

THE IMPACT OF PROJECT EXCELLENCE ON THE LEVEL OF PROJECT MATURITY OF AN ORGANIZATION

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Purpose: The main research objective entails identification of the project excellence manifestations in project-immature organizations as well as delineation of the areas of excellence positively affecting the PMMM-model-accordant organizational project maturity.

Design/methodology/approach: To achieve the research objective, the methods of bibliometric analysis and literature review, as well as an opinion survey, statistical analysis and LOGIT modeling, were used in the theoretical and the empirical dimensions respectively. The study covered a group of large organizations registered in Poland, which were assessed with respect to their levels of project maturity and excellence. The statistical analysis carried out allowed a delineation of the excellence areas positively impacting project maturity in organizations at low stages of project maturity.

Findings: The vast majority of the examined group of large organizations is characterized by low levels of project maturity and excellence. The entities surveyed meet the excellence criterion mainly in the areas of process integration and culture. Statistically, the area of excellence supporting organizational project maturity is informal project management. Areas of project excellence, which, if properly managed, will positively affect the level of organizational project maturity have been identified.

Research limitations/implications: The use of non-probabilistic sampling is a research limitation restraining the conclusions formulated to the surveyed group of 48 large organizations. The study carried out can serve as an inducement of extended empirical investigations. Future research should be focused on the search for the factors supporting and hindering the achievement of higher levels of project maturity, in order to formulate assumptions regarding a strategy enabling organizations' transition to higher levels of project maturity.

Practical implications: The research results indicate important interdependencies between the stages of project maturity and the areas of excellence. These interdependencies call the attention of business and project-management practitioners to the prospect of achieving higher levels of organizational project maturity through targeted management of the key, from the positive-impact perspective, areas of project excellence. Recognition of these mechanisms should encourage businesses to take deliberate steps aimed at improvement of organizational project management.

Originality/value: The article fills an important cognitive gap by indicating that management activities focused on the project excellence areas identified in the paper can positively impact the levels of project maturity. The results can be of significance for both the researchers exploring for the factors supporting the achievement of higher project-maturity levels as well as the practitioners, i.e., organizations keen on methodical improvement of project maturity levels.

Keywords: project maturity, project excellence, project management, PMMM, computer science.

Category of the paper: Research paper.

1. Introduction

The contemporary organizational environment is characterized by complexity (Schneider et al., 2017) uncertainty (Sanchez, 1997), hypercompetition (Moravveji et al., 2007), fast pace (Constanzo, 2004) as well as dynamism and turbulence (Camillus, Datta, 1991; Salmela et al., 2000; Lee, 2000). The above features of economic environment generate a state, in which organizations seek management formulas allowing dynamic response to the changing structure of the exogenous factors. This requires a design of highly flexible operating systems and organizational structures enabling simultaneous focus on the activities aimed at increasing, inter alia, productivity, process efficiency of genotypic (indigenous) activity, as well as research and innovation activities, the purpose of which should entail the search for new areas of added value generation. This fits in with the assumptions of the *ambidexterity* concept, and thus necessitates implementation of management activities aimed at balancing the exploitative and exploratory activities (Tushman, O'Reilly, 1996), ergo, calls for focus on activities that are grouped into such operational categories as processes (exploitative and exploratory) and projects (cf. Kohlborn et al., 2014; vom Brocke et al., 2016; Bitkowska, 2019). The article centers on the exploratory layer, the key object of the construction of which encompasses both the project area and the management of this operational category.

To identify the degree of organizations' conscious implementation of project management elements, models of project maturity (cf. Kohlegger et al. 2009) and project excellence (Kerzner, 2001, 2003) assessment are used.

The starting point for addressing the issue of project excellence manifestations in project-immature organizations entailed the results of literature studies. The research results published in the Polish literature indicate a low level of project maturity in the organizations operating in Poland (e.g., Juchniewicz, 2009a; Spalek, 2013). This, in the Authors' opinion, makes the attempts to identify the manifestation of project excellence in project-immature organizations and to delineate the areas of excellence positively affecting the achievement of higher levels of maturity a worthwhile and constructive task. Project immaturity, according to the PMMM model adopted in the study, should be defined as an organizational system allowing

classification of a given organization within one of the first four stages (levels) of maturity, whereas a project-mature organization is identified as an organizational state characteristic of the fifth stage (level) of maturity. It should be noted here that, for the purpose of this article, the target level of organizational project maturity has been set at the strategic level. This means that, from the perspective of organizational strategy and goals, it is not always necessary to aim for the highest level of maturity, but to set a desired target level thereof.

As a result of the bibliometric analysis and literature review, a knowledge deficit was outlined, indicating the need as well as the manner of identifying the project excellence manifestations in organizations characterized by low levels of project maturity.

The theoretical study has revealed three cognitive gaps intersecting at two planes:

- the theoretical, stemming from the paucity of publications describing the relationship between the levels of organizational project maturity and project excellence,
- the empirical, consisting in the paucity of publications presenting the results of project excellence levels, particularly in organizations which had carried out project maturity assessments.

The cognitive gaps presented have led the Authors to outline the following research problem: Which of the areas listed in the H. Kerzner's model of project excellence exert positive impact on increasing project maturity in project-immature organizations (organizations at stages 1-4 of the PMMM model)? The following research questions were posed with regard to the research problem formulated:

- PB1: At which stage of project maturity are large organizations operating in Poland?
- PB2: At which level of project excellence are large organizations operating in Poland?
- PB3: How to identify the project excellence manifestations, in order to achieve higher levels of project maturity using the assumptions of the project management method?

To answer the research questions posed, a wide range of research methods, including bibliometric analysis, literature review, an opinion survey, and statistical methods, were used.

The main objective of the research undertaken is to identify the manifestations of project excellence in organizations classified as entities at the first, second, third and fourth stages of project maturity, in accordance with the PMMM model developed by H. Kerzner (2001, 2003), and to delineate the areas of excellence positively affecting organizational project maturity.

The main research objective was assigned sub-objectives within the empirical dimension (CCE).

- CCE1: To assess the level of project maturity in a non-probabilistically selected group of large organizations operating in Poland.
- CCE2: To assess the level of project excellence in a non-probabilistically selected group of large organizations operating in Poland.
- CCE3: To delineate the areas of excellence positively affecting project maturity in organizations at low stages of project maturity (stages 1-4).

As a result of the empirical study, only 3 organizations, out of the 48 surveyed, were qualified as project-mature organizations. Ultimately, a set of areas of excellence positively affecting the organizational project maturity was identified in the sample of 45 organizations.

2. Research Background – project maturity and project excellence

2.1. Bibliometric analysis – identification of publications simultaneously addressing the issues of project maturity and project excellence

The theoretical study began with the implementation of a bibliometric analysis based on the Web of Science Core Collection (WoS) resources. The bibliometric analysis was aimed at identification of publications simultaneously addressing the issues of project maturity and project excellence. Table 1 presents a summary of selected bibliometric indicators for the search terms identified in the WoS database. It should be emphasized here that, for comparative purposes, the indicators were compiled in a thematic distribution by the ‘project maturity’ and ‘project excellence’ fields, using the keywords presented in Table 1. The search results apply to the topic search area within all the WoS categories, as well as English-language publications, due to the subsequent detailed analysis thereof.

Table 1.

Summary of selected bibliometric indicators for the set of keywords explored

Entry	Years of publication	Number of publications	h-index	Number of citations per publication	Total number of citations
Project maturity	1969-2022	4040	97	14.27	57650/55639*
Project management maturity	1990-2022	1692	60	12.22	20670/19405*
Project excellence	1961-2022	3070	79	11.79	36197/35806*
Project management excellence	1985-2022	867	50	11.84	10268/10201*
Project maturity and Project excellence	1997-2022	46	10	17.04	784/783*

* without self-citations

Source: compiled on the basis on Web of Science databases (access: 12.11.2022).

Table 2 compares the keywords searched with the Web of Science disciplinary categories in which they appear most frequently.

Table 2.

Summary of the main Web of Science categories for the set of keywords explored

Web of Science Categories	Project maturity	Project management maturity	Project excellence	Project management excellence	Project maturity and Project excellence
Management	12.82%	23.29%	9.12%	23.18%	31.48%
Computer Science Information Systems	10.82%	13.89%	3.55%	3.92%	5.56%
Computer Science Software Engineering	10.64%	10.17%		2.31%	3.70%
Computer Science Theory Methods	8.71%	9.16%	3.42%	3.92%	1.85%
Engineering Electrical Electronic	7.55%	8.22%	4.66%	3.92%	3.70%
Engineering Industrial	6.81%	11.17%	3.19%	7.15%	5.56%
Business	6.21%	10.23%	3.39%	8.42%	12.96%
Economics	3.07%	3.72%	2.05%	3.11%	5.56%
Education Educational Research			17.82%	13.26%	5.56%
Engineering Multidisciplinary					9.26%

Source: compiled on the basis on Web of Science databases (access: 12.11.2022).

As a result of the bibliometric analysis, 3 generalizing conclusions were formulated.

Number of publications

The issues of project maturity are much more frequently addressed on the theoretical, methodological and empirical planes, compared to project excellence. Against that background, publications combining both areas are scarce.

Topicality of the subject matter

All search terms reached the highest citation rate in 2021, while 2022 is not yet closed. This demonstrates the timeliness of the topics and the growing interest in the matter. The relevance of the organizational project maturity and excellence issues can also be evidenced by the number of conferences, as a result of which the share of post-conference materials devoted to these topics accounts for almost 50% in the set of the publications examined.

With regard to the topics combining the concepts of project maturity and project excellence, the interest in the issue is quite high, although relatively few studies have been produced over nearly 25 years. This is evidenced by the continued high citation rate, as of 2019, and the same the highest citation rate per publication, compared to the other keyword search entries.

Disciplinary categories

Both the issues of project maturity and project excellence are interdisciplinary in nature, with a dominance of the 'Management' category. Publications combining the two areas are mainly located within the 'Management' and 'Business' categories. This possibly indicates a large rendition of such a combination of issues in the business aspects, much greater than in the case of a disjoint approach to each area.

This part of the theoretical study resulted in an outline of cognitive gaps, consisting in the paucity of publications addressing the relationship between project maturity and excellence, and consequently the lack of research data describing and exemplifying the two organizational states.

After examining 46 publications, 12 articles were qualified for further detailed analysis, in the context of the research objective (i.e., to identify the relationship between project maturity and project excellence). The English-language publications identified within the WoS database, which attempt to explain (partially at the very least) these relationships on a theoretical-cognitive plane include Dolata (2019a, 2019b), Fajsi (2022), Bersam (2017). Other studies dealing with similar subject areas address slightly different sets of relationships.

The results of the studies presented in these publications can, nevertheless, indirectly explain certain aspects of the dependence between project excellence and maturity. The analysis of these publications enabled delineation of the following frames of reference, in association with the approaches to project maturity and project excellence:

- project management effectiveness, assessed via a combination of the Balanced Scorecard and the EFQM Excellence Model (Scheiblich, 2017),
- a project maturity model developed for Spanish organizations based on the most common business practices thereof (Amendola, 2016),
- project maturity models used as a tool for determining the level of company competitiveness within a given industry (Chovanova, 2017),
- a maturity model for construction projects, which combines the ICMM model with the EFQM excellence model (Guangbin, 2020),
- the impact of project maturity on the increase of operational excellence in the construction industry (Xing, 2011),
- the impact of project management centers of excellence (CoEs) on project management maturity (Walker, 2005),
- software-development project excellence vs. quality-culture maturity (Karout, 2017),
- organizational maturity (including project maturity) versus high reliability of hospital units (Chassin, 2013).

Publications the research content of which did not overlap with the research topics assumed were excluded, i.e., articles addressing the following issues were not considered:

- BIM maturity measurement at the levels of project, organization and industry,
- assessment of the technological maturity of micro and nano manufacturing processes,
- the impact of process excellence elements on the digital transformation of companies,
- the impact of business and process analytics on business excellence,
- achievement of organizational excellence through digital-maturity enhancement projects,
- Maturity Model for Innovation in SMEs,
- technological maturity and excellence vs. organizational development strategy.

A study (Dolata, 2019a) based on a research carried out in public sector organizations (basic local-government units in Poland) has outlined a set of variables most and least determining project management success and formulated the key success factors, which include the following: commitment and support of the superiors representing basic local-government units in Poland; appropriate schedules of project activities (including appropriate distribution of tasks and responsibilities); appropriate selection of project team members (taking the competence, experience, attitudes and commitment thereof into account); identification and regular monitoring of risks, for all projects implemented; as well as risk management ability. The group of the factors least correlated with organizational project maturity included: project management orientation on people (provision of knowledge enhancement and skill improvement, development of an appropriate incentive system, and assurance of a proper flow of information), organization of project team working meetings, and the development of communication rules (Dolata, 2019a, p. 213).

Another study (Dolata, 2019b) presents selected aspects of project management serving as a possible source of competitive advantage, on the example of basic local-government units in Poland. It should be emphasized here that, as per the author of the publication, competitive advantage, in the context of the public sector units analyzed, is based on the satisfaction of the stakeholder needs. The study shows that a relationship exists between the importance assigned by municipalities to individual project tasks and the level of project maturity. The findings show that, according to the respondents, achievement of competitive advantage in project management is determined by both soft and hard project management factors. Based on the research results obtained, M. Dolata pinpointed that achievement of competitive advantage in project management is primarily dependent on the synchronization and coordination of the activities carried out in projects. This requires a structured, homogeneous approach to project management, which is primarily facilitated through implementation of various standards encompassing project management methodologies and techniques (Dolata, 2019b).

A study (Fajsi, 2022), in which an attempt was made to determine the impact of different levels of project management maturity (PMMM) on business excellence, in the context of Industry 4.0, contrasted project maturity with business excellence. The study covered 124 organizations awarded business excellence awards by the European Foundation for Quality Management (EFQM) and proved that higher levels of organizational project management maturity have positive impact on business excellence. Statistically significant differences were also noted between the individual dimensions of project maturity and the impact thereof on business excellence, except for one – the cultural factors. The study indicated that organizations with high levels of excellence define quite clearly and support a ‘corporate culture’ of project management.

Another article (Bersam, 2017) attempted to assess the project maturity of IT companies, using the H. Kerzner's model of organizational project excellence. While the theoretical considerations presented in the work did address the PMMM model, the study itself only

attempted to identify the dependencies between the components that are based on the characteristics of IT companies and the areas of project excellence. Foreign or multinational companies (characterized by greater ability to manage time, scope and quality within all phases of the project life cycle) as well as companies which have been operating in the sector longer (characterized by higher scores of integrated processes) showed better maturity assessment results. Contrarily, no significant relationship exists between the number of patents in a company and the level of project maturity - project maturity does not imply company innovation.

2.2. H. Kerzner's model of project management maturity (PMMM) and project excellence

Most of the existing project maturity models only deal with the maturity of project management processes. Kerzner's PMMM model, in addition to assessing the maturity of project management processes, also takes the relationships from the EFQM excellence model into account, providing a more complete picture of an organization's assessment, in terms of its project management capabilities. The PMMM model therefore finds broad application in empirical studies (Karlsen, 2011; Simangunsong, 2013; Rezaeean, 2012; Andersen 2003).

According to H. Kerzner, project maturity is identified as *development of systems and processes that are repetitive in nature and provide a high probability that each project will be a success. Repetitive processes and systems do not guarantee success. They simply increase the probability of success* (Kerzner, 2004, p. 34). The PMMM model identifies 5 stages of project maturity: embryonic, board support, line management support, development, maturity. The statements contained therein allow organizations to assess their levels of project maturity, indicating, at the same time, the steps necessary to achieve full project management maturity and improve organizational performance. As such, both the levels of project management maturity as well as the points of possible improvement are determined when applying the model (PMI, 2001).

Project excellence, on the other hand, occurs when *the growth and maturity phases of the project management life cycle are implemented* (Kerzner, 2004, p. 16). Kerzner's excellence model defines the level of project management excellence in terms of six areas: integrated processes, organizational culture, management support, training and education, informal project management and behavioral excellence (Kerzner, 2001). The six main segments of the model are understood as follows:

- Integrated processes: Integrated processes consist of all the areas of project management implemented in an integrated manner. An integrated use of processes affects the efficiency and success of project implementation.
- Organizational culture: This segment facilitates the organization's perception of its organizational culture in terms of its impact on project management, supporting the assessment of which elements of the culture positively affect project execution and which do not foster the effectiveness of project management processes.

- Management support: The role and support of senior management directly affects project excellence. Supportive management skills and appropriate communication with project managers increase the effectiveness of project management.
- Training and education: This segment indicates the ability to view the investment in training and education through the lens of a return in terms of a better contribution to project management. Performance of an educational assessment of a company, including indication of the contribution resulting from training and education, allows accurate determination of its project excellence.
- Informal project management: Such assessment draws attention to the team's ability to cooperate smoothly, without unnecessary formal protocols. This, of course, involves the ability to communicate effectively and the trust between project team members and managers.
- Behavioral excellence: Behavioral excellence focuses on the project manager's role in the organization, his/her positive and reliable behaviors. It also draws attention to the aspects of motivation in project management as well as the project team effectiveness.

In the article, project management excellence, in the context of the study carried out with the use of H. Kerzner's model, is equated with an organization's conscious discounting of the benefits resulting from the use of project management methods to ensure project implementation, from the perspective of the so-called iron triangle of project management, i.e., the project scope, cost and time (see Meredith, Mantel Jr., Shafer, 2017, p. 3).

3. Research Design

3.1. Research procedure

The study was carried out on the basis of the research steps formalized at the stage of outlining the concept of the proceedings presenting a plan of action in both the theoretical and empirical research stages.

- Step 1. Identification, using bibliometric analysis, of the publications simultaneously addressing the issues of project maturity and project excellence.
- Step 2. Systematic literature review. Analysis of secondary research on project maturity and excellence.
- Step 3. Outlining the cognitive gaps as well as the research problem and objectives.
- Step 4. Selection of the organizational project maturity and excellence models.
- Step 5. Selection of the survey method and sampling technique, including definition of the selection criteria and compilation of the organization register.

- Step 6. Implementation of the proper survey, using an opinion polling with the CAWI technique.
- Step 7. Analysis of the empirical data collected.
- Step 8. Assessment of the project maturity and excellence levels, based on the model developed by H. Kerzner.
- Step 9. Statistical analysis of the results, followed by LOGIT modeling.
- Step 10. Compilation and discussion of the results, including suggestions and recommendations for achievement of a higher level of project maturity.

3.2. Structure of the organizations under study

The empirical investigation was carried out in 2021. The study involved a research method of an opinion survey, carried out using the CAWI (Computer Assisted Web Interview) technique. The research sample was selected using a non-probabilistic technique with purposive selection. Only large organizations operating in Poland (the organization's headquarters are located on the territory of the Republic of Poland) were included in the survey. The classification criterion was company size, where the number of employees for large organizations exceeded 250 persons. At the stage of inviting the organizations selected to participate in the survey, a preliminary identification was additionally attempted, based on a declarative assessment of the degree of project management. Out of the 80 organizations invited, 74 organizations participated in the survey. After analyzing the data contained in the survey questionnaires, 48 organizations were ultimately qualified for the study. This means that, at the stage of the questionnaire verification, 26 organizations indicated no project implementation.

Out of the 48 correctly filled in questionnaires, the vast majority of the organizations were headquartered in the Pomeranian (16), Mazovian (7) and Lower Silesian (5) provinces. In the group of the entities surveyed, based on the PKD (Polish Classification of Business Activity), Finance and Insurance (12) as well as Manufacturing (11) were the most dominant business activity areas, as indicated by the largest number of the surveyed organizations. As a result, the organizations surveyed were divided according to the dominant type of activity: manufacturing (12), services (30) and trade (6). The last entity division criterion was the scope of the business activity conducted. Based on the respondents' declarations and the documentation analysis, the largest share of the organizations surveyed were entities operating internationally (25) and nationally (16). Detailed numerical share of the organizations included in the empirical investigation is shown in Appendix 1.

The survey questionnaire was completed by respondents representing different hierarchical levels, depending on the genotype (core) business activity. The respondent structure is shown in Figure 1.

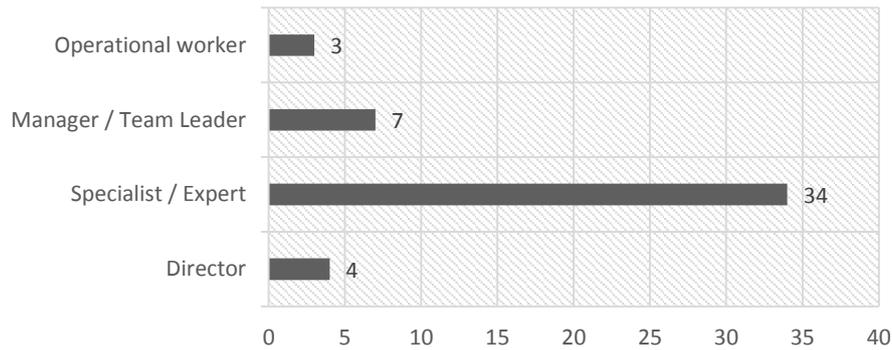


Figure 1. Survey respondent structure, N = 48.

Source: compiled on the basis of a study carried out in 2021.

The Authors aimed to address the survey tool to senior (e.g., director, manager) or middle-level (manager) executives. It should be noted here that specialists and experts constituted the largest share in the total number of the survey respondents. This group was dominated by such positions as, inter alia, process expert (3), quality management system specialist (7), process improvement specialist (4), project management specialist (12), investment project specialist (4).

4. Assessment of organizational project maturity and excellence – results of the empirical study

4.1. Assessment of project maturity in the surveyed group of organizations

Based on the research-questionnaire data generated in the empirical investigation, an attempt was first made to assess the degree of project maturity in the surveyed group of organizations, using the Project Management Maturity Model (PMMM) and a research tool (survey questionnaire) developed by H. Kerzner (2001, 2003).

Figure 2 shows the classification of organizations into PMMM-model maturity levels, based on the survey results obtained.

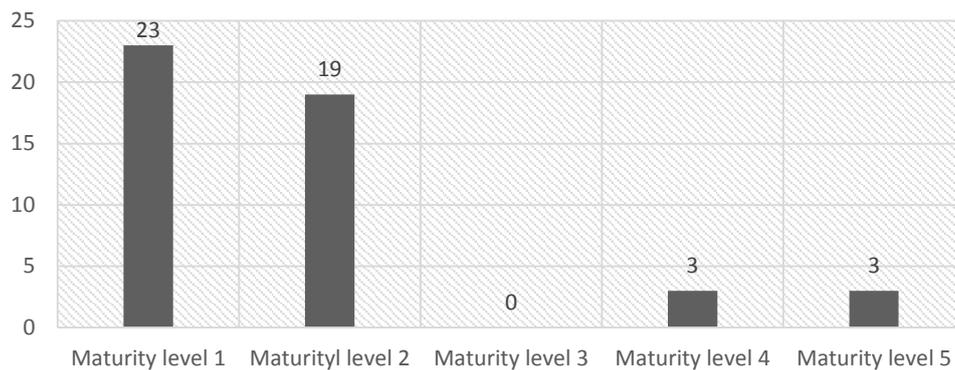


Figure 2. Summary of project maturity stages in the surveyed group of organizations, N = 48.

Source: compiled on the basis of a study carried out in 2021.

As Figure 2 shows, the vast majority of the organizations surveyed were classified as stage 1 (23) and stage 2 (19) entities. In the surveyed group of 48 entities, only 6 were qualified as organizations at maturity stages 4 (3) and 5 (3). The results obtained are in line with the results of the empirical investigations carried out in Poland, indicating a low level of organizational project maturity (e.g., Juchniewicz, 2009a; Spalek, 2013). It should be emphasized here that, due to the varied model of maturity, as well as the research methods (CAWI, CATI, observation) and the sampling techniques (non-probabilistic and probabilistic techniques) used, the study compiling possibilities are limited. Table 3 presents descriptive statistics for the maturity stages under examination.

Table 3.

Descriptive statistics for the PMMM-model maturity levels examined

Maturity levels	Median	MIN	MAX	Q1	Q3	SD
Level 1_PMMM	2	4	5	4	-4	8
Level 2_PMMM	0.75	2	4	2	-4	7
Level 3_PMMM	0	2	4	4	-4	7
Level 4_PMMM	1.75	4	5	4	-5	8
Level 5_PMMM	0	2	3	2	-5	8

* MIN – minimum value, MAX – maximum value, Q1 – quartile I, Q3 – quartile 3, SD – standard deviation.

Source: compiled on the basis of a study carried out in 2021.

As Table 3 shows, no entities meeting most of the criteria, approaching the maximum response value for the sum = 8, were observed in the surveyed group of organizations. The maximum results = 5, in the surveyed group of entities, were obtained for stages 1 and 4. The low median values for stages 3 and 5 of maturity are worth noting as well.

Figure 3, in turn, shows a summary of the organizations' stages, in distribution by the range of operation. Based on the results obtained, a conclusion was drawn that the organizations characterized by an international scope of operation were mostly classified at stages 1 and 2 of project maturity, with one organization classified at stage 4.

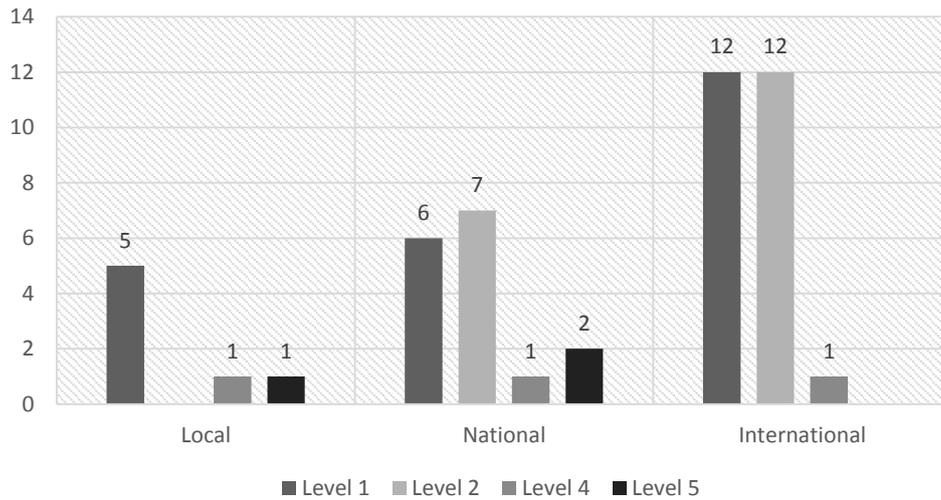


Figure 3. Summary of project-maturity stages in distribution by the surveyed organizations’ scope of operation.

Source: compiled on the basis of a study carried out in 2021.

Figure 4 shows the distribution of the organization classification, into one of the five stages (levels) of maturity, by the dominant activity of the entities surveyed. The results obtained for the group of the 48 organizations participating in the empirical investigation show that stages 4 and 5 were primarily achieved by the service sector organizations.

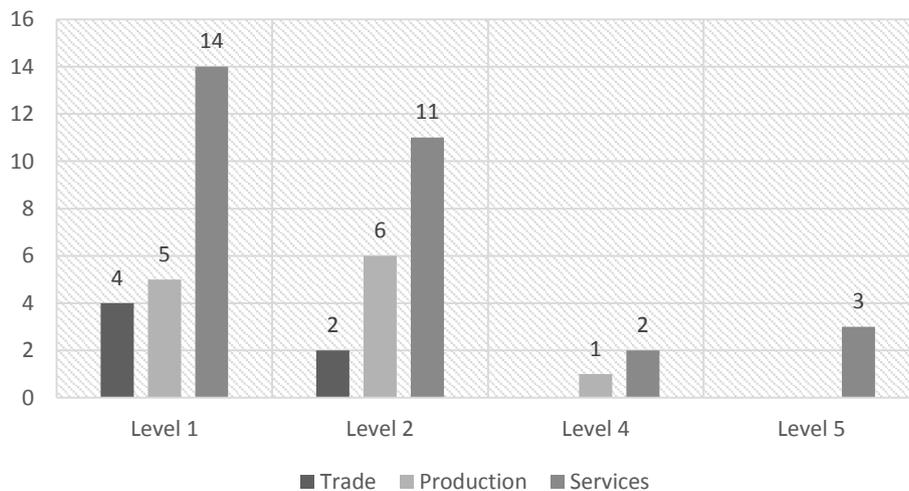


Figure 4. Summary of project-maturity stages by the surveyed group of organizations’ dominant activity.

Source: compiled on the basis of a study carried out in 2021.

In order to assess the scale homogeneity of the survey tool used, and thus the reliability of the questionnaire domain responses, the Cronbach's alpha test was used. The resulting index value for the project maturity assessment was 0.90. All the values obtained are above 0.70, which shows the compatibility thereof with the tool’s limit of acceptability, as described in the literature (see Hair et al., 2010).

4.2. Assessment of project excellence in the surveyed group of organizations

The second part of the empirical investigation entailed the assessment of project excellence in the surveyed group of 45 organizations (organizations at stage 5 of project maturity were excluded). The attempt to assess project maturity in the surveyed group of organizations was carried out using the excellence model and research tool developed by H. Kerzner (2001, 2003).

Just as in the case of the project maturity assessment, the Cronbach's alpha test was used to assess the scale homogeneity of the survey questionnaire used and the reliability of the responses received. The resulting index value for the project excellence assessment was 0.89. All the values obtained, as in the case of project maturity investigation, fall above 0.70, which is fully acceptable.

4.3. Identification of excellence manifestations in project-immature organizations

Based on the partial data obtained, Table 4 shows the descriptive statistics for the surveyed areas of project excellence assessment in the organizations under examination.

Table 4.

Summary of H. Kerzner's areas of project excellence assessment, N = 45

Assesment area	Model Max*	Median	MIN	MAX	Q1	Q3	SD
Process integration	35	24.5	2	34	20.75	27.5	7.625
Culture	35	23	8	31	18.75	26.25	5.632
Management support	35	15	8	25	13	20	4.530
Training and education	40	19.5	8	34	15.75	25.25	6.604
Informal management	30	14.5	7	24	12	18	3.987
Behavioral excellence	35	20	13	27	18	23.25	3.656

* According to the model, the MAX value indicates the maximum number of points to be scored in the area under examination.

Source: compiled on the basis of a study carried out in 2021.

According to the assumptions of the H. Kerzner's model, the partial results obtained enabled classification of the organizations surveyed into 1 of the 4 levels of excellence (2001, p. 729). This means that each of the areas investigated constitutes a component of the project excellence hexagon. Only one organization scored enough to qualify as an organization meeting the project excellence criteria, in accordance with the adopted assessment model of H. Kerzner (2001). The remaining organizations scored an average of 116 points, out of the possible 210.

It should be noted here that, despite the fact that the organizations surveyed were not classified as entities at the 5th stage of project maturity (as per the PMMM), they do show signs of excellence. The research proceedings assumed that the project excellence criteria are met, within a selected area of assessment, when the number of the points obtained exceeds 70% of the maximum value. The value adopted was developed based on the criterion of summative project excellence assessment in the H. Kerzner's model (2001, p. 729). As a result, out of the 45 project-immature organizations surveyed, 24 entities were identified as meeting the excellence criterion in the area of process integration, 14 in the area of culture, 2 in the area of

management support, 6 in the area of training and education, 2 in the area of informal management, and 4 in the area of improvement/excellence.

Using statistical methods (LOGIT modeling), an attempt was then made to identify the areas of project excellence assessment supporting the achievement of higher levels of project maturity in an organization. Dichotomous variables were used for this purpose (Table 5).

Table 5.

Classification of organizations by the criterion of project maturity and excellence

Project excellence\ Project maturity	Immature Organization	Mature Organization	Total
The organization does not meet the project excellence criteria	44	3	47
The organization does not meet the project excellence criteria. The organization meets the project excellence criteria (summation of the points scored in the 6 evaluation areas of the H. Kerzner's model)	-	-	1
Total	45	3	48

Source: compiled on the basis of a study carried out in 2021.

A catalog of dependent and explanatory variables was formulated, which are characterized in Table 6.

Table 6.

Dependent and explanatory variables in the logit models – characteristics

Variable type	Symbol	Variable	Description of variable
Dependent variable	ED1	Level1_PMMM_LOGIT	1 = a state, in which the organization can be described as meeting the criteria for stage 1 of project maturity 0 = a state, in which the organization does not meet the criteria for being classified at stage 1 of project maturity
	ED2	Level2_PMMM_LOGIT	1 = a state, in which the organization can be described as meeting the criteria for stage 2 of project maturity 0 = a state, in which the organization does not meet the criteria for being classified at stage 2 of project maturity
	ED3	Level3_PMMM_LOGIT	1 = a state, in which the organization can be described as meeting the criteria for stage 3 of project maturity 0 = a state, in which the organization does not meet the criteria for being classified at stage 3 of project maturity
	ED4	Level4_PMMM_LOGIT	1 = a state, in which the organization can be described as meeting the criteria for stage 4 of project maturity 0 = a state, in which the organization does not meet the criteria for being classified at stage 4 of project maturity

Cont. table 6.

	EDex1	process_integration_LOGIT	1 = a state, in which the organization meets the integration area criteria of the project excellence model, 0 = a state, in which the organization does not meet the integration area criteria of the project excellence model
	EDex2	culture_LOGIT	1 = a state, in which the organization meets the culture area criteria of the project excellence model, 0 = a state, in which the organization does not meet the culture area criteria of the project excellence model
	EDex3	management_support_LOGIT	1 = a state, in which the organization meets the management support area criteria of the project excellence model, 0 = a state, in which the organization does not meet the management support area criteria of the project excellence model
	EDex4	training_and_education_LOGIT	1 = a state, in which the organization meets the training and education area criteria of the project excellence model, 0 = a state, in which the organization does not meet the training and education area criteria of the project excellence model
	EDex5	informal_management_LOGIT	1 = a state, in which the organization meets the informal management area criteria of the project excellence model, 0 = a state, in which the organization does not meet the informal management area criteria of the project excellence model
	EDex6	behavioral_excellence_LOGIT	1 = a state, in which the organization meets the behavioral excellence area criteria of the project excellence model, 0 = a state, in which the organization does not meet the behavioral excellence area criteria of the project excellence model
Explanatory variable	DsP_O1	process_integration	Total points scored in the area under study - process integration in the H. Kerzner's project excellence model
	DsP_O2	culture	Total points scored in the area under study – culture in the H. Kerzner's project excellence model
	DsP_O3	management_support	Total points scored in the area under study – management support in the H. Kerzner's project excellence model
	DsP_O4	training_and_education	Total points scored in the area under study – training and education in the H. Kerzner's project excellence model
	DsP_O5	informal_management	Total points scored in the area under study – informal management in the H. Kerzner's project excellence model
	DsP_O6	behavioral_excellence	Total points scored in the area under study – behavioral excellence in the H. Kerzner's project excellence model
	PMMM_1	Level 1_PMMM	Suma punktów uzyskana w obszarze badania dla etapu 1 (poziomu 1), według modelu dojrzałości projektowej H. Kerznera

Cont. table 6.

	PMMM_2	Level 2_PMMM	Total points scored in the area under study for stage 2 (level 2) in the H. Kerzner's project excellence model
	PMMM_3	Level 3_PMMM	Total points scored in the area under study for stage 3 (level 3) in the H. Kerzner's project excellence model
	PMMM_4	Level 4_PMMM	Total points scored in the area under study for stage 4 (level 4) in the H. Kerzner's project excellence model
	PMMM_5	Level 5_PMMM	Total points scored in the area under study for stage 5 (level 5) in the H. Kerzner's project excellence model

* The classification of organizations into project maturity stages was developed based on the PMMM model assumptions (Kerzner, 2001).

Source: own compilation.

The impact of project-excellence areas on project maturity

An attempt was further made to identify and statistically assess the impact of the project-excellence assessment areas on the various stages of project maturity.

Table 7 (Model 1) shows the results of the LOGIT estimation for the dependent variable *EDI* (stage 1 of PMMM-model maturity).

Table 7.

Model 1 – LOGIT estimation for dependent variable EDI

Variable	Factor	Standard error	z	p value
const	-8.40178	3.56026	-2.360	0.0183**
process integration	0.0765907	0.0771873	0.9923	0.3211
culture	0.179481	0.111341	1.612	0.1070
management support	-0.147065	0.106696	-1.378	0.1681
training and education	0.105774	0.0783826	1.349	0.1772
informal management	0.238603	0.127202	1.876	0.0607*
behavioral excellence	-0.0310212	0.119029	-0.2606	0.7944

* $p < 0.1$. ** $p < 0.05$.

Source: own compilation using the GRETTL package. based on the data obtained via a study carried out in 2021.

In the presented Model 1. a statistically significant relationship between the explanatory variable *informal_management* and the dependent variable *EDI* was identified. indicating a statistical impact of the activities aimed at increasing informal project management on the satisfaction of the criteria for the first level of project maturity (*EDI*).

Table 8 (Model 2) in turn shows the results of the LOGIT estimation for the dependent variable *ED2* (stage 2 of PMMM-model maturity).

Table 8.

Model 2 - LOGIT estimation for dependent variable ED2

Variable	Factor	Standard error	z	p value
const	-12.5740	4.65308	-2.702	0.0069***
process integration	0.166348	0.0966110	1.722	0.0851*
culture	0.00227206	0.105838	0.02147	0.9829
management support	-0.0880701	0.0909013	-0.9689	0.3326
training and education	0.0177747	0.0709770	0.2504	0.8023
informal management	0.174158	0.117572	1.481	0.1385
behavioral excellence	0.289165	0.143493	2.015	0.0439**

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.001$

Source: own compilation using the GRETTL package. based on the data obtained via a study carried out in 2021.

Based on Table 8. it can be noted that the factor supporting the achievement of the second stage of project maturity encompasses the activities within the excellence-related area. identified in the model as *behavioral_excellence*. The following have been qualified as such activities: project team building as well as the project managers' roles, skills and training.

Table 9 (Model 3) shows the LOGIT estimation results for the dependent variable *ED3* (stage 3 of PMMM-model maturity).

Table 9.
Model 3 - LOGIT estimation for dependent variable ED3

Variable	Factor	Standard error	z	p value
const	-13.0480	4.71059	-2.770	0.0056***
process_integration	0.103091	0.0943322	1.093	0.2745
culture	0.0949973	0.125692	0.7558	0.4498
management_support	-0.0757431	0.0928785	-0.8155	0.4148
training_and_education	0.0152105	0.0710570	0.2141	0.8305
informal_management	0.215273	0.126960	1.696	0.0900*
behavioral_excellence	0.247795	0.139195	1.780	0.0750*

* p < 0.1. ** p < 0.05. *** p < 0.001.

Source: own compilation using the GRETLM package. based on the data obtained via a study carried out in 2021.

Based on Model 3. a statistical relationship between the variables *informal_management* and *behavioral_excellence* as well as the dependent variable *ED3* was identified.

Table 10 (Model 4) shows the LOGIT estimation results for the dependent variable *ED4* (stage 4 of maturity).

Table 10.
Model 4 - LOGIT estimation for dependent variable ED4

Variable	Factor	Standard error	z	p value
const	-11.8009	4.20300	-2.808	0.0050***
process_integration	0.0701438	0.0806508	0.8697	0.3845
culture	0.231312	0.135190	1.711	0.0871*
management_support	-0.219779	0.117339	-1.873	0.0611*
training_and_education	0.0694560	0.0797787	0.8706	0.3840
informal_management	0.381712	0.148944	2.563	0.0104**
behavioral_excellence	0.0764272	0.126001	0.6066	0.5441

* p < 0.1. ** p < 0.05. *** p < 0.001.

Source: own compilation using the GRETLM package. based on the data obtained via a study carried out in 2021.

As Table 10 shows. statistically significant impact of such explanatory variables as *culture*, *management_support* and *informal_management* on the fourth stage of PMMM-model project maturity (variable *ED4*) was identified. The organizational-culture aspect fits in with the opinion of K. Piwowa-Sulej (2015). according to whom *the success factor of project implementation in organizations employing a project approach is unquestionably the project culture [...]. The concept of organizational culture thus approximates the issue of project maturity* (Piwowa-Sulej, 2015, p. 256).

Summing up, 4 factors associated with the level of informal management in H. Kerzner's (2001) excellence model were classified within the set of the excellence areas identified as the potentials supporting the achievement of higher stages of project maturity.

The first factor pertains to employee promotion to line (functional) managerial positions, based on the managerial skills possessed. This approach indicates the need to reconfigure the desired, from the perspective of an organization's objectives and strategies, role of the functional manager, from a specialist (expert) in the implemented part of the process, towards a manager overseeing the knowledge potential of employees, whose role, in the context of project management, should entail provision of the resources necessary for project implementation (matrix structure).

The second factor pertains to the organizational culture within the trust-, communication, and cooperation-based spheres of project management. This area of excellence is in line with J. Skalik's opinion, according to whom *achievement of excellence in organizational project management is also characterized by its cultural determinants. The organizational culture prevailing in a changing institution should support the four core values in project management: cooperation, teamwork, trust and effective communication* (Skalik, 2014, p. 33). The driving force behind a collaborative culture entails improvement of communication, trust and teamwork. Such-outlined factors facilitate project management, resulting in reduced project costs and implementation time as well as in lesser reliance on rigid rules and procedures (Magano et al., 2021, as cited in Spalek, 2014; Kerzner, 2019). Moreover, in an empirical investigation of biotechnology companies, carried out by J. Magano et al. (2021) the majority of the respondents indicated that an organization's culture is characterized by informal project management.

The third factor concerns organization design based on a low level of formalization. In the context of the issue under study, this pertains to the time devoted to report generation, which can have positive impact on the reduction of the associated costs.

The fourth factor pertains to the process of project planning in an organization. Checklists and guidelines are in demand in this regard. The importance of project planning, in terms of successful project completion, has been also pinpointed in the work (Iqbal et al., 2018) on the example of IT software development.

The analysis of the partial results of the organizational maturity assessment carried out has led to the identification of a relationship between the organizational structure and the level of maturity in the organizations surveyed (Figure 5).

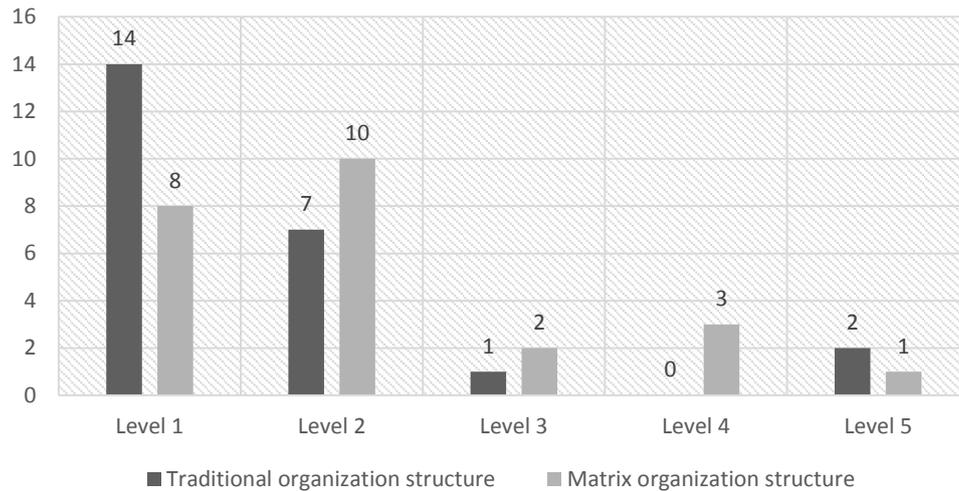


Figure 5. Project-maturity level classification of the surveyed group of organizations by declared organizational structure. for N = 48.

Source: own compilation based on a study carried out in 2021.

Based on Figure 5. it can be noted that higher levels of maturity are achieved by organizations in which the traditional structure, identified as functional in the study, is replaced by matrix solutions.

5. Conclusions

The theoretical and empirical research carried out has led to the formulation of 4 conclusions of a generalizing nature.

First, the theoretical study has highlighted the cognitive gaps, consisting in the paucity of publications describing the relationship between project maturity and excellence, the essence of which has been undeline*d*, *inter alia*, in the work (Martusewicz, Szumowski, 2018). The study has filled (to some extent) the research gaps described in the introduction, indicating that management activities focused on the project excellence areas identified in the work can positively affect the level of maturity. This is particularly true in informal process management. It should be emphasized here that the results obtained constitute a mere starting point for much broader empirical investigations.

Second, based on the assumptions of the project maturity and excellence models developed by H. Kerzner (2001, 2003), it has been determined that the vast majority of the surveyed large organizations operating in Poland is characterized by low levels of project maturity and project excellence.

Third. 45 project-immature organizations were identified as meeting the excellence criterion in such assessment areas as process integration (24). culture (14). management support (2) training and education (6). informal management (2) and behavioral excellence (4).

Four. the LOGIT modeling carried out indicated that statistically. the area of excellence supporting organizational project maturity is informal project management. This fits in with the conclusions of a similar study conducted in the public sector (Dolata, 2014). According to M. Dolata: *the observations made indicate that. according to the respondents. the achievement of successive levels of project maturity is largely influenced by the soft factors of project management* (2014, p. 81).

Like any such survey. this study too is not free of research burdens and limitations. These burdens can result from the CAWI technique used. i.e. the lack of contact with the respondent and the unfeasibility in terms of leveling the errors resulting from incorrect understanding of the questions and answers. It should be also underlined that. due to the non-probabilistic sampling technique used. the conclusions formulated are limited to the surveyed group of 48 large organizations operating in Poland. Research reliability. nevertheless. entails one of the typical problems in this area. namely the determination of a sufficient sample size. In order to assess the questionnaire response reliability. the Cronbach's alpha test was used. The issues of Cronbach's alpha test application and sufficient sample size have been widely discussed in the literature (Bland, Altman, 1997; Yurdugül, 2008; Samuels, 2015). The literature on the subject suggests that the sample size should be at least 30. and this condition was met in this study.

The research results presented in this work serve as an inducement of extended empirical investigations. The Authors intend to carry out further research. focused on the search for factors supporting and hindering the achievement of higher levels of project maturity. taking both the classical (cascade) and iterative/incremental methodologies into account. It is worth pinpointing here that identification of the factors supporting and hindering the achievement of project maturity can enable formulation of strategy assumptions for organization transition to higher levels of project maturity.

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