terminology, we find that research and analysis and terms are two very distinct terms. Research is a broader term. It refers to all activities related to the collection and analysis of information related to the phenomena and processes on the market. It can be said that this is a general term, which applies to all the tasks of a researcher. What then is analysis? Well, it is one of the two areas, in addition to forecasting, that a researcher can deal with. These are tasks divided according to the time horizon, where forecasting is about predicting trends and future situations, and market analysis is about learning about past and present phenomena [5].

In recent decades, quantitative research methodology has received a lot of attention. One can even speak of the dominance of quantitative research [6]. In quantitative research, there is a historically formed view of seeing theory as a scientific basis for predicting or explaining what the researcher expects. A theory is „a set of interrelated constructs (variables), definitions, and assertions that presents a systematic picture of phenomena, whereby explaining the relationships among variables we move toward an explanation of the phenomena that occur" [7]. From this understanding of theory in quantitative research, it follows that theory is a set of related constructs (variables) captured in the form of a statement or hypothesis that defines the relationship between variables. A theory may appear in a scientific study as a line of argument, discussion, or as a basis supporting the explanation (or prediction) of real-world phenomena. Theory thus plays an important role because it formulates the theoretical premises relating to how and why variables are related to each other in specific relationships [8].

The quantitative approach focuses on studying phenomena by collecting numerical data and performing statistical, mathematical, or computational techniques. The overarching goal of quantitative inquiry is to classify features, count them, and construct statistical models to explain what has been observed [9]. The quantitative approach is derived from the assumptions of methodology based on positivist philosophy. The assumptions emphasize „the existence of an objective world, the possibility of equally objective cognition of it by means of precisely constructed tools. We study only objects that can be measured, we look for cause-effect relationships between them in order to discover them and to be able to exert a more effective influence on social reality" [10].

For the purpose of this discussion, it should be explained that quantitative research is the verification of neutral theories by analyzing the relationships between variables. Variables can be measured using appropriate tools. The results can be processed with the help of statistical analysis. The final report is structured and consists of an introduction, a theory based on the literature, the methods of the study, its results, and the conclusions drawn [11]. They consist of showing numerical data on specific topics and also showing the connection between them. The purpose of quantitative research is to demonstrate the truth or falsity of the hypotheses formulated in it. This is done by conducting a survey related to the participants' topics of interest. Such a group of people is called a statistical sample. The selection of a statistical sample is extremely important because it should be representative of its population. Therefore, it is believed that random selection is best for this purpose. Apart from this, it is important to keep in mind the proper selection of research tools. The results should be the same, every time we redo the calculations. Statistics are used to analyze data in quantitative analysis. They numerically describe the data and assess the risk of an error occurring [12]. Quantitative research, mainly consists of questionnaire surveys, which can be conducted among a large group of respondents, and which provide answers to the basic question „How many?", for example: how many people buy a particular product?, how many people know a particular brand?, how often does a phenomenon occur? etc. Proper selection of the research sample means that this technique can be used to survey such a number of people that the results are representative of the entire population. Quantitative research, allows us to determine how often a particular phenomenon occurs in a given community.

Quantitative analysis is any research method that aims to present the results of a survey in a numerical form (e.g. prevalence, percentages, mean, fashion, median, etc.). Quantitative analysis mainly uses statistical inference techniques, and the results

obtained can usually be generalized to the entire study population. The characteristic feature of quantitative analysis is the representation of economic conditions using measurable indicators, which makes it possible to determine the values of a specific parameter by numbers. The results of quantitative methods are expressed in terms of specific numerical values assigned to specific parameters, which enables us to highlight the advantages of quantitative analysis, such as: the ease of comparing the results between the groups studied, the ease of comparing the results over time, the study of the impact of individual factors on a given phenomenon, and the objectivity of the study. It is for this reason that quantitative analysis has found application in the field of economics through the micro and macroeconomic indicators developed over decades that allow for a detailed description of the economic situation using quantitative analysis indicators.

Popular tools of economic analysis are research experiments, surveys, interviews, observations, and collected financial data, which is particularly important in public and local government finance. An indicator in quantitative analysis can be any parameter whose understanding is common or is clarified for the purposes of a given study. With the help of quantitative analyses, we measure events, and directions of activity, and determine the scale and factors that influence the studied phenomenon. We give phenomena specific measures such as how much, when, if, and what? This type of research allows us to obtain quantitative results, which additionally provide knowledge about the researched entities, occurrence of particular phenomena, market position, or effectiveness of actions. Thanks to the quantitative questions we obtain data on a specific subject which allows us to present the general model of the entity in a more precise way. The obtained picture of the entity is more reliable and accurate [13].

Numbers characterize a given phenomenon [14]. The collection of quantitative data, results from the need to know the functioning of individual entities and trends, to collect information about the scale of activities, and to average the numerical data allowing for the development of future directions of activities and a model of organization based on scientific research as well as to discuss the legitimacy of activities, effects, with particular emphasis on the expediency of spending financial resources. In the investigated phenomena the researcher must first define the facts which he is interested in, build a model of the phenomena, determine the conditions of their occurrence, the relationship between them, and assign the roles of cause or effect. He must also construct research tools that allow measurement, paying attention to their accuracy (ensuring measurement of the appropriate phenomena) and reliability (accuracy of measurement) [15]. The researcher is usually an external observer of the facts, phenomena, processes, and behaviors in the study. The methodology of research conducted in the present study is modeled on the methodology of research in natural conditions. In quantitative research the researcher, while maintaining objectivity, by means of counting and measuring, studies only the objects subject to measurement. Quantitative research can be carried out on a large group of respondents. Appropriate selection of the research sample allows for the examination of such a number of people that the results are representative of the whole population. Quantitative research lets us determine how often a certain phenomenon occurs in a given community. Therefore, the choice of appropriate methods for gathering information is very important. Thanks to properly conducted research we can draw conclusions about the implementation of the project we are carrying out.

Results and discussion

For example, let us analyze quantitative research in marketing. The most popular methods of data collection are surveys and interviews. In the case of a survey, it is assumed that the respondent will fill out the questionnaire independently, without the participation of an interviewer. It is important, therefore, that the questionnaire does not contain too many questions, as this may result in the respondent not completing it. Moreover, the questions should not be complicated, but clear and understandable. The interview, on the other hand, involves an interaction between the respondent and the researcher. In quantitative research, it takes the form of an arranged, standardized conversation. N. K. Malhotra, and D. F. Birks [16] presented a breakdown covering the means of reaching respondents, distinguishing four basic forms: telephone, face-to-face, postal or electronic.

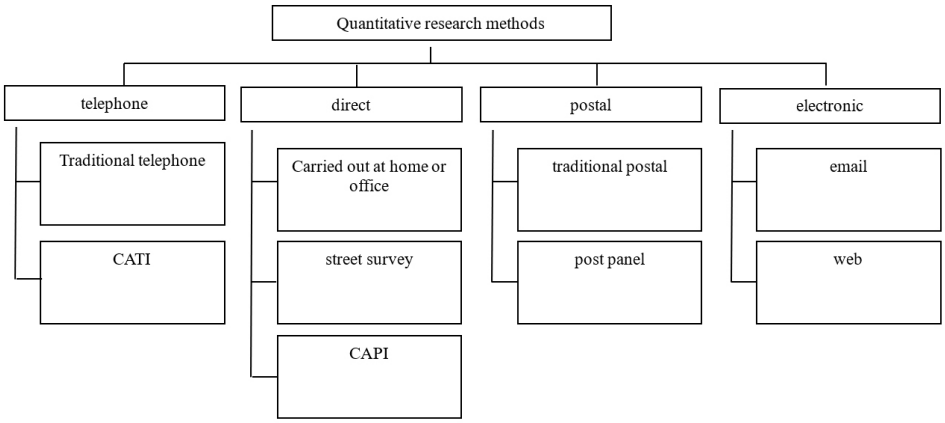

Fig. 1. Quantitative research methods
Source: Malhotra N.K., Birks D.F. (2007), Marketing Research. An Applied Approach.

Telephone interviewing can take the traditional or computer-assisted form.

- The traditional form involves the interviewer making phone calls and marking the answers given by the respondent on a paper form. It allows surveys to be conducted over a wide geographical area but is rarely used nowadays.
- The computer-assisted telephone interview (CATI) method requires the research company to have the appropriate data communications infrastructure. In this method, paper form is replaced by computer form. Telephone numbers are automatically dialed by the system, and the interviewer reads questions to the respondent and marks the indicated answers, which are sent to the system in real-time and can be immediately analysed. This type of method is often used in public opinion research.
- Direct methods of quantitative research can be divided into:
- The face-to-face method is conducted at home or in an office. The interviewer is present at one of these locations, asking questions and recording responses. The method of interviewing at the respondent's home is currently not very popular, mainly due to its costliness. In contrast, an office-based survey is used frequently.
- Street interviewing is another method of face-to-face research that involves questioning respondents in public places such as shopping malls or downtown. It is often used to test merchandising ideas, advertising, and other forms of communication. Both face-to-face interviews conducted at home or in the office

and surveys in public places are referred to as PAPI (Paper and Pencil Interview).

- Computer-Assisted Personal Interview (CAPI) also involves a face-to-face meeting between an interviewer and a respondent. Such a form is filled out by one of the interviewers. Nowadays interviewers often use tablets instead of computers, which undoubtedly provide greater opportunities for conducting this type of research, e.g. in public places.
- Another group of quantitative research in marketing is research conducted by mail. Among them, we distinguish the traditional postal method and the postal panel.
- The traditional postal method involves sending correspondence containing a cover letter, survey form, survey instructions, and a return envelope to the respondent base. This form of survey does not involve direct contact between the interviewer and the respondent. The recipient's task is to fill out the questionnaire on their own and then send it back in the return envelope. However, this form of research is often accompanied by low responsiveness and a lack of control over who actually completes the survey.
- The postal panel, on the other hand, is conducted on a representative group of permanently selected respondents who have agreed to participate in periodic surveys and product testing. This form of research allows for a certain degree of repeatability, as it involves obtaining information from the same respondents.

The last methods of quantitative research in marketing are those conducted electronically. They can be conducted in the form of online or e-mail surveys. The development of the Internet and technology undoubtedly affects the popularity of this research method - especially Internet surveys.

An email survey is simply a questionnaire sent to a database of respondents in the form of an email message. However, this method has some major limitations such as uninteresting form, and lack of control over whether the recipient gives logical answers or answers all the questions.

An online survey is undoubtedly a very popular method of conducting quantitative research. Such a form can be programmed for the needs of a given study, but there are also many ready-made tools that can be successfully used, especially with small research samples. This method opens up several possibilities for researchers that a mail survey cannot provide. Its main advantages are speed, low cost, relatively high quality of data, reaching a specific target group, and quality of responses. On the other hand, the disadvantages include potential technical problems and a lack of control over who actually completes the survey [16].

The selection of appropriate research methods is very important, and of equal importance is the responsibility of the researcher based on reliability, conscientiousness, and the number of errors made. The accuracy of the results of quantitative analyses, i.e. the extent to which they are consistent with reality, is determined by the extent and level of errors that occurred during their implementation. These errors are the result of the conditions under which the study took place. The conditions are determined by the subject of the study, which is a function of its purpose, the socio-economic environment, and the period in which the study was carried out, as well as by the competence of the people participating in the study. How the survey will be implemented is determined by the authors of the project, choosing the method of field measurements and methods of analyzing the collected data, the interviewers, the technical personnel creating the database, and most of all, the respondents to whom the survey is addressed. Each of

these entities is a generator of errors that may occur during the survey implementation. The errors that arise in a quantitative survey consist of sampling errors, i.e. errors related to the selection of units for the survey, and other errors. If the survey was conducted using a representative method and the survey units were drawn according to the selected sampling scheme, then the results of such a survey are subject to both random and non-random sampling errors. On the other hand, if the survey units were selected by a purposive (non-random) method, the survey is subject only to non-random errors, both sampling and other survey errors. Non-random errors occur both in fragmentary studies, i.e. studies based on samples, and in full studies when all units of the population to which the research hypotheses are addressed are examined.

The size of the sampling error and the possibility of its assessment result from the method of sample construction. If it is purposive sampling, the sampling error is not random, but a result of the adopted method of selecting units for the survey, and the rules of its assessment are unknown. If, on the other hand, the survey is conducted on a random subset, the sampling error is random and the rules for its assessment are known. The level of random error is therefore subject to estimation and should be presented in the final report for each survey result separately. According to the law of large numbers, these results will be within the range that can be determined with a probability determined by the researcher, i.e. the confidence level, and generally, its value is taken as 0.95 or 0.99 [17].

The entire analysis process should be summarized. One element of summarization is the inference and generalization of the findings. Inference, often with generalization, is an element of both scientific cognition and any mental cognition. One of the main factors influencing the nature of rational inference is the distinction between inductive and deductive thinking [18]. Inductive reasoning moves from a set of detailed observations to the discovery of general regularities that reflect the degree of ordering of events. Induction is a process of successive stages of analysis of empirical data, activities that lead to the formulation of hypotheses and theoretical questions [19].

Deductive inference is often considered the „gold standard" of rational thinking and can be used to explore the relationship between theory and empirical observation through the implementation of hypothetico-deductive models [20]. Inference, which is considered one of the last elements of the research process, actually already starts at its beginning, as it is determined by the paradigmatic distinction and the choice of the methodological path. However, quantitative data, especially when juxtaposed with the possibilities of qualitative research, comes with both benefits and limitations.

Among its advantages we can certainly include the possibility of grouping data in different options, the study of relations and their strength between variables, causal relations, conditions and/or the sufficient possibility of model specification and hypothesis testing, and finally verification of the statistical power of the model, as well as the objectivity of inference, and relatively high representativeness. Weaknesses of inference on the basis of quantitative research include problems with obtaining reliable measurement ranges, perception of fragments of studies as separate parts, limitation of statistical generalization, limitation of the possibility of controlling the environment in which the research subject is embedded, and difficulty in obtaining a representative group [18]. The quantitative approach equates generalization with transferring results from a sample to a population of objects or individuals.

Reporting research results is considered an important and obligatory part of researchers' scientific work [21]. It stems not only from guidelines [3], but also from communicating research results, transferring knowledge between academics and practitioners, or offering opportunities for researchers and practitioners to reuse and build on the work of others. This dissemination refers to „a planned process that includes consideration of the intended audiences and settings in which research results are to be received and, where appropriate, communication and interaction with broader policy and...service audiences in ways that facilitate the use of research in decision-making and practice" [22]. In other words, disseminating research findings involves careful planning, forethought, consideration of target audiences, and communication with them. Scientific reports are characterized by specific rhetoric and guidelines - their specificity is determined by the type of research. Quantitative analysis focuses on the study of phenomena by collecting numerical data and generalizing them to groups of people or explaining a particular phenomenon which requires the reduction of phenomena to numerical values for statistical analysis. Hence, the reports of these studies also have standards. In order to check what information should be included in a quantitative analysis report, the researcher can use international standards (APA, CONSORT) or checklists (STROBE). Each of these provides guidelines for what items should be included in the report. Among the most widely used is the American Psychological Association (APA) manual [23]. In addition to standards or checklists, the literature includes guidelines for reporting quantitative analyses that talk about what constitutes the basis for quantitative analyses, how the data collection process should be described, and how the collected data should be presented. Of course, the above guidelines refer to basic expectations for the main sections of a quantitative research report that can be used for statistical reporting in dissertations, theses, and reports, as well as for manuscripts submitted to journals. However, keeping in mind the need for continuity of research and evaluation of report recipients, a properly written quantitative analysis report must address the issues of reliability, accuracy, and objectivity of the researcher [24].

Based on quantitative analyses, which of course does not remain free of limitations, the integration of quantitative and qualitative approaches is increasingly recommended. However, one should always keep in mind the research possibilities and be aware that in some cases it is more worthwhile to use imperfect but feasible methods [25]. As shown earlier, quantitative analysis - is the verification of neutral theories by analyzing the relationships between variables. Variables can be measured using the appropriate tools. On the other hand, with the help of statistical analysis, the results obtained can be processed [11]. They consist of showing numerical data on specific topics and also showing the connection between them. The purpose of quantitative analyses is to demonstrate the truth or falsity of the hypotheses formulated in them [12].

In the pluralistic research approach, two ways of research procedure can be distinguished - quantitative and qualitative. These approaches complement each other, which means that the researcher does not treat them as opposites, but complementary. Both types can be used in parallel or sequentially. Quantitative research can be complemented and enriched by qualitative research and vice versa. Due to the growing stock of quantitative information, the usefulness of qualitative methods is particularly high [26]. These methods make it possible to broaden knowledge about the functioning of organizations and, although they have the character of a contribution, they are an excellent complement to their image. A pluralistic approach provides the opportunity to learn about social reality in different ways, where qualitative analysis, unlike

quantitative analysis, answers the questions of how? why? how? - while it does not answer the question of how much?

Thus, a mixed method approach has emerged, Mixed research, also known as combined research, is an alternative research approach to qualitative and quantitative [27] where there is an integration and complementary synergy of qualitative and quantitative research [28] importantly, an integration that is intentional but not necessarily assumed in advance [29]. In view of the above, the mixed research approach represents an expression of methodological pluralism, breaking with the orthodox thesis of the incompatibility of qualitative and quantitative approaches [30]. From the point of view of a researcher or a research team carrying out a given scientific-research project, the use of a mixed-methods approach provides an opportunity to develop methodological and analytical competencies and, in the long run, increases the likelihood of popularizing one's scientific work and faster growth of scientometric indicators [28, 31]. Today, „method mixing" is seen as an opportunity to increase the fruitfulness of empirical research. The literature review shows that pragmatism and common sense, rather than new theoretical ideas, are at the core of such thinking. Therefore, it should not be forgotten that the problems noticed at the stage of „confrontation" still exist and that the use of different methods does not automatically lead to an increase in cognition because, after all, it is not clear why the strengths of methods should add up without adding up their limitations [32].

3. Conclusions

Quantitative methods focus on research in which numbers reflect quantitative and qualitative variables. They require continuous improvement in ways of measuring phenomena, processes, and events in the world around us. This is due to the increasing complexity of the processes and phenomena facing the researcher to solve and the thicket of numbers and information to be processed. The growing popularity of quantitative research may be due to its potential benefits. Data (numbers, percentages, and measurable values) in the numerical form are analyzed using quantitative techniques, which can contribute to obtaining data analysis results in a fairly short period of time. Surveys can be applied to numerous populations (communities) while maintaining anonymity, intimacy, and a relatively high degree of reliability of the responses obtained. Conducting research using quantitative methods is neither difficult nor complicated, while also being transparent, making it accessible to the non-scientific community. It is important to remember that if any scientific evidence provides unique, previously unknown knowledge, it means that the study was original. It makes a significant contribution involving the expansion of scientifically based knowledge.

Thus, it should be emphasized that the important strengths of quantitative analysis are:

- providing answers to the questions „how much", „when", „if", and „what", allowing the value of a particular parameter to be determined by numbers,
- the analysis may be conducted on large, representative research samples,
- quantitative research has developed tools, the selection of which is decided upon by the researcher, which facilitates the planning and course of the research,
- ability to demonstrate the truth or falsity of hypotheses formulated in scientific research,
- allowing for the verification of neutral theories by analyzing correlations between variables,

- making it possible to show numerical data on specific topics, as well as showing the connection between them.
- creating opportunities for learning about past and present phenomena,
- generating knowledge and creating conditions for understanding the social world,
- enabling features to be classified, and counted and statistical models to be constructed in order to explain what is being studied.

Quantitative research focuses on testing objective theories by analyzing the relationships between variables and seeks to obtain accurate and reliable measurements, as well as observations and descriptions of features or characteristics of objects. And finally, the basis of quantitative research is an objective measurement, statistical, mathematical, or numerical analysis of data collected in surveys, and questionnaires through computational techniques [9].

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BADANIA PODSTAWOWE W NAUKACH SPOŁECZNYCH PRZY UŻYCIU METOD ILOŚCIOWYCH

STRESZCZENIE

Procesy empiryczne oparte na danych pochodzących ze źródeł wtórnych lub pierwotnych są charakterystyczne dla badań w naukach społecznych, w dyscyplinie ekonomia i finanse. Różnica między tymi dwoma formami polega na wykorzystaniu w analizie odpowiednio danych obcych lub tzw. autorskich. Badania pierwotne to proces badawczy, w którym autor opracowania prowadzi badania z wykorzystaniem autorskich narzędzi pomiarowych, stworzonych na potrzeby badania i w odniesieniu do przyjętej metody badawczej. W dziedzinie ekonomii stosowane są głównie metody ilościowe, a najbardziej egalitarną metodą jest metoda ankietowa, z kolei techniką badawczą - kwestionariusze ankietowe. W niniejszej publikacji autorzy przedstawili typologię ilościowych metod badawczych stosowanych w dysycplinie ekonomii i finansów.

SŁOWA KLUCZOWE

badanie ilościowe, badania pierwotne, metody ilościowe, metoda ankietowa, kwestionariusz ankiety.