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The "UMO" as an Example of Scientific Project Implementation

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Abstract:

Purpose: *The article aims to present the implementation of scientific projects on the example of "the Young Discoverer's University" – in Polish "Uniwersytet Młodego Odkrywcy" (further in the text referred to as the UMO). In 2016-2017, the project was financed by the Ministry of Science and Higher Education, and in 2018-2021 by the National Centre for Research and Development (NCRD). The objectives, insights, and significance of science projects are presented.*

Design/Methodology/Approach: *The paper presents the types and structure of the project pyramid to characterize the affiliation between the ongoing project and the group. The research is based on a case study as a research method, focus interviews, and a literature review. The research objective of the paper is to evaluate the implementation of scientific projects on the example of the UMO based on the author's own experience. The research contributes to the formulation of the research aim if there is a regular pattern for implementing scientific projects on the example of the UMO.*

Findings: *The research results allow the author to verify the research hypothesis. The subjective scope of evaluation includes both young people participating in implementing projects from the West Pomeranian Voivodeship and academic staff. The subject of evaluation pertains to the implementation of scientific projects.*

Practical Implications: *The case study relating to the phenomenon in question at a specific time, place, and conditions on the target population is used to obtain the relevant data to verify the validity of the research hypothesis.*

Originality/Value: *According to the research, there is a regular pattern for implementing scientific projects on the example of UMO; therefore, it is worthwhile to engage in such initiatives. The choice of the topic is due to the current issues related to applying for various types of funding from various institutions, i.e., the National Science Center (NSC), the National Centre for Research and Development (NCRD), the Ministry of Science and Higher Education (MSHE) and Associations, which are increasingly crucial for scientific units.*

Keywords: *Economy, external sources of funding, project.*

JEL classification: *C13, C22, C53, F31, G11.*
Paper Type:*. Case study/Article.*

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1. Introduction

In the era of a changing market environment, companies are forced to compete more aggressively. The issue also applies to Higher Education Institutions (research units), which must adapt to the changing reforms in higher education; thus, maintaining a compelling advantage determines how to manage a given institution and introduce innovative solutions that are the backbone of a given activity. Therefore, nowadays, most universities try to obtain funding from various institutions, i.e., the National Centre for Research and Development (NCR), the National Science Centre (NSC), the Ministry of Science and Higher Education (MSHE), or various Associations. The funds obtained are targeted primarily at the scientific development of a given unit, maintaining or improving the quality of education, or a competitive position in the higher education market. However, in the difficult period of struggle for students – if only due to the present epidemiological condition – the critical task is to obtain funds by beneficiaries for student-oriented purposes. It should be added that difficulties also occur due to teamwork on the creation of project applications, as due to restrictions, they have been limited to online contacts. The implementation of scientific grants (projects) should bring economic benefits for both parties concerned, namely, both for the assumed target group and the entire project team responsible for the task.

The European Union allocates funds to Poland to support the development of science for the economy and the development of higher education. Obtaining funds allows the units to enrich and expand their educational offer and co-finance scientific research for academic staff. In turn, it constitutes the basis for the development of a given university, both due to research works concerning the development of innovative educational programs and extensive opportunities related to the publication of research findings in the economy. Another important fact concerns the author's assertion that not every written and submitted application will receive funding and will be positively verified by the reviewing committee, receiving financial aid to realize intended objectives.

On the other hand, not every project implemented is likely to be successful and achieve the anticipated results due to many unfulfilled assumptions that must be closely interrelated. If this is the case, one can only wonder how all projects are implemented. It is crucial to develop the proper patterns for the implementation of projects and their ongoing improvement. The article aims to evaluate the implementation of scientific projects on the example of UMO based on first-hand experience. The research aims to identify the regular pattern for implementing scientific projects on the example of the UMO. The research conducted and the author's own experience show that it is possible to create a given regularity, but it must be repeatable and constantly improved. With the satisfaction of the assumed target group, the project team achieves contentment with implementing the project objectives and the fulfillment of the project indicators, leading to the correct billing of the project.

On the other hand, for the scientific unit, the most important goal is the pursuit of sustainable scientific development through participation in projects.

2. Literature Review

There are many definitions of a project in the literature. Nevertheless, an essential issue is a distinction between the concept of project and project management. K. Kacuga, in his work, presents an interpretation from the point of view of management. According to his interpretation, *"a project is a planned range of activities over a specified period to achieve a set objective (...), and a project is a problem for which a solution has been planned"* (Kacuga, 2008, 13). It is worth noting that a *project* is defined as creating something innovative or different that will make one team stand out from the rest and other individuals applying for funding. It is crucial to plan its beginning and end, assuming an appropriate distribution of all planned undertakings in time aimed to create a unique result or product, or service.

Thus, Black A&C views a project as unique as it consists of interrelated, time-scheduled activities, striving for high-quality results with multiple resources and specific costs (Black, 2009: 2). B. Grucza, on the other hand, emphasizes that – aside from being unique, time-framed, planned from the beginning to the end, financially limited – the project is also characterized by very high complexity because it is implemented by a project team of qualified professionals representing various scientific fields, which is associated with organizational, technical and economic risk. The implementation and preparation of the project itself require knowledge, time, willingness, and unique methods (Grucza, 2012). A project is a set of activities characterized by features such as (Kuck, 2014):

- a predetermined beginning and end,
- the complexity of interrelationships,
- a strive to achieve a set objective by creating something unique (a product, service, or result),
- organized sequences of human activities,
- a strive to achieve the defined result,
- team-based implementation.

Burton and Michael state that project management is a process in which a person in charge of the project (a manager) should plan and control all the tasks within the project while having the resources made available by the organization to complete the project (Burton and Michael, 1999). The authors believe that project management is the skillful use of available techniques to achieve the planned results consistent with the specified budget and time standards. *Project management* is also defined as a field of management that deals with applying available knowledge, skills, methods, and tools to achieve the stated objectives of a project, i.e., quality of the expected outcome, timing, and cost (Brilman, 2002). The Project Management Institute (PMI, USA, 2013) interprets project management as applying skills, tools,

knowledge, and techniques of a project operation to meet and even exceed the expectations and needs of project stakeholders (Mingus, 2009). Thus, a broader interpretation of project management is presented by the Project Management Institute. It shows the variety of types of projects, which can include: educational, research, research, and scientific, implementation or business projects.

Apart from defining a given project's objectives, it is also vital to manage the resources necessary for its effective and efficient implementation (Pawlak, 2006). Project management and applying for funding from external sources require extensive interdisciplinary knowledge, creativity, management skills, and good organization. However, an essential issue is the project management itself as it depends on three crucial parameters such as quality, resources, and time (Webster and Knutson, 2005). *Project management* is an ongoing process in which the person responsible for the project carries out a deliberate control as well as planning of the tasks included in the project and makes the appropriate allocation of resources, using appropriate methods to achieve the desired objectives at the designated cost (Jędrych, Pietras, and Szczepanczyk, 2012). From the point of view of social sciences, J. Zieleniewski believes that effective action is one that at least minimally leads to the effect of the intended goal. At the same time, the measure of effectiveness is only the degree of proximity to a specific goal (Zieleniewski, 1981).

Concerning projects, one can say that effectiveness is gradual due to the gradualness of objectives and the rule of intermediate objectives, which aim at the main objective. M. Bielski, in his study, considers that effectiveness should be evaluated from the point of view of the realization of goals and then from the point of view of the degree of use of all possible resources – efficiency. Therefore, in Polish literature, effectiveness is often replaced by efficiency (Bielski, 1997). In conclusion, J. Zieleniewski states that efficiency means the simultaneous occurrence of effectiveness, cost-effectiveness, and usefulness. From her personal experience, the author believes that a project should, first of all, have an appropriate title, then the main objective, the specific objectives, and the whole concept should be adjusted. It is also necessary to choose the right staff for managing the project, assigning managerial functions accordingly, and creating a team of people who will provide support and added value. In addition to the objectives, it is imperative to evaluate the effectiveness of the project, which is possible by creating output and result indicators. Generally, output indicators refer to all products made in project implementation and should not exceed the deadlines for implementing the project.

On the other hand, result indicators refer to the effects of activities that should be visible upon completion and as a result of a given project. According to the general and conceptual statement, the result indicators should be presented after the output indicators since the results must be coherent and logically connected with the product indicators. Creating an innovative solution allows the applicant to stand out from the competition and positively impact the promotion of the entity implementing the project. The project must have an appropriately selected

management and team because all the people actively participating in implementing the planned activities must have predetermined tasks to perform. The project is more effective when carried out by a team, as each individual can support the other through their experience. A desirable feature for the result is an assumption concerning the target group. It consists of determining a given number of people to whom the project offer will be addressed, assuming that it will be obtained in the end. Each project should lead to a unique and unrepeatable success and profit for a given unit and the employees' everyday behavior changes. Those changes should directly impact the organization's financial indicators and obtain a specific, measurable, and additional business value (Wysocki, 2013).

3. Results and Discussion

Conventional academic research and development projects involve verifying scientific theories or concepts for practical application. Depending on the nature of the work carried out and the final result, such projects can be divided into "soft" and "hard" ones (Kisielnicki, 2018):

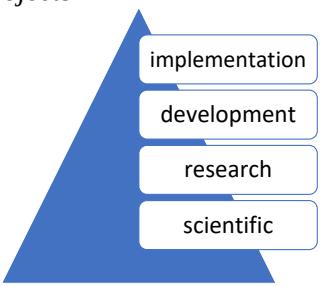
- "hard" – these are projects aimed at a strictly defined product presented in the form of a finished product or pattern; according to the value chain, in this case, the result is a prototype that is improved in further projects and introduced into mass production,
- "soft" – these are, on the other hand, projects that involve the presentation of computer or semantic models, all reports and studies that are related to the discovery of new elements of the real world in the process of improvement, enhancement, refinement, patenting, methodology or technology. According to the value chain, the result of these projects is further research and development projects that deal with discoveries, concepts, hypotheses, or theories.

J. Kisielnicki, in his work, also presents the structure of the pyramid of projects. At the base of the proposed typology lies the involvement of intellectual capital in the implementation of projects – this involvement is highest at the stage of scientific projects and lowest at the stage of implementation projects (Kisielnicki, 2018). However, when considering economic practice and the involvement of financial resources in a given project, they are highest in the implementation phase and lowest in the scientific project phase. Therefore, the pyramid of the financial resources involved in business practice compared to the one shown in Figure 1 below is inverted.

Due to the daily use of this terminology in the literature, the two middle project types (research and development) are now a single project type. The term “research and development (R&D) projects” is commonly used in documents on programs funded by the European Union and government agencies. This terminology also applies to business activities that are scientific and scientific-technical, as well as activities aimed at implementing the strategies of different types of organizations

and development. Research and development projects are defined as very complex projects carried out by a team of researchers called researchers (Kisielnicki, 2013, p. 28). They usually pertain to the analysis of a relation existing in a selected area of reality. Such projects are an open system of activities as all relations and elements are subjected to in-depth analysis.

Figure 1. *The pyramid of projects*



Source: *Kisielnicki, J.: Projekty badawczo-rozwojowe: charakterystyka i znaczenie, Studia I Prace, Zeszyt Naukowe 159/2018, Warszawa 2018, 31-32.*

The subject literature also indicates slightly different classifications. The best known and commonly used is the typology described in the work of M. Trotsky. who used a division into R&D and development projects (Trocki, 2012). According to Figure 1 above, these are the two lowest levels of the pyramid. The main difference between these types is that research projects, as their primary objective, tend to implement new technology or a new product. In contrast, scientific and research projects aim to create new knowledge. However, as one can notice, the suggested division is debatable, as all types of projects permeate each other, as they are usually executed in various economic, legal, or social environments. Moreover, the relations between the project and its environment are different. An R&D project is a result of the merger of development and research projects; thus, this type of project can also be considered as a scientific and research project (Mesjasz- Lech and Grabowska):

- being a product (a result) in the form of a report, a model, a written paper (e.g., for a degree),
- being an intended undertaking of a specific group of individuals (scientific team),
- having an attributive meaning (e.g., in the context of the statement "project implementation is at an outstanding level").

Such a project is usually understood as a system of measures defined by project delimitations (purpose and scope), implementation deadlines (time), people, material or information goods, or capital necessary for its implementation (resources). T. Young concludes that the success of a project is influenced mainly by such elements as (Young, 2007):

- proper communication in the project,

- a carefully selected project team, in particular employees (e.g., researchers) with appropriate professional qualifications, i.e., adequate skills and knowledge to perform specific tasks,
- a properly formulated project plan and schedule, proper distribution of all responsibilities and duties,
- accurate specification of objectives, resources, and project parameters (indicators),
- regular control and monitoring of the project to avoid risks,
- timely and accurate reporting of project execution progress,
- addressing any issues at the management level on an ongoing basis,
- maintaining lasting relationships with project stakeholders (individuals, organizations, institutions, offices) to communicate project progress.

One should admit the rightness of T. Young's statement in that the above elements positively impact the implementation of scientific projects (grants), as they also bring economic benefits for both parties involved in project activities.

One of the methods of qualitative research is the case study, whose application facilitates a comprehensive description of the phenomenon under study, concerning any scientific discipline (Grzegorczyk, 2015), as it refers to a detailed description, usually of a natural economic phenomenon (e.g., organization), the management process and its elements or the organization's environment in order to formulate conclusions about the causes and results of its course (Grzegorczyk, 2015). The critical point is that this method is empirical since it analyzes and evaluates a phenomenon in reality. Therefore, a case study is usually applied to descriptive research topics. It provides information on what, where, and how it happened. This method employs a variety of tools and techniques for data collection and analysis.

These can include observations, questionnaires, interviews, participant observation, organization documents understudy, available databases, press, and internet sources (Grzegorczyk, 2015). Due to collecting information, the case study method results in an in-depth analysis of the investigated problem, presenting its specificity, interaction with other elements of the organization or its environment (Kostera, 2011). The contextualized case study includes analysis and description of specific variables and conditions of the studied phenomenon. Conclusions, which are the case study results, can be generalized to other cases that similar variables will characterize.

Moreover, the findings of the case study in the form of a description of the entire process of operation (or its elements) of a given unit, completed with the achievement of the previously determined goals, can serve as a model for practical use by other organizations (Grzegorczyk, 2015). Most research articles do not precisely specify the number of units to be considered in the study. However, it is recommended that a sufficient number of cases should be studied to reach the state

of "theoretical saturation" or "point of redundancy," i.e., a point at which all data necessary for hypothesis verification have already been collected, and each subsequent case would bring so little significant change that it could be omitted (Eisenhard, 1989). However, some literature references give more precise guidelines on the number of cases included in the study. It is stated that the case study should include at least 2 to 4, but no more than 12-15 units (Zaborek, 2007). In the presented method, there are no methodological limitations concerning the data analysis itself.

Concluding the above content, derived from the subject literature, the author described in detail and reality the implementation of the project and the entities with which she had the opportunity to work. It should also be noted that the case study as a research method was based on hands-on experiences. "The Young Discoverer's University" (UMO) can be qualified as a scientific and research project, as it was a purposeful activity of a particular group of people (scientific team) and is a product (result) in the form of reports as well as written works. The author verified the correctness of the hypothesis by conducting research. The presented content, which resulted from the conducted research from the completed project, helped meet the article's aim. Analyzing the target group, one can notice that the research sample representativeness is appropriate, as it includes 300 people in total from two project editions. The survey results show that there are correct patterns in implementing scientific projects, provided that both parties are willing to participate in the project.

4. Findings and Discussions

Data for the evaluation were obtained through the use of the case study method and focus interviews. An important consideration is the appropriate selection of the number of focus group participants. It usually depends on the research topic addressed and the total number of focus groups participating in a given research project. E. Babbi asserts that the number of people participating in an interview should be correlated with the research topic and can range from 12 to 15 people (Babbi, 2005). Thus, the group interview was conducted on a representative group of researchers from the project implementing unit, young participants, and supervisors of schools qualified for the project (14 people).

The scope of evaluation includes young people participating in the project from the West Pomeranian Voivodeship (including those living in rural areas, according to DEGURBY 3) and the teaching staff. The subject of the evaluation is the implementation of scientific projects. In both editions of the project, the product indicators referred to the number of persons who participated in educational courses. These were, in turn, verified through the youth project enrolment forms, their recruitment, and the final report prepared by the beneficiary. In turn, result indicators referred to the number of people who improved their competencies within university activities.

The competition implemented under the UMO program was first announced in 2016 with the possibility of obtaining funding from the Ministry of Science and Higher Education. The first edition of the project in 2017 gave the basis for creating cyclical initiatives in future years according to the already developed methodology. Thus, the 2nd edition of the competition under the UMO program was announced in 2018, with increased funding from the National Centre for Research and Development. The developed methodology from earlier years contributed to implementing the next edition of the project in the scientific unit (University of Szczecin) in 2018-2021.

The Ministry of Science and Higher Education's program, "Young Discoverer's University" (UMO), started in 2016. Scientific units that engage in work with young people were eligible for support from this program. It was the first of the Social Responsibility of Science programs. The UMO was a new program aimed at children and teenagers, and scientists were to disseminate the results of the latest scientific research and develop an interest in science among the participants.

Children aged 6 to 16 could participate in specially prepared classes, most of which were held at universities. The program aimed to create new initiatives and support existing children's universities. A minimum of 70 children was to participate in each project. Cyclical educational activities within the project were conducted by university staff and specialists in a given field. The budget of the 1st edition was a maximum of PLN 1.6 million, and the maximum amount of a grant for a single project was PLN 40 thousand. The budget of the 2nd edition was up to PLN 5 million, and the maximum grant for a single project was PLN 500 thousand. The table below presents general information (research results) on the financial resources obtained for the project implementation in the two editions.

Table 1. *Study results - general information*

Research results		
	1st edition of the UMO (funded by the Ministry of Science and Higher Education)	2nd edition of the UMO (funding by National Centre for Research and Development)
Project Title:	*"Think economically – explore your horizons"*	*"Build your future career today" – Junior University of Szczecin*
Duration of the project:	01.03-30.06.2017	01.08.2018-31.07.2020
Funding Amount:	40,000	458 432, 50
Applicant:	The University of Szczecin, Faculty of Economics and Management	The University of Szczecin, Faculty of Economics and Management (currently Faculty of Economics, Finance and Management)

Source: *Own elaboration.*

As a result of the COVID-19 pandemic that began in March 2020, and due to all the restrictions and safety measures, the 2nd edition project activities were extended and completed in April 2021. From the above information (Table 1), one can see a certain existing regularity. The first edition of the project was financed at the level of PLN 40 thousand. Developing a specific scheme, and more precisely, the whole concept of the project and the satisfaction of both parties of participants resulted in the second edition of the project with increased funding of over PLN 400 thousand. The project concept of the 1st edition concerned:

- the target group of 14 to 16-year-olds,
- implementing classes in a lecture and workshop format (once a month),
- theoretical aspects of the lecture part that were used practically during the workshop,
- teaching participants teamwork skills as well as healthy competition,
- 100 people selected from various middle schools from the Szczecin city area.

The first edition aimed to popularise science in the following areas: economics, management, finance, and IT. It is worthwhile adding that the first edition of the project was carried out in cooperation with four middle schools from Zachodniopomorskie Voivodeship, which were the first to apply for participation in the project via application forms.

The project concept for the 2nd edition, on the other hand, was more scientifically developed as it related to:

- familiarizing young people with the scientific, educational and academic culture of the Faculty of Economics and Management of the US (currently Faculty of Economics, Finance and Management),
- creating opportunities for young people (13-15 years old) to acquire knowledge to help choose the right path of educational development,
- improving foreign language skills (English),
- improving the quality of education in economics, ecology, finance, marketing, computer science, management, and English language by providing access to modern methods of practical training,
- peer interaction, making new friends, collaboration, group work,
- educational games (puzzles, quizzes), adapted to the level of knowledge of the target group.

The second edition aimed to improve the competencies of young people aged 13-15 years, representing a group of 200 people, through the implementation of high quality intensive didactic training in the field of economics, ecology, finance, marketing, computer science, management, and English language, and to develop a curriculum aiming at obtaining further funding. Thus, another regularity is implementing a low-budget project (1st edition), which was then expanded and

enriched through the scientific offer for young people with a broader didactic scope (2nd edition). In both editions, the author had the pleasure of acting as assistant manager. As a result, focus group interviews (FGI) were conducted to identify the cognitive gap regarding the needs and expectations for further collaboration between elementary schools and universities. Interviews were conducted with both instructors, participants, and their supervisors. The group within which the interviews were conducted included four tutors representing a school that joined the project, five professors representing the academic staff, and five randomly selected participants (from the 1st edition).

The qualitative study aimed to expand the youth's collaboration with researchers and create a cyclical initiative. Individuals participating in the project answered questions about competencies they would like to improve or acquire, and that would be necessary for them in choosing their future educational path. In the survey, nine people responded that it was helpful to have practical skills they acquired during the workshops due to the excellent preparation of instructors while stimulating their cognitive curiosity. Young participants indicated that having soft skills such as interacting, making new friends, collaborating, and working in groups was helpful.

Therefore, the 2nd edition applied equal opportunities in competence development regardless of gender, residence, and presence of a disability. In the FGI survey, four research supervisors indicated that young people from their schools have broad theoretical knowledge. Still, however, they lack creativity, analytical, and communication skills, making it challenging to take a right educational path. The faculty members participating in the project in both editions and representing various scientific fields were delighted with the activities with young people and the organized initiative and expressed their willingness to cooperate further.

It should be added that within the framework of the project (both in the first and second edition), a series of competitions were planned, aimed at encouraging students to take an active part in the project through a tangible system of motivation. The three best people who obtained the highest number of points in a given field within each workshop received in-kind prizes. That is another regularity in the implementation of projects from two editions. Thanks to the developed motivation system, young people were more prone to creative thinking as their intellectual development was stimulated. An important issue is that the prizes were given following the rule of equal opportunities, which means that a person who received a prize in one science class could not receive another one. It also had a positive effect on the distribution of prizes to more participants.

There were, of course, consolation prizes for more active individuals. Additionally, the offer of the second edition of the project was extended to include classes for parents in workshops.

The author thinks that it is an excellent distinction for each university to obtain funding from external sources – i.e., the National Science Centre, the National Centre for Research and Development, the Ministry of Science and Higher Education – within the framework of all competitions and completed projects because a given unit receives additional financial support for selected activities. This, in turn, contributes to the following:

- improving access to higher education,
- increasing competencies of people participating in higher education, responding to the needs of the economy, labor market and society,
- improving accessibility of international educational programs for Polish and foreigners participating in higher education,
- supporting university employees undergoing restructuring processes as a result of university consolidation,
- supporting organizational changes and improving competencies of staff in the higher education system.

The amount of funding received depends mainly on the intermediary institution's expert opinion and the concept developed by the originator and allocating funds for the given project tasks.

5. Conclusions

The competition was implemented under "the Young Discoverer's University" (UMO) program, co-financed by the Ministry of Science and Higher Education (1st edition) and the National Centre for Research and Development (2nd edition), aimed at young people from the Zachodniopomorskie Voivodeship, was a success. Based on the research carried out, the author, referring to the research objective and hypothesis, believes that there are proper schemes of scientific projects implementation on the example of the UMO. At the same time, they bring mutual benefits for both young people – potential future students – and the entire project team responsible for the overall tasks. The benefits may include the added value for the unit implementing the project and the participants' satisfaction, team activities, the achievement of the project objectives.

The findings show that cooperation between universities and elementary schools is mutually beneficial and that it is worth participating in such initiatives for personal and scientific development. The research and the author's experience show several regularities in the implementation of scientific projects. However, the most important is that small undertakings should be repeatable and enriched with new scientific experiences. Therefore, all the author's assumptions regarding the hypothesis and the research aim are reached through the accomplished, intended, and realized activities.

Due to the current pandemic (COVID-19), the researchers have to adapt their

professional activities, i.e., teaching students or project meetings, to the prevailing conditions facilitated by remote working. However, it does not discourage them from continuing with the project activities. Therefore, through such activities, cooperation can still develop. In science, the aim is constant development, looking for new initiatives that create opportunities to broaden horizons and create joint solutions. Work and mutual support are always beneficial to both parties.

The present study results may become an incentive to undertake further research on the existence of correct schemes for implementing scientific projects to explore knowledge. The developed long-term concept containing the right plan for the project implementation is verifiable on the example of the UMO. The author believes that the study carries valuable feedback for both future beneficiaries and recipients.

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