
A N N A L E S
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA

VOL. LIV, 3

SECTIO H

2020

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*Determinants of the Use of Research Methods and Techniques
and Their Impact on the Effectiveness of Enterprises*

Keywords: research methods; research techniques; enterprises

JEL: M30; C80; C83

How to quote this paper: Golik-Górecka, G., & Skonieczka, R. (2020). Determinants of the Use of Research Methods and Techniques and Their Impact on the Effectiveness of Enterprises. *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia*, Vol. 54, No. 3.

Abstract

Purpose of the article: The purpose of this article is to clarify the problem of key determinants which fundamentally influence the use of research methods and techniques by enterprises.

Research methods: The authors attempt to understand the determinants and conditions based on the analysis of the literature on the subject.

Main findings: The article concludes with an analysis of the sets of the main determinants related to the use of research methods and techniques in business and their impact on the effectiveness of the organization.

Introduction

The article uses the diversification of research methods, including literature review, elaboration of the scope of conditions for the use of research methods and techniques, the effectiveness of enterprises as well as the presentation of case studies. This review allows one to look at the conditions of applying research methods and techniques from the point of their use by Polish enterprises and their impact on the growth and development of the surveyed organizations.

Review of research methods and techniques

To understand the determinants of the use of research methods and techniques and their impact on business efficiency, one should first answer the question about scientific studies – What are they?, What is their nature? and What are the principles that guide them? Scientific research in every field has a common goal which is to expand existing knowledge, its critical verification or preparation for practical implementation, characterized by the principle of rationality, ordering of logical inference through the process of building a useful scientific theory.

The result of this research should always be the establishing of links between the studied phenomena, especially in the humanities and where economic relations between the studied phenomena are complex and multilateral. In this regard, special attention should be paid to the aim pursued by the function they perform, substantive and methodological preparation of test administration, as well as research facilities. Not without significance is the function of scientific research, in the literature on the subject we can find three basic functions of scientific research. The first – theoretical function, which consists in confronting current theories, correcting them, and on the basis of the obtained results, the constructing new scientific laws. The second – methodological function, analyzing problems related to such activities of the cognitive process as: general observation and measurement, comparison, modeling, experiment, case study, etc. The third function – practical – based on the construction of empirically verified models and, therefore, implementation into practice.

An important element is the objective and orderly approach to the study of specific phenomena as the essence of the scientific method. It serves individual researchers as a system of clearly defined rules, concepts, hypotheses, tools, materials, information, activities and processes used in the investigation necessary to explain a specific research problem while eliminating subjective conditions dependent on knowledge, understanding or evaluation of the subject by the researcher.

The research process, is “a comprehensive scheme of actions that scientists undertake to produce knowledge, this is a paradigm of scientific investigation” (Frankfort-Nachmias & Nachmias, 2001, p. 36) consisting of seven basic stages and a cyclical nature that usually begins with a problem and ends with preliminary

general conclusions being the beginning of the next cycle of the research process. There are seven basic stages of the research process (*Ibid.*):

- 1) Research problem – the intellectual stimulus causing the reaction in the form of research,
- 2) Hypothesis – a hypothesis is proposed by the answer that can be given to the research question,
- 3) Research plan – a research plan is a program according to which the researcher collects, analyzes and interprets results,
- 4) Measurement – a procedure in which numerical values or other symbols are assigned to empirical properties according to certain rules (Stevens, 1951),
- 5) Data collection – registration of results concerning the studied phenomenon,
- 6) Data analysis – getting to know the structure and dependence of the studied phenomenon, in particular causal links and the mechanism of its functioning,
- 7) Generalization – generalization of test results with regard population.

Summing up the current discussion on the use of research methods and techniques, we can conclude that:

- their goal is to expand the existing knowledge,
- their aim concerns critical verification or preparation for practical implementation,
- they are characterized by the principle of rationality, logical ordering,
- they perform as a theoretical, methodological, and practical function,
- an important element is an objective and orderly approach to studying specific phenomena,
- they serve as a system of clearly defined rules,
- eliminate subjective conditions dependent on knowledge, understanding or evaluation of the subject by the researcher.

What is also worth considering is the term “research problem” as such. The concept of the problem stems from the Greek *problema* and means an “obstacle” or “difficulty”. According to a dictionary definition, a problem is “a difficult situation regarded as needing to be dealt with and overcome” as well as “a serious matter that requires some thought and decision”. In Polish, we can find a lot of synonyms for the “problem”, for example, “dilemma”, “complication”, “obstacle”, “barrier”, “difficulty”, or “issue”. The essence of the research problem can be interpreted in several ways: as the elimination of the gap resulting from the difference between the states of knowledge (the current state and the desired state), which allows the explanation of the situation, or as a challenge solution. The mentioned difference between knowledge levels can occur both at the level of objective (scientific) knowledge as well as at the colloquial level (competence). As we can see, the sense of a research problem is “to learn to know the truth that is within what you do not know” (Apanowicz, 2002, p. 45). The research method, as we can read in Apanowicz (2002), quoted by many authors, is nothing more than a procedure, characterized both by specific procedures and the use of appropriate research tools, in particular by:

- research content, which should take into account the effectiveness and applicability of the method (procedure),
- objectives of the assumed tests,
- available resources.

Apanowicz distinguishes the following research methods:

- observation method – registration of facts, which are combined into the relationships and dependencies, including cause-and-effect relationship,
- experimental method – involves the conscious introduction of an experimental factor into the process,
- monographic method – consists in a thorough examination of a specific (individual) case,
- document examination method – it consists in gathering, selecting, describing and interpreting the facts contained in documents,
- individual case method – based on the analysis of factual, separated events,
- method of diagnostic survey – it refers to the statistical collection of facts and information about structural and functional phenomena and the dynamics of their changes,
- method of analysis and criticism of the literature (sources) – it consists in demonstrating the usefulness, originality and new approach of the chosen and researched subject,
- method of analysis and logical construction – analysis and synthesis,
- statistical methods – drawing conclusions from selected features of collections of statistical elements,
- computer simulation methods – organizing and conducting computer simulations,
- heuristic methods – investigating new solutions through discovering new facts and relationships between them taking place in reality.

The concept of efficiency in enterprises

One of the basic concepts that should be understood is the concept of efficiency because it is a key element in the assessment of the effectiveness of the basics of work. Effectiveness accompanies man in everyday life being the result of conscious or unconscious possessing of limited resources and as such is one of the basic concepts in management. In 1913, Harrington Emerson, the founder of scientific management, established twelve principles of efficiency. He wrote that efficiency is “the right thing done in the right way”. Samuelson and Nordhaus (1999, p. 478) have defined efficiency as the most effective use of resources in the process of meeting people’s needs and deficiencies, whereas according to Stoner, Freeman and Gilbert (1997, p. 249), effectiveness is a measure of efficiency and effectiveness in achieving the goals.

As we can read in Kowalski's (1992, p. 22) paper, the true meaning of effectiveness stems from the context or from the commentary, for example: investment efficiency or management efficiency. Ernest Pasour is of similar opinion on the effectiveness, and he thinks that the efficiency is always subjective and cannot be defined or measured regardless of the objectives and knowledge of the decision-maker. In the management theory, we can also find the definition of "organizational effectiveness" also called "the efficiency of the functioning" perceived as the ability of the company to adapt to changes in the environment on the current and strategic basis and to use its resources productively in order to achieve the adopted structure of goals. There are many different definitions of efficiency. Table 1 contains the terminology used when examining the effectiveness.

Table 1. The terminology used during examining the effectiveness

Concept	Synonym	Pseudo synonym	The content of the concept
Efficiency	economy, rationality, profitability, economic efficiency, productivity, effectiveness	optimality, productivity	ratio as a result useful for the effort incurred to achieve the result
Effective	economical, rational, profitable, productive, advantageous, effective,	optimal, best, efficient	a positive (desired) result, but not necessarily the highest efficiency
Optimality	maximum state, minimal state	efficiency, rationality, productivity	accepts only the values 0 or 1
Optimum	the best from the point of view of the criterion adopted	effective	the state in which the objective function reaches the extreme (max., min.) with given limitations
Social efficiency	efficiency, social production, macroeconomic objective, investment, management	economic efficiency	the results obtained are beneficial for the economy as a whole from the point of view of expenditures
Economic efficiency	efficiency of management	social efficiency	it concerns phenomena and measurable processes that can be shaped
Production efficiency	efficiency of production	economic efficiency; efficiency of: work, enterprises	indirectly affected production activities related to the manufacturing process of products
Enterprise efficiency	efficiency: microeconomic, subjective, subjective, economic, management	production efficiency, work efficiency	includes enterprise management processes in a holistic approach
Work efficiency	labor consumption	efficiency of: production, enterprises	the ratio of employment to the workload
Technical efficiency	–	productivity	comparison of parameters of a specific product with the parameters of the standard
Ecological efficiency	eco-efficiency	social efficiency, production efficiency	analysis of the state of the natural environment of the enterprise before and after the start of a given production

Source: (Czechowski, 1997, p. 19).

As demonstrated by the above-mentioned examples described effectiveness is a complex, multidimensional subject. There are many theories and approaches towards

the term. Skrzypek from the University of Economics in Wrocław describes effectiveness as correlations between the effects of the objectives of expenditures and costs (Skrzypek, 2012, p. 313). It is inextricably linked with the economic approach to the issue of evaluation of the effectiveness, resulting in a final positive economic result. In the case of economic efficiency, it is presented in two ways, the first way is the differential method where the result minus the effort is greater than zero and the output minus the result is less than zero. The second method, where the outcome quotient divided by the effort expended is greater than one, which means that the expenditures are lower than the results. As can be seen, so recognized effectiveness, in the case of companies and their functioning, is inextricably linked to the economic expediency of actions undertaken and the relationship between the result and the expenditures incurred for its achievement. For the purposes of the analysis of the conditions of application of research methods and techniques and their impact on the effectiveness of enterprises, an economic approach was adopted to interpret the effectiveness of undertaken activities, which assume that the enterprise as an organization is an artificial creation and is created to achieve specific objectives. This is shown in Table 2.

Table 2. Effectiveness and efficiency in economic activities

Level of:	Factors affecting efficiency
organization	<ul style="list-style-type: none">– strategy, goals and methods of measuring them– organizational structure– the way resources are used
process	<ul style="list-style-type: none">– developing new products (innovations)– the procurement process– production process– sales process– distribution process– invoicing process– the process of collecting receivables
work post	<ul style="list-style-type: none">– methods of recruitment and promotion– scope of tasks and responsibilities– applicable work standards– feedback provided– prizes, trainings

Source: (Szymańska, 2010, p. 156).

The above-mentioned assessment of the effectiveness and efficiency of the company does not exhaust the subject. Some of the above definitions describe effectiveness in more detail, whereas others address this process more generally. As can be seen in the case of companies, their functioning is inextricably linked to the economic expediency of actions undertaken and the relationship between the result and the expenditures incurred for its achievement.

As demonstrated in the previous parts of the work, the important and significant elements are the economic effectiveness of actions and efficiency. One of the proposals that can be found in the literature of economics is the one proposed by

Wawak, namely the groups of measures constituting the basis of economic evaluation (Wawak, 1998, pp. 205–209).

1. Synthetic measures of:
 - inputs,
 - productivity,
 - effectiveness,
 - money expenditure for effects.
2. Quality cost measures of:
 - dynamics of quality costs,
 - internal structure of quality cost,
 - share of quality costs in revenue and production costs.
3. Analytical quality measures of:
 - defects,
 - incompatibilities, defects, downtime,
 - losses related to internal and external, repairable and irreparable deficiencies,
 - intensity,
 - defective and delayed deliveries.

Rummler and Brache (2000) propose evaluating the effectiveness in a holistic way. They distinguished three levels of organization effectiveness: 1) the level of organization, 2) the level of process, and 3) the level of the work post. This opinion is shared by Lisiecka, who defines measures of organizational and economic efficiency for each of the three levels which are presented in Table 3.

Table 3. Performance measures in the organization

Efficiency levels	Objectives and strategies	Management object	Measurement criteria	Organizational efficiency measures	Economic efficiency measures
level of organization	goals and strategies of the organization	management of the organization as a whole	economic and financial, market	two new products, market share, complaint share, share of returns	profitability (profit/share) of cash flow, financial liquidity, receivables turnover ratio
level of processes	goals and strategies of processes	personnel, technology and production management	productivity, computerization, defective-ness	online purchase, participation processes statistically regulated	productivity (profit / 1 item)
work post level	work post	work place management	innovation, shortage	share of losses, share of shortages, share of waste	work efficiency, cost reduction

Source: (Lisiecka, 2002, p. 236).

Our approach in the selection of indicators is based on the assumption that the primary factor in determining the effectiveness of the company is its operational activity while taking into account the life cycle of the company. The effects of operational activity directly affect the company's liquidity, thus, ensuring the survival of the organization.

Research and analysis of practical case studies of companies X and Y

As part of the conducted (by one of the authors) business activities and projects carried out in the company over the year, 21 projects were qualified for preliminary selection in 10 companies. As a sampling selection tool, the non-random target method was chosen. The method was low-cost, not time-consuming and, at the same time, unrepresentative. However, well-defined conditions gave rise to some generalizations. On this basis, we selected three projects from the three companies as the most representative of the whole population due to the following reasons:

- the fact of carrying out measurements,
- the test procedure is deliberately used,
- a structured and objective approach to studying specific phenomena,
- the relevance and timeliness of the data that can be obtained,
- legality (restrictions resulting from confidentiality agreements),
- formal and technical testing possibilities,
- budget restrictions.

The authors would like to pay special attention to the fact that the examples below, due to the practical dimension, illustrate only a selected portion of the reality of projects characterized by dynamics and variability in time. The practical examples presented below are mainly an empirical approach to the issue of conditions for the use of research methods and techniques by enterprises. They refer to the described example and, at the same time, reflect the nature of the tested efficiency in the online sales model. In this context, it should be noted that the described case studies are focused on the three main criteria for applying research methods and techniques in companies: 1) conditions for the application of research methods and techniques, 2) the function they perform, 3) the test procedure used.

Example of company X

Company X is a company from the automotive industry that deals with long-term rental of vehicles. The company has been operating on the automotive market for over ten years. One of the key indicators on which the company focuses is the acquisition of sales opportunities and the optimization of their cost. Rational goals set for the marketing department by the management board are:

Short-term goals:

- the number of sales opportunities obtained,
- the cost of acquired sales opportunities.

Long-term goals:

- reducing customer acquisition costs,
- increasing the number of clients acquired.

In order to carry out the research process, a non-directional hypothesis was put forward: it is possible to effectively conduct campaigns of acquiring sales opportunities by marketers based on parameterization indicators, and conducting campaigns of acquiring leads by marketers with the support of marketing automation. Therefore, there are some indicators related to KPIs (key performance indicators) of company X. These are:

- the number of ad impressions,
- the number of keyword views,
- the number of clicks on an ad,
- the average position of an ad,
- the number of conversions from an ad or a keyword,
- CTR (click through rate) of an ad or a keyword,
- the average CPC (cost per click) of an ad,
- the average CPC of a keyword.

The data was taken from:

- 35 weeks,
- 1,656 ads,
- 10,246 keywords that one’s ads were showing,
- 25,649,540 ad views,
- 92,780 unique users on the site,
- 1,285 conversions.

For data analysis, among others, Spearman’s rank analysis was used to select the relationship between random indicators in relation to the conversion rate, which was to be the basis for further actions. This method of analysis was adopted for several reasons. First of all, rank analysis shows slight sensitivity to outliers. That is why it seems particularly useful in the analysis of low-quality data, and data from external sources were accepted as such. In addition, it is calculated based on rank rather than the same values, so it can be used for any variables whose values can be arranged in ascending order. Bearing in mind the disadvantages of such analysis, e.g. the lack of periodic dependence, or the fact that strongly correlated variables may indicate coexistence, and not a causal relationship, it was decided to implement it as a starting point for further actions. The obtained dependences of selected indicators are presented in Tables 4 and 5.

Table 4. Company Y – dependence of selected indicators on the number of clicks on the ad

	Spearman’s rank correlation
Number of views	0.97
The average position of the ad	0.74
Number of conversions	0.68
CTR height	0.39
Average of CPC	-0.03

Source: Authors’ own study based on the conducted campaigns.

Table 5. Company Y – dependence of selected indicators on the number of ad impressions

	Spearman's rank correlation
Number of views	0.97
The average position of the ad	0.71
Number of conversions	0.65
CTR height	0.4
Average of CPC	-0.07

Source: Authors' own study based on the conducted campaigns.

Thus, prepared data and statistical analysis made it possible to generalize the research results related to the conducted campaigns according to the steps of the re-search process. They were also the basis for creating an algorithm that would allow for the implementation of the automation of the process of optimization of opera-tions. As shown in Table 6, the research process carried out based on the analysis of indicators with the support of the automation of marketing processes, showed that there is a difference between the analyzed efficiencies. This illustrates the increase in the number of conversions in the company's website and the reduction of the lead acquisition cost over a period of 12 weeks (Table 6).

Table 6. Cost of obtaining a lead and the number of conversions after marketing analytics in combination with marketing automation in a 12-week period for company X

Week	Conversions	The cost of obtaining a lead (in PLN)
1	6	33.75
2	14	19.69
3	10	39.06
4	22	14.42
5	20	11.35
6	64	6.56
7	71	8.09
8	80	7.07
9	68	8.21
10	89	6.53
11	117	7.73
12	134	4.80

Source: Authors' own study based on the conducted campaigns.

As we can see, the cost of a single lead incurred by the client decreased from the initial PLN 33.75 to PLN 4.80, which resulted in a real saving of 85.7%. In addition, the number of leads increased from 6 (within a week) to 134, which gives a 2133.3% increase over a 12-week period. Comparison of the optimization effects of the lead acquisition process for company X before and after implementation is shown in Table 7.

Table 7. Comparison of the optimization effects of the lead acquisition process for company X before and after implementation

	Before implementation	After implementation
Number of leads per week	4	134
The effectiveness of the sales department	15.0%	15.0%
The number of products sold	2.4	80.4
The average value of the product	PLN 80,000	PLN 80,000
Turnover per month	PLN 192,000	PLN 6,432,000
Turnover per year	PLN 2,304,000	PLN 77,184,000

Source: Authors' own study based on information obtained from company X.

As can be see, the use of marketing analytics in the case of company X's marketing, brought real and measurable benefits in terms of increasing efficiency and optimizing activities in the described period. Its role both for research and for the organization is of great importance, significantly increasing the efficiency and effectiveness of the organization's activities, allowing for the scaling of activities.

Example of company Y

Company Y offers dog training services. It has been operating on the Polish market for more than 40 years. It offers multiple services and products addressed to professionals. However, due to the changes on the market (including outflow of clients from Generation X, inflow of clients from Generation Y and changes of consumer attitude), the company decided to create and implement a new product, which is a pet travel seat. Launching a new product on the market proves that the organization is mature, market-oriented and operating in accordance with rational goals. In addition, the company decided to carry out the survey. The goals of the study were:

- to examine the level of safety awareness with regard to the transportation of pets by cars,
- to identify the method of the transportation of pets,
- to identify sources of knowledge about the transportation of pets,
- to define the method of purchasing pets accessories,
- to define financing method and budget size designed to purchase a product.

The survey was done via the standardized online survey. The questionnaire consisted of 30 closed questions. The survey was conducted in Poland, on a sample of 160 people that own a pet. It was done by a non-probabilistic selection method (non-random). The aim was to concentrate on households that own a pet and transport them by car. The first part of the questionnaire included questions linked with safety awareness referring to the transportation of pets by car. Questions in the next section allowed to gather information about how consumers decide to purchase the product. The last part of the survey included questions concerning collecting information

about a person and a household. During the survey, done by company Y, it turned out that 97.5% of the respondents are aware of the fact that transporting pets by car can be dangerous for humans. Surprisingly, 38.3% of the respondents transport their pet in an inappropriate way, which makes other travelers feel uncomfortable (21.2% of the respondents hold their cat/dog on their knees and 17.1% let their dog move freely). At the same time, 86.9% of the respondents would buy a product designed to ensure safe transport for their pet. During the interview with company Y, information gathered during the survey became a crucial basis for undertaking further actions to introduce pet travel seats to the market.

Conclusions

The purpose of this article was an attempt to understand the determinants of the use of research methods and techniques and their impact on business efficiency. As we can see, the concept of the effectiveness of enterprises is, to a large extent, related to qualitative dimensions, while the growth of the enterprise is associated with quantitative characteristics. The presented approach towards the selection of indicators by the company is based on the assumption that the primary factor in determining the effectiveness of the company is its operating activities. The effects of operational activity directly affect the financial liquidity of the company, providing its survival. The considerations presented above do not exhaust this topic. The time of the theoretical development shows that the issues of conditions for the use of research methods and techniques by enterprises are still valid. Summing up the previous considerations, it can be concluded that conducting research in enterprises has, in particular, a practical dimension, serving the purpose of building models verified empirically. At the theoretical level, serving confrontation of existing scientific theories, we can observe the verification of the theory within the competences that the company has. However, at the methodological level, the surveyed companies seem to achieve significant results especially in terms of pragmatics. As shown in the practical examples, achieved results may surpass past achievements of companies, which suggests that the companies will aim towards the use of research methods and techniques to improve their efficiency. At the same time, they can become a great way to keep the organization in the right condition due to its cyclical nature. In light of these conclusions we can reflect on the conditions of using further testing methods and research techniques in business and continue more detailed research and studies. The authors were particularly interested in the fact that many of the companies covered by the initial selection do not conduct research. This issue may constitute the subject of another study.

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