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The Impact of State Policies on Investment Project Management in Polish Industrial Construction Sector

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In this paper, we discuss the influence of economic, environmental and legal policies of the state on the management of investment projects in the area of industrial construction in Poland. Our empirical study relies on conducting a questionnaire survey. A total of 158 Polish companies dealing with industrial construction took part in the survey. Then, the collected questionnaires were subjected to a thorough analysis and interpretation, with the use of a method called the exploratory factor analysis (EFA). Our research reveals the key factors influencing successful investment project management in the Polish industrial construction sector. These factors have been identified as the "availability of technology in a stable political system", "stability of the economic and tax systems", "stable social system policy, stability and transparency of the legal system" and a "well-targeted environmental policy". A key conclusion that can be drawn from our study is that an efficient management of investment projects in the industrial construction industry is significantly influenced by properly shaped and stable economic, environmental, and legal policies of the state.

Keywords: corporate performance, investment project management, industrial construction, exploratory factor analysis

Introduction

The construction market is a special type of market in that it is very complex, highly imperfect and heterogeneous, which means that it is difficult to study in scientific terms and provides scientists with many complex problems. The imperfection of this market is a result of its anti-features. It can be described as non-mobile, non-liquid, non-mass, non-homogeneous, non-obvious, uncertain, non-transparent, inflexible, not-immediate and ineffective (Ludwiczak, 2017).

In fact, it is impossible to find some complex studies for this market, which would be conducted systematically and updated from time to time. Its extremely complicated nature undoubtedly makes it difficult—and often even impossible—to refer to certain model simplifications in order to see in it a relatively clear picture of the reality. It can be reasonably said that the most appropriate perception, description, and presentation of the construction market requires the widest possible perspective of its examination. In other

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words, it necessitates reference to a holistic approach of a systemic and network nature (Bryx, 2006; Ludwiczak, 2017).

The development process in the construction industry is an exceptionally complex and complicated undertaking. At the same time, it is a unique venture and therefore requires an individual approach. Efficient and effective management of an investment process requires taking into account many conditions and factors that determine its effectiveness and the manner of its implementation in a timely manner. Scientists all over the world have been exploring this topic for years (A. P. C. Chan, Scott, & A. P. L. Chan, 2004; Duy Nguyen, Ogunlana, & Thi Xuan Lan, 2004; Gunhan & Arditi, 2005; Doloi, Sawhney, Iyer, & Rentala, 2012). Of particular importance here is a properly implemented state policy towards companies and corporations from the construction sector. Efficient and well thought-out economic, environmental and legal policies have a significant impact on effective management of investment processes. However, Poland lacks a well-considered and properly implemented state policy in the area of industrial construction, which would have a significant impact on the development of this area of activity. Therefore, it seems important for the functioning of construction companies to assess the impact of economic, environmental and legal policies on the quality and effectiveness of investment project management in order to make up for the gaps and deficiencies of the state system, as well as to indicate corrective and remedial actions in the analysed area.

This paper is structured as follows: First, it provides a certain theoretical background and reviews the literature on the subject, describes basic objectives of the study, as well as its research problems and hypotheses. Next, it presents the method for conducting an empirical study and applied research methodologies that are helpful in the verification of the hypotheses and for the sample selection. In the final part, empirical verification of the variables identified in the questionnaire survey concerning the impact of economic, environmental and legal policies on the management of the investment process in the industrial construction industry is conducted in detail. The values of the separated factors and variables are estimated by means of exploratory factor analysis with the use of the Statistical Product and Service Solutions (SPSS) Statistics software.

Theoretical Background

Scientists for a long time have been trying to identify the factors determining the success of a construction project. However, it is difficult for them to reach a certain consensus. As a general rule, various scholars highlighted five main groups of independent variables, namely project-related factors (Akinsola, Potts, Ndekugri, & Harris, 1997; Songer & Molenaar, 1997; Belout, 1998; Chua, Kog, & Loh, 1999; Dissanayaka & Kumaraswamy, 1999; Kumaraswamy & Chan, 1999; A. P. C. Chan et al., 2004), procurement-related factors (Pocock, Liu, & Kim, 1997, Pocock, Liu, & Tang, 1997; Walker, 1995; Kumaraswamy & Chan, 1999; Walker & Vines, 2000), project management activities (Hubbard, 1990; Jaselskis & Ashley, 1991; Belout, 1998; Chua et al., 1999; Walker & Vines, 2000), personnel factors (Hassan, 1995; Belassi & Tukel, 1996; Chan & Kumaraswamy, 1997; Songer & Molenaar, 1997; Dissanayaka & Kumaraswamy, 1999; Chua et al., 1999; A. P. C. Chan et al., 2004) and the external environment (Akinsola et al., 1997; Kaming, Olomolaiye, Holt, & Harris, 1997; Songer & Molenaar, 1997; Chua et al., 1999; Walker & Vines, 2000), to which they attributed the key role in the project's successful implementation.

In the industrial construction sector, there are countless examples of the impact of a dynamically changing environment on construction processes (Kaming et al., 1997; Li, Cheng, & Love, 2000; Faridi & El-Sayegh, 2006; Pasławski, 2008). One of its elements is the economy and economic state policies, and it is worth taking

a closer look at them. Both analyses of individual processes and entire projects show that changes in economic policy may significantly impede the implementation of investment projects or lead to a significant delay in their completion. In some cases, this results in a lengthening of the implementation time schedule by as much as 30-100%. One example of such an extension of the schedule is the flagship project implemented by the Polish state in the field of energy construction, namely the construction of a terminal for the off-take of liquefied natural gas (LNG) in Świnoujście (Pastuszak, Chadam, Phusavat, & Polkowska, 2013; NIK, 2015).

The vast majority of errors during the implementation of investment projects could be avoided (or at least the impact of errors on the whole process could be significantly reduced) if an appropriate methodology of investment implementation was applied. Many situations that occur during the implementation of investment projects can be predicted and prevented accordingly, e.g., by foreseeing additional time for their resolution or by effectively managing the risks in time schedules and cost projections. It is also worth considering the use of good and proven solutions applied in other countries. These include a long and very thorough preparation of investment projects, development of contingencies for their implementation, as well as the introduction of the standardisation of engineering documentation, e.g., International Federation of Consulting Engineers (FIDIC) (Kapliński, Dziadosz, & Zioberski, 2011). The most appropriate methodology should be aimed at adapting to changing environmental conditions. In particular, it should be as flexible as possible due to an extremely frequent reorientation of the legal, environmental and economic policies of the state. Such an approach is supported above all by the ability to anticipate changes and appropriate measures to mitigate the impact of risks and promotion of the use of potential opportunities. It is also important to have a well-drafted characterisation of a given task, which determines the intensity of the impact of various factors and the so-called non-controlled variables. In industrial construction, one can find countless examples of the impact of dynamically changing environment on construction processes.

Both analyses of individual processes and entire projects show that changes in the environment may lead to difficulties in the realisation of investment projects, e.g., legal problems, quality deteriorations, budget overruns, failures of entire projects, and significant delays in their closures (Leśniak & Pelbankiewicz, 2010). It should also be stressed that construction is a special sector of the national economy in which, due to a very dynamic environment and the lack of control over many factors, it is not possible to precisely plan only one implementation scenario. Therefore, the only effective management style is to adopt the assumption that changes in the progress are a natural phenomenon, and the actions taken by the management conducting the project should be adequate to the interaction between the environment and the construction company itself. Thus, flexibility must be the basis of any efficient management model (Pasławski & Jastrząb, 2009; Kapliński et al., 2011).

Most authors address disturbances that slow down construction works due to external (independent of people) or operational factors. For example, Drzewiecka and Pasławski (2011) referred to two specific cases, i.e., the construction of the Northern Bridge Route in Warsaw and the construction of a water supply system in rural areas, and indicated the high water levels of the Vistula and high groundwater table respectively as important reasons for disturbances in construction processes in the case of these projects. In turn, Dziadosz and Rejment (2012) described the course of construction processes of the commercial-service-office in Poznań. Each project has its own unique implementation conditions which only occur in a specific case, and which are determined by many different factors, and these, in turn, may untimely affect the completion of the project by a contractor, resulting in a decrease in quality or leading to a budget overrun. Delays in the realisation of

construction works and lengthening of investment time schedules are a very common phenomenon today, despite the existence of modern technologies and tools that should theoretically support investment processes (Leśniak & Plebankiewicz, 2010). Generally speaking, the vast majority of scientists dealing with this problem as a source of all difficulties accompanying the investment process distinguish non-systemic reasons, e.g., human factors, contract terms, and other unpredictable factors (Leśniak & Plebankiewicz, 2010). Leśniak and Plebankiewicz (2010) indicated a group of political, economic and legal factors (classifying them as local ones) yet they do not devote much attention to them. Meanwhile, it is the very group of factors that deserves an in-depth discussion, since knowledge about it and the ability to cope with these factors allows for avoiding negative consequences of a systemic nature, especially on the Polish construction market. For example, G. Sweis, R. Sweis, Abu Hammad, and Shboul (2008) indicated three groups of factors responsible for disturbances in investment processes, namely the entry factors (human work, material, equipment and devices, etc.), internal environmental factors (investor, contractor, designer, consultants, etc.), and unpredictable factors (weather conditions, legal regulations, etc.). In other words, the success or failure of investment projects either is dependent on individual parameters of each project and its complexity or on local factors (e.g., climate conditions). This is, of course, true but so far not too many authors have tried to examine the systemic reasons for projects' failures, e.g., how legal, environmental or economic aspects (i.e., external environment) make it impossible or difficult for construction companies to implement their investment processes in an efficient and timely manner. In this paper, an attempt is made to explore this difficult challenge (in the context of Polish business reality).

Literature Review

A. P. C. Chan et al. (2004) studied the issues related to the implementation of construction projects and presented a conceptual framework for critical success factors (CSFs). They identified five groups of independent variables, namely project-related factors, project procedures, project management activities, human factors, and the external environment. These are the factors they defined as essential for the successful development of construction projects. They also pointed to the need for further research on Key Performance Indicators (KPIs) and finding causal links between CSFs and KPIs, indicating these correlations as a useful source of information on successful project implementation.

Generally speaking, the growing uncertainty that accompanies new technologies, budgets and development processes of construction companies makes the whole sector a very dynamic industry. A. P. C. Chan et al. (2004) also noted that construction projects are becoming more complex and difficult. This puts project teams often faced with a very difficult task of adapting to unprecedented changes.

Wing (1997), Li et al. (2000), and Chan, Scott, and Lam (2002) made a comprehensive review of many different articles, based on a similar methodology for assessing project/construction and partnership projects, trying to assess their implementation in terms or the effectiveness, and taking into account critical success factors and their determinants.

A. P. C. Chan et al. (2004) showed that by studying CSFs and drawing conclusions from them, it is possible to significantly improve the effectiveness of implemented projects. However, success is often defined very heterogeneously in the minds of construction experts. Even scientists have problems with establishing a certain general list of constant factors, because their attempts to define CSFs in the construction industry have given different results. In any case, it is difficult to find a consensus. Although some of the proposed variables

are repeated in different studies, there is no generalisation in this respect. There is also a lack of comprehensive study that would cover many construction companies and assess the opinions of sector managers at many different levels, including economic, environmental and legal policies.

The term CSF or critical project success factors (CPSF) was first introduced by Rockart in the early 1980s (Rockart, 1982) and in essence, refers to the factors determining the success of projects. The topic was later addressed by many scientists who studied the construction sector (Sanvido, Grobler, Pariff, Guvents, & Coyle, 1992; Metri, 2005; Toor & Ogunlana, 2009; Banihashemi, Hosseini, Golizadeh, & Sankaran, 2017). In general, the most important CPSFs are those that are related to people working on project preparation and implementation (e.g., site manager), factors related to projects' procedures, project management with all related activities, and all factors related to the external environment, including economic, political, legal, technological and environmental factors.

A large group of scientists pointed to the factors related to the project scope, emphasising its importance for the successful completion of projects (Walker, 1995; Songer & Molenaar, 1997; Dissanayaka & Kumaraswamy, 1999; Kumaraswamy & Chan, 1999). The scope itself can be seen, for example, as a predictor of the amount of time needed to close a project. To assess the scope of a project, Chan et al. (2004) argued that it is necessary to take into account its nature, type, size, and complexity. Other important factors identified by the scientists are those related to procurement issues (Walker 1995; Walker & Vines 2000), public procurement issues and tender procedures, including the criteria for selecting successful bidders (a very sensitive and important issue in Poland and often having a political context, since many aspects of this issue are determined by successive governments and politicians), including the main contractor (Dissanayaka & Kumaraswamy, 1999).

The role of project managers was highlighted by Jaselskis and Ashley (1991). The job of construction site managers is supposed to involve appropriate use of management tools, e.g., planning. In turn, Hubbard (1990) indicated proper communication, feedback from subordinate employees, proper organisational structure, implementation of appropriate control mechanisms (i.e., monitoring), security measures, time schedules planning, problem-solving skills, decision-making skills and the ability to coordinate various management activities. The important issue of controlling subcontractors or other stakeholders should not be forgotten either. According to Belout (1998), previous experience in project implementation is also a must. The pivotal role of experience is also strongly highlighted by Chan and Kumaraswamy (1997). Success is determined by key players on whom a given project depends, i.e., project manager, client, contractor, consultants, subcontractors, suppliers, and producers (Chua et al., 1999). Walker (1995) pointed to the role of the client and his representatives as an important factor determining the effectiveness and efficiency of project management. Also, Songer and Molenaar (1997) highlighted the importance of client-related factors; therefore, it is necessary to know the client's profile well before construction works even begin. Above all, trust must be created between the client and the construction team. Success can also be dependent on such aspects as familiarity with the organisation behind the construction project, project financing, and risk management issues. The project team must have an appropriate project experience, and should understand the complexity of projects, which should later translate into minimising errors/delays in the creation of project documentation (Chan & Kumaraswamy, 1997).

Chan and Kumaraswamy (1997) and later Dissanayaka and Kumaraswamy (1999) focused on factors related to contractors and subcontractors, emphasising their importance for successful project implementation. They pointed also to such issues as involvement of subcontractors, construction supervision, flows of contractor funds, competitiveness, cost control and the speed of information flow. In the era of rapidly

developing technologies and the growing importance of information (as a resource category), the latter issue may turn out to be invaluable. Moreover, Chua et al. (1999) listed the skills and relevant qualities of project managers, their authority and involvement as important. More specifically, everything that concerns project teams and their adaptability, working relationships among team leaders and their subordinates, including the support provided by parent companies. Hassan (1995) argued that successful project implementation depends on the synergy at the level of cooperation between all the stakeholders involved, i.e., investor, contractor, architect, site manager, and subcontractors, etc.

A. P. C. Chan et al. (2004) noticed that success is often determined by a complexity of the project. Generally, there is a common sense logical principle that the less complex is a project, the better are the chances for its successful completion, especially if the investor is a private entity with some experience in the project realisation and provides its own funds. Another important issue is the preparation of project descriptions and effective decision-making.

Akinsola et al. (1997) pointed to external factors. This category includes economic, political, legal and social environment, industrial relations and new technologies. These aspects were also studied in detail by Songer and Molennar (1997) and later by Walker and Vines (2000). There is no new, more up-to-date view on these issues and we want to cover that gap.

Research Problems and the Questionnaire Survey

This paper relies on a questionnaire survey which explores the impact of state policies on the management of investment processes in the area of industrial construction. The surveyed entities constitute a specific group of companies from the industrial construction sector, represented by their management representatives.

The assessment of the influence of the state policy on the processes taking place in the industrial construction industry will constitute the basis for the development of exploratory factor analysis (EFA) model explaining the existing key dependencies and links between the economic, environmental and legal policies and the processes of managing investment projects. The objective of this paper is also to illustrate the economic, environmental and legal policies in the state system, and identify the key factors determining adequate planning and implementation of effective economic, environmental and legal policies in the context of managing industrial construction projects. Another objective is to indicate directions of changes and reorganisation activities that need to be applied in the design and implementation of economic, environmental and legal policies in order to achieve the desired quality of investment process management.

The paper defines a number of research problems that were later addressed in the design of the questionnaire. These are, among others, the following questions: Will the industrial construction market in Poland continue to grow and will it be an important element of the country's economic development? Do companies operating in the industrial construction market in Poland know the legal regulations concerning the management of investment ventures? What is the influence of the state's environmental policy on the effectiveness of investment processes? What is the impact of the state's legal policy on the effectiveness of investment processes? What actions in the economic, environmental and legal policies need to be taken in order to achieve a better quality of management in the industrial construction sector? Will the recommended directions of changes in the economic, environmental and legal policies of the state significantly contribute to the improvement of the speed, quality and economic efficiency of investment process management, which in consequence could exert an influence on the improvement of economic results in the industrial construction market in Poland?

Characteristics of the Research Methods

An appropriate course of the study depends to a large extent on adequately selected research methodology, thanks to which it is possible to conduct an accurate and reliable research. This study is based on both qualitative and quantitative analyses. Qualitative analyses were conducted by using the method of direct individual interviews as well as the participatory observation. Their aim was to identify problems describing the studied phenomenon of the influence of economic, environmental and legal policies on the investment processes in the industrial construction sector. Individual direct interviews were conducted with business owners and representatives of the highest management of the companies operating in the Polish industrial construction market, responsible for making strategic decisions in the area of shaping and managing the investment processes within their companies and having an appropriate level of knowledge in the area of economic, environmental and legal policies of the state. The interviews were conducted in selected companies with a longer period of experience on the market (i.e., over 20 years) and many completed investment projects in the industrial construction area. The selection of companies for a qualitative survey was carried out on the basis of a targeted sample, using a telephone interview method.

The participant observation, which was employed while performing the study, involved a collection of data and information through the researcher's entry into a specific working environment and observation of a given community from within. By participating in a given working environment, the researcher becomes a member of the group, adopts its perspective, and studies its habits, customs and the language of its members (Frankfort-Nachmias & Nachmias, 2001). The study conducted by the participants consisted of uncontrolled observations, whose purpose, and scope, as well as the manner of their recording and measurement, depended on the researchers' discretion.

As part of the qualitative study, a number of personal meetings and interviews were held with stakeholders and top management representatives of the large construction companies, responsible for making strategic decisions. These studies identified a set of problems influencing the investment processes in industrial construction, which were later subjected to empirical verification by means of the questionnaires' responses and their statistical verification based on the exploratory factor analysis.

The questionnaire formed the basis for quantitative analysis and included a metric and a list of relevant questions. It consisted of eight basic questions characterised by 125 variables and five metric questions. The variables representing these questions are shown in Table 1. The contents of the metric questions are presented in Table 2.

Table 1

Questions and Survey Variables Included in the Questionnaire

Symbol	**An industrial construction company implementing investment processes on the market is expected to:**
C1	Continuously monitor the national economic situation
C2	Continuously monitor the environment
C3	Monitor the emergence of new technologies (availability of staff and their attitude towards new technologies; technical requirements defined by public administrations before obtaining permits for investments)
C4	Record and analyse events that occur
C5	Monitor and analyse innovative competition strategies
C6	Monitor and analyse innovative concepts of investment project management
C7	Monitor the market and competitors' activities
C8	Monitor domestic/foreign demand

Table 1 to be continued

C9	Identify financial factors and expected returns (availability of the sources of investment financing and knowledge about their costs; return on investments; lack of non-investment opportunities so as to use the available funds, etc.) through financial operations
	The key factors influencing effective and efficient investment project management in the state' economic policy are dependent on:
C10	Stability of the economic system
C11	Stability of the political system
C12	Stability of the social system
C13	Stability of the legal system
C14	Predictability of state policies
C15	Availability of qualified managers
C16	Availability of executive staff
C17	Access to public and EU grants
C18	Access to bank loans
C19	Access to bank guarantees to secure good performances of the agreements and completions of investment projects on time
C20	Introduction of new taxes which increase investment costs and operational costs of construction companies
C21	New taxes introduced: - Sporadically
C22	- Every four years
C23	- Once a year
C24	- Several times a year
C25	Stable, transparent and simplified tax law
C26	Economic policy towards companies in the industrial construction sector is not properly implemented (or does not exist)
C27	Lack of the preparation of a complex reform in the structure of the operation of state and local government offices (e.g., the reform of the organisation of the National Water Management Holding Polish Waters)
	The key factors influencing the implementation of the investment processes are as follows:
C28	Legal acts
C29	Public consultations on new legislation
C30	Easy-to-understand and well-ordered construction law
C31	Introduction of a massive number of laws, acts and regulations (approx. 400 per year)
C32	Well-ordered construction code, prepared in a clear and unambiguous way
C33	Knowledge of construction regulations among managers
C34	Implementation of the conclusions resulting from the conducted construction reports
C35	Changing building regulations: - Several times a year
C36	- Once a year
C37	- Every two years
C38	- Every four years
C39	Consistent legal provisions on investment processes
C40	Necessity of using a lawyer to provide an unambiguous interpretation of current legislation in the area of construction regulations
C41	Ability to familiarise oneself promptly with changes in legislation
C42	Availability of reports on construction and investment projects/processes, which are prepared on behalf of individual ministries and government agencies
C43	Introduction of partnership agreements with self-government and state entities, and their honouring, which guarantees certainty of business transactions and legal stability
C44	Acceptable time limit from the first hearing to the delivery of a judgment in commercial cases, which should not exceed: - One month
C45	- Three months
C46	- Six months
C47	- Six to nine months
C48	- More than 9-12 months

Table 1 to be continued

C49	Deadline for setting the first hearing from the moment of filing the statement of claim should not be longer than: - One month
C50	- Three months
C51	- Six months
C52	- Six to nine months
C53	- More than 9-12 months
C54	Existing pace of resolving court cases (e.g., involving the General Directorate for Road and Motorway) considerably influences the economic situation managed by your company
	The key environmental policy factors affecting the implementation of the investment projects/process are:
C55	Time limit for issuing a decision on whether a given investment requires an environmental decision
C56	Water-legal permits for groundwater pumping
C57	Easy-to-understand, transparent and structured provisions of the Environmental Protection Act
C58	Awareness of environmental legislation/procedures among managers
C59	Simplified and well-structured environmental procedures
C60	Procedures for obtaining a building permit, environmental decision or a water-legal permit, which should not take longer than: - 65 days (in accordance with the construction law)
C61	- 90 days (three months)
C62	- 120 days (four months)
C63	- 180 days (six months)
C64	- 24 months
C65	Quick and effective environmental decision making
C66	Comprehensible and transparent environmental decisions and legal acts that can be easily understood by employees (e.g., by foremen, facility managers, works managers, site managers)
	Technological factors influencing the implementation of the investment projects/processes include:
C67	Awareness of technologies available on the global markets
C68	Good and proven technologies
C69	Availability of technologies, in terms of: - Delivery time from the moment of placing an order
C70	- Delivery value
C71	- Reasonable time of delivery
C72	- Warranty period
C73	- Efficient, quick post-warranty service
C74	Risk assessment of the use of specific technologies
C75	Use of modern design methods, e.g., BIM
	Economic system stability comprises:
C76	Average unemployment rate at which job finding takes: - One month
C77	- Three months
C78	- Six months
C79	Low inflation rate
C80	Positive GDP growth: Over one year
C81	Over one to two years
C82	Over two to three years
C83	Over three to four years
C84	Over more than four years
C85	Stable currency exchange rates
C86	Long-term law and regulations stability (e.g., over decades)
C87	Political stability of the country
C88	Social stability of the country

Table 1 to be continued

C89	Balanced exports with imports
C90	Excess of export over import
C91	Excess of imports over exports
C92	Balance of payments and state budget
C93	Balance between an increase in consumption and an increase in production
C94	Growing foreign investments
C95	Legal system adapted to the needs of conducting business activities (i.e., effective and transparent legal regulations)
C96	Strong competition on the market
C97	Lack of competition on the market
	Stability of the political system is conducive to investment projects when:
C98	Political environment is secure, stable, effective and adapted to business needs
C99	Political system effectively responds to the economic challenges (i.e., government policy responds quickly and effectively to changes in the economy)
C100	Corruption is at a low level
C101	Democracy is well developed
C102	Professional, non-partisan civil service
C103	Fair and transparent competitions for civil service positions
C104	Substantive assessment of a candidate as the basic criterion for filling positions in public administration, State Treasury and utility companies
	Social system stability is determined by:
C105	Constant communication with representatives of non-governmental, pro-social, economic, legislative or trade union organisations.
C106	Adequate and sustainable pension system
C107	Adequate pro-family state policy
C108	Adequate pro-social state policy
C109	Effective tripartite committee
C110	Credibility of the government
C111	HR policy pursued by the Government, supporting the construction projects/processes
C112	Working conditions for employees
C113	Freedom of movement for workers
C114	Qualified workforce
C115	Opportunities for development and vocational training of employees
C116	Visas issued to employees: - For a one-year period
C117	- For the two-year period
C118	- For the three-year period
C119	- For the four-year period
C120	- until the completion of construction work
C121	Government that simplifies procedures (through social policies) related the employment of foreign workers for the length of construction processes (e.g., by amending the law so as to allow workers to be accommodated at construction sites in containers)
C122	Changes in the law so that the existing facilities together with the social facilities be operational for the entire length of the investment project or so that it is possible to obtain one-off notifications for the entire duration of the construction contract
C123	Adjusted legal provisions on registration, making it possible to build facilities within 30 days (which is widely implemented at construction sites in Germany)
C124	Impact of social programmes on the labour market, e.g., the “500+” child benefit programme
C125	Social peace

Table 2

Questions Related to Respondents' Particulars (Metric Questions)

Symbol	Question
M1	How many investment projects in the area of industrial construction have been implemented by your organisation?
M2	In which voivodeship is located the headquarters of your organisation (please select only one answer)?
M3	What is the size of your organisation (please select only one answer)?
M4	What is the size of your organisation including subcontractors (please select only one answer)?
M5	How many years has your organisation existed on the market?

The questionnaire was built on the basis of a five-point Likert scale (1 = "I strongly agree"; 2 = "I rather agree"; 3 = "Hard to say"; 4 = "I rather disagree"; and 5 = "I strongly disagree"). Respondents were asked to tick off the answer in one of the categories. The survey was anonymous and impersonal. The results of the questionnaire survey were verified with the exploratory factor analysis (EFA). This statistical method was used to investigate the internal relationships between a large number of distinguished variables and to describe these variables with a reduced number of hidden factors. The examined factors are initially unknown, but they are identified while analysing the values of random variables. Therefore, the aim of the EFA method is to reduce the number of variables employed in the questionnaire and to find a new set of variables, less numerous than the original one, reflecting the interdependencies between the observable variables.

In this way, selected analytical tools allowed for a deeper identification of the studied problems, determination of the current state of the examined phenomenon, and a formulation of the conclusions.

Selection and Characteristics of the Study Sample

Empirical examination included two types of studies, namely the pilot study and the main one. The purpose of the pilot study was to examine the questionnaire design in terms of its correctness and legibility against the backdrop of the designed research questions, while the main study concerned the analysis and assessment of the impact of economic, environmental and legal policies on the efficient management of investment processes in the industrial construction sector. Its aim was also to identify the improvement and reorganisation measures that should be adopted in the state policies. Both the pilot and main studies were conducted on a targeted sample, called the non-probabilistic selection. The targeted sample was used because of the value and quality of the information collected. When selecting respondents for the survey, they were expected to have a greater knowledge of the issues related to the analysed area. In order to ensure as much representativeness of the targeted sample as possible and its adequacy in relation to the surveyed phenomenon, reliable surveys were conducted among 158 representatives of the management staff of the industrial construction companies in Poland. However, several questionnaires were rejected due to the lack of proper data in the questionnaires. Only 141 correctly filled in questionnaires were accepted for further analysis.

The empirical survey was conducted between January and July 2018. The structure of the research sample was made up of respondents selected according to the number of completed investment projects in the industrial construction sector. The most numerous were the group of companies which completed up to 15 investment projects during the whole period of their activity (see Table 3). These companies accounted for over 58% of all surveyed entities (82 companies in total). Over 18% (26 companies) were companies which implemented between 16 and 30 investment projects. The least numerous group were companies, which completed over 100 investment projects (3.55%).

Table 3

The Structure of the Realised Research Sample in Relation to the Number of Completed Investment Projects in the Industrial Construction Sector

Ranges	0-15	16-30	31-50	51-100	101-500	Total
Number of companies (%)	82 (58.16%)	26 (18.44%)	14 (9.93%)	14 (9.93%)	5 (3.55%)	141 (100%)

The obtained research sample consisted of respondents from companies from all over the country. However, a significant over-representation could be attributed to the representatives of the Mazowieckie Voivodeship (central part of Poland). In total in the survey took part 69 companies from the Mazowieckie Voivodeship, which accounted for 48.94% of all that took part in the survey (see Table 4). Over 8% (12 companies) were from the Wielkopolskie Voivodeship, over 7% from the Łódzkie region, and over 6% were companies from the Dolnośląskie Voivodeship. The least numerously represented was the Podkarpackie region (0.71%).

Table 4

Structure of the Research Sample by Voivodeship

Voivodeship	Number (%)	Voivodeship	Number (%)	
Mazowieckie	69 (48.94)	Opolskie	2 (1.42)	
Małopolskie	4 (2.84)	Wielkopolskie	12 (8.51)	
Kujawsko-Pomorskie	4 (2.84)	Łódzkie	10 (7.09)	
Warnińsko-Mazurskie	2 (1.42)	Świętokrzyskie	2 (1.42)	
Podlaskie	7 (4.96)	Pomorskie	6 (4.26)	
Dolnośląskie	9 (6.38)	Śląskie	3 (2.13)	
Lubelskie	4 (2.84)	Zachodniopomorskie	3 (2.13)	
Podkarpackie	1 (0.71)	Lubuskie	3 (2.13)	
Total	100 (70.92)		41 (29.08)	141 (100)

The structure of the conducted research sample by the size of employment is presented in Table 5. It shows differences in terms of the number of people employed in the surveyed companies. Most of them were small companies (with 11 to 50 employees), constituting 37.59% of the surveyed sample, and medium-sized companies (with 51 to 250 employees), constituting 32.63% of the surveyed sample.

Table 5

Employment Structure in the Analysed Companies

Number of employees	1-10	11-50	51-250	Over 250	Total
Number of companies (%)	29 (20.57%)	53 (37.59%)	46 (32.63%)	13 (9.22%)	141 (100%)

The structure of the realised research sample by the size of employment in the surveyed organisation with its subcontractors is presented in Table 6, which shows that the most represented group were medium and large companies with a number of employees from 51 to 100 including subcontractors (24.11%). The least numerous was the group of large companies (12.06%).

Table 6

The Employment Structure in the Analysed Companies Including Subcontractors

Range	1-50	51-100	101-200	201-500	Over 500	Total
Number of companies (%)	32 (22.70%)	34 (24.11%)	31 (21.99%)	27 (19.15%)	17 (12.06%)	141 (100%)

The structure of the realised research sample by company age is presented in Table

Table7, which shows that the most numerous group comprised the companies under 30 years of age (93.62%). In turn, the least numerous group of companies were the ones whose period of existence on the market ranged from 31 to 50 years (2.13%).

Table7

Structure of the Realised Sample by Company Age

Ranges	0-15	16-20	21-30	31-50	Over 50	Total
Number of companies (%)	65 (46.10%)	25 (17.73%)	42 (29.79%)	3 (2.13%)	6 (4.26%)	141 (100%)

Analysis and Evaluation of Empirical Results

The statistical analysis of the empirical research findings aims at determining which survey variables form a hidden data structure and can be described with a relatively simple mathematical model. In order to analyse the survey results, the exploratory factor analysis has been applied, which allows for exploration and discovery of the hidden data structure contained in the respondents' answers. The research was based on the assumption that we do not know the hidden data structure *a priori*, hence the exploratory factor analysis is applicable here. All statistical calculations were performed in the SPSS Statistics software.

A mutual correlation of questions (variables) is sought, which can create one more general dimension, referred to as a factor. While performing the exploratory factor analysis, a method known as the principal axis factor (PAF) was employed, and additionally, for the verification of the correctness of the results was applied the centroid method of factor extraction. The difference between these two methods is subtle, and in the end, it boils down to small differences in the value of individual factor loadings. Also, in order to optimise the loadings, we used the Varimax rotation.

At the initial stage of the analysis, it was not certain whether the proposed questionnaire was properly designed and whether its results were reliable, so the correctness (i.e., reliability of the adopted scale) of the survey results had to be checked first, with the use of the α-Cronbach index. Moreover, because we were looking for a data structure hidden in the statistical results, the knowledge of control indicators (KMO and Bartlett's) would give us important information on the quality of data extracted from the analysed questionnaires. In this way, it was possible to estimate whether the obtained results met the basic criteria of statistical variables, e.g., whether respondents' answers formed a normal distribution and whether the variables correlation matrix was appropriate for the use of EFA. The most popular method of data scales reliability analysis is the α-Cronbach index. It is a measure that determines the consistency of the entries on a given scale, i.e., whether they are similar to each other and whether they reflect the same phenomenon under study. Thanks to this measure, it is possible to exclude those questions from the survey that underestimate the reliability of the analysis. The α-Cronbach index assumes values from 0 to 1. The higher the value is, the greater the reliability of the scale is. It is assumed that values above 0.7 indicate correct reliability of the scale. On the other hand, the results above 0.9 suggest some redundancy (i.e., repeatability) of the designed questions.

Table 8

Results of the α-Cronbach Analysis

Adequacy of measurement scales	
α-Cronbach	Number of variables
0.914	122

The overall score of 0.914 turned out to be a very good result. It suggests only a small degree of the repetitiveness of issues in the subsequent questions. The analysis of the assigned Cronbach's alphas for the exclusions of subsequent questions gives us an answer as to whether it is necessary to modify the survey and exclude some of the designed questions (see Table 9).

Table 9

α-Cronbach Values When Excluding the Variable

Variables statistic					
Variables	α-Cronbach after the elimination of the variable	Variables	α-Cronbach after the elimination of the variable	Variables	α-Cronbach after the elimination of the variable
1	0.912	42	0.912	83	0.912
2	0.912	43	0.912	84	0.912
3	0.913	44	0.914	85	0.913
4	0.913	45	0.913	86	0.915
5	0.912	46	0.915	87	0.913
6	0.913	47	0.915	88	0.917
7	0.912	48	0.913	89	0.913
8	0.913	49	0.915	90	0.913
9	0.913	50	0.915	91	0.913
10	0.912	51	0.916	92	0.912
11	0.912	52	0.913	93	0.914
12	0.913	53	0.912	94	0.916
13	0.912	54	0.913	95	0.912
14	0.912	55	0.912	96	0.912
15	0.912	56	0.915	97	0.912
16	0.912	57	0.912	98	0.912
17	0.913	58	0.912	99	0.913
18	0.912	59	0.916	100	0.913
19	0.912	60	0.916	101	0.912
20	0.914	61	0.915	102	0.912
21	0.915	62	0.912	103	0.913
22	0.916	63	0.913	104	0.913
23	0.916	64	0.913	105	0.912
24	0.915	65	0.912	106	0.913
25	0.912	66	0.912	107	0.912
26	0.913	67	0.912	108	0.912
27	0.914	68	0.912	109	0.912
28	0.912	69	0.912	110	0.912
29	0.912	70	0.912	111	0.912
30	0.912	71	0.912	112	0.913
31	0.912	72	0.913	113	0.917
32	0.912	73	0.915	114	0.916
33	0.913	74	0.913	115	0.915
34	0.912	75	0.916	116	0.915
35	0.913	76	0.911	117	0.915
36	0.914	77	0.916	118	0.913
37	0.915	78	0.915	119	0.913
38	0.916	79	0.914	120	0.913
39	0.912	80	0.913	121	0.913
40	0.913	81	0.912	122	0.913
41	0.912	82	0.912		

As can be seen in Table 9, when excluding individual questions α-Cronbach changes between 0.911 and 0.917. The variability of the Cronbach's alpha is small, so there is no need to exclude any of the questions from the designed survey questionnaire.

The next step of the study was to check whether the results of the survey could be subjected to the exploratory factor analysis. To this end, we employed the Bartlet's sphericity test and the Kaiser-Meier-Olkin (KMO) measure. The values of the tested indicators provide an answer to the question of whether it makes sense to use the EFA. The expected value of KMO as a measure of the input variables adequacy for factor analysis was above 0.5, meaning that this method of analysis is justifiable. Bartlett's sphericity test verifies the unitary correlation matrix hypothesis and if it is significant, the factor model seem to be appropriate since the variables are significantly correlated.

Table 10

Values of the Bartlett's and KMO Test Indices for All Variables

Bartlett's test of sphericity	Chi-square	15,597.115
	Degrees of freedom	7381
	Significance	0.000
KMO		0.537

The KMO measure of 0.537 provides a basis for conducting the exploratory factor analysis, however, this result is moderate (i.e., a result that falls within the range of 0.5-0.7). On the other hand, in the case of EFA method, which is assumed to employ a larger set of general data, the link between the results is less pronounced. The Bartlett's test measures the value of the Chi-square statistics and then compares it with the top critical value for a given number of degrees of freedom. The null hypothesis is rejected if the Chi-square is greater than the critical value. In this case, Bartlett's test is rounded to the nearest 0.000 and is smaller than critical (0.050), therefore the exploratory factor analysis can be performed.

The first step in the exploratory factor analysis was a determination of eigenvalues. In our study, there were 122 of them, as many as statistical variables, i.e., questionnaire questions. Unfortunately, due to the singularity of the correlation matrix, i.e., its determinant turned out to be very small (i.e., of the order of 1e-40), it was necessary to apply certain measures to improve the situation. This could be achieved by adding a small value to the main diagonal and then by standardising the correlation matrix so that the values of the main diagonal were constantly equal to 1. Such modification of the matrix worsened the accuracy of calculations, so we had to remember that EFA results were no longer accurate. Table 11 presents 22 non-negative eigenvalues obtained with the principal factor analysis method. The number of eigenvalues determines the maximum number of factors in the analysis. The second column of Table 11 describes the eigenvalue, and the subsequentone describes the percentage of the analysed variance (i.e., contribution of a given eigenvalue). The third and fourth columns represent the cumulative eigenvalues and the cumulative percentage of the explained variance, respectively.

The first factor is definitely dominant and explains more than 17% of the variance, whereas the second factor explains only 6% and the third one 4%, respectively. Eigenvalues smaller than 1, i.e., those that describe at most one variable, were not be taken into account. When selecting the number of factors it is necessary to analyse the scree plot and the factor loadings.

Table 11

Eigenvalues of the Correlation Matrix

	Eigenvalues			
	Method: Principal Factor Analysis			
	Eigenvalue	% of the total variance	Cumulative eigenvalue	Cumulative % of variance
1	21.06584	17.26708	21.06584	17.26708
2	7.08507	5.80743	28.15091	23.07451
3	5.33493	4.37289	33.48584	27.44741
4	3.85514	3.15995	37.34098	30.60736
5	3.44964	2.82757	40.79062	33.43493
6	3.24054	2.65618	44.03115	36.09111
7	2.68240	2.19869	46.71356	38.28980
8	2.37718	1.94850	49.09073	40.23830
9	2.15878	1.76949	51.24951	42.00779
10	1.99471	1.63501	53.24421	43.64280
11	1.86492	1.52862	55.10913	45.17142
12	1.74043	1.42658	56.84956	46.59800
13	1.66813	1.36732	58.51769	47.96532
14	1.60462	1.31526	60.12231	49.28058
15	1.52384	1.24905	61.64615	50.52963
16	1.49113	1.22224	63.13728	51.75187
17	1.33078	1.09080	64.46806	52.84267
18	1.28965	1.05709	65.75771	53.89976
19	1.25614	1.02962	67.01385	54.92938
20	1.14595	0.93930	68.11677	55.83341
21	1.07226	0.87890	69.18903	56.71232
22	1.04798	0.85900	70.23701	57.57132

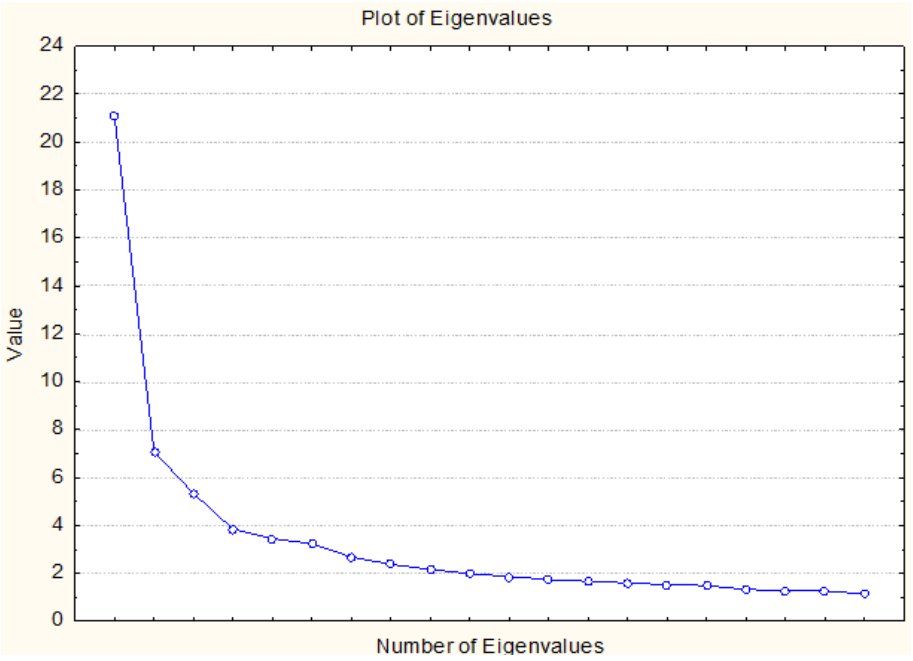

Figure 1. The scree plot.

The scree plot (see Figure 1) confirms the dominance of one factor over other factors. The graph points to the selection of only three factors (the remaining ones constitute the scree of data), however relatively high eigenvalues of subsequent factors that were considered as the scree suggested a careful analysis of the factor loadings in order to make a final choice of the actual number of factors under study.

Analysis of non-rotated factor loadings, including the ones above 0.7, revealed the existence of a hidden data structure covering only 15 variables (i.e., questions) out of the total of 122 survey variables.

The number of variables forming the data structure presented in Table 12 can be increased by slightly reducing the requirements for the necessary factor loading (to 0.6) and by rotating the obtained results (e.g., with the use of Varimax rotation) in order to optimise the obtained structure (see Table 13).

Table 12

Factors Structure

	Factors (not rotated) Method: Principal Factor Analysis Loadings > 0.70			
	Factor 1	Factor 2	Factor 3	Factor 4
1	V_16	V 14	V_115	V_36
2	V_101	V_21	V_116	V_38
3		V_22		
4		V_24		
5		V_74		
6		V_76		
7		V_77		
8		V_78		
9		V_79		

Table 13

Factors Structure After Rotation and for Factor Loadings Greater Than 0.6

Factor 1	Factor 2	Factor 3	Factor 4	Factor 7	Factor 8	Factor 9	Factor 12	Factor 13	Factor 14	Factor 15	Factor 22
V_53	V_1	V_12	V_13	V_3	V_113	V_60	V_10	V_37	V_88	V_11	V_45
V_55	V_10	V_15	V_25	V_65	V_114	V_61	V_21			V_95	
V_56	V_14	V_16	V_30	V_66						V_96	
V_57	V_19	V_85	V_32	V_68						V_97	
V_58	V_21	V_101	V_35	V_69							
V_62	V_22	V_105	V_36	V_70							
V_63	V_24	V_108	V_38	V_72							
	V_74	V_109	V_39								
	V_76	V_110	V_43								
	V_77	V_111	V_83								
	V_78	V_115									
	V_79	V_116									

The rotated loadings structure presented in Table 13 shows that Factors 1, 2, 3, 4, 7, and 15 seem to be significant. We reject the remaining factors as insignificant and of a little general character. Factor loading values of these general factors are shown in Table 14.

Table 14

Factor Loadings for Selected Factors

Factor 1	Factor 2	Factor 3	Factor 4	Factor 7	Factor 15
0.671	0.752	0.759	0.632	0.807	0.659
0.640	0.645	0.749	0.644	0.608	0.663
0.896	0.755	0.732	0.677	0.638	0.639
0.620	0.751	0.765	0.678	0.644	0.700
0.651	0.713	0.761	0.748	0.620	
0.660	0.807	0.719	0.899	0.678	
0.734	0.850	0.704	0.821	0.782	
	0.788	0.727	0.673		
	0.769	0.721	0.648		
	0.832	0.750	0.693		
	0.843	0.822			
	0.812	0.805			

After rotation and with slightly reduced loadings (to 0.6), the factor analysis indicated that there was a link between 52 variables and the overall number of 122 survey questions.

Verification of the correctness of the results performed with the use of the centroid method yielded an identical data structure with approximated factor loadings as shown in Table 15.

Table 15

Factor Loadings Determined by the Alternative Centroid Method

Factor 1	Factor 2	Factor 3	Factor 4	Factor 7	Factor 15
0.853	0.776	0.738	0.621	0.683	0.654
0.625	0.740	0.622	0.640	0.639	0.682
0.647	0.735	0.784	0.649	0.900	0.690
0.615	0.760	0.748	0.708	0.599	0.638
0.615	0.763	0.709	0.757	0.664	
0.668	0.716	0.803	0.899	0.693	
0.779	0.695	0.838	0.853	0.749	
	0.738	0.781	0.654		
	0.719	0.749	0.646		
	0.727	0.876	0.702		
	0.837	0.854			
	0.839	0.825			

The centroid method slightly changed the order of factors in that for the Factor 7 the Variable 57 no longer met the reduced factor loading criterion (it was only marginally below the value 0.6, which could be considered a minor deviation). For the revealed 52 relevant variables (see Table 15), the reliability of scales was again verified with the use of the Cronbach's alpha parameter (see Table 16) and the KMO and Bartlett's tests (see Table 17). The exclusion from the analysis of insignificant variables reduced the Cronbach's alpha slightly below 0.9, which allowed to evaluate the accepted set of variables as optimal and not showing any signs of redundancy.

Table 16

α-Cronbach for the Selected Set of Variables

α-Cronbach	Number of variables
0.895	52

Table 17

Results of the α-Cronbach Analysis With Exclusions (With Elimination of the Variables)

Variables	α-Cronbach after the elimination of the variable	Variables	α-Cronbach after the elimination of the variable	Variables	α-Cronbach after the elimination of the variable
V_1	0.890	V_38	0.901	V_77	,900
V_3	0.893	V_39	0.890	V_78	,897
V_10	0.890	V_43	0.891	V_79	0.896
V_11	0.891	V_53	0.892	V_83	0.890
V_12	0.892	V_55	0.891	V_85	0.895
V_13	0.890	V_56	0.897	V_95	0.891
V_14	0.891	V_57	0.890	V_96	0.890
V_15	0.890	V_58	0.890	V_97	0.890
V_16	0.890	V_62	0.889	V_101	0.890
V_19	0.890	V_63	0.893	V_105	0.892
V_21	0.901	V_65	0.890	V_108	0.891
V_22	0.903	V_66	0.890	V_109	0.890
V_24	0.900	V_68	0.890	V_110	0.891
V_25	0.890	V_69	0.891	V_111	0.891
V_30	0.890	V_70	0.890	V_115	0.900
V_32	0.891	V_72	0.893	V_116	0.900
V_35	0.893	V_74	0.894		
V_36	0.897	V_76	0.890		

The values of Cronbach's alpha after excluding individual variables oscillated in the range between 0.889 and 0.903. Similarly as before, the variability of the alpha was small and there was no clear necessity to eliminate additional variables from the analysis.

For the selected set of data, the Kaiser-Meyer-Olkin (KMO) measure was equal to 0.874, well above the required minimum (i.e., 0.5 required). Such a high value indicates that the EFA method is very useful and therefore we could expect a high degree of reduction in the analysed variables. Like in the case of the analysis of the complete questionnaire with all variables, the Bartlett test was rounded to 0.000 and turned out to be smaller than the critical value 0.050, hence we could perform the EFA method.

Table 18

The Kaiser-Meyer-Olkin Adequacy Measure and Bartlett's Test

Kaiser-Meyer-Olkin adequacy measure		0.874
Bartlett's sphericity test	Chi-square	5,747.614
	Degrees of freedom	1326
	Significance	0.000

After assessing the adequacy of the modified set of input data, we estimated the eigenvalues of 52 variables. They were determined with the use of PAF method (see Table 19). The correlation matrix determinant was very small (1e-20) yet much larger than in the previous analysis. Again, it was necessary to apply mathematical procedures (i.e., the diagonal modification and matrix standardisation) in order to determine the eigenvalues of the matrix. The number of eigenvalues was reduced to six. The results indicate the dominant role of the first eigenvalue with almost 40% share in the total variance. The share of other eigenvalues increased only significantly. The abovementioned six factors accounted for more than 83% of the variance.

Table 19

Eigenvalues of the Correlation Matrix

	Eigenvalues			
	Method: Principal factor analysis			
	Eigenvalue	% of the total Variance	Cumulative eigenvalue	Cumulative % of Variance
1	20.55642	39.53157	20.55642	39.53157
2	10.24440	19.70077	30.80082	59.23234
3	5.62593	10.81910	36.42675	70.05145
4	3.21814	6.18873	39.64489	76.24018
5	2.30600	4.43462	41.95089	80.67480
6	1.41829	2.72748	43.36918	83.40227

Presented below (see Figure 2) is the scree plot showing the dominance of one factor (with a total of six significant factors). The plot takes a favourable shape for the analysis with a minor significance of the data in the scree.

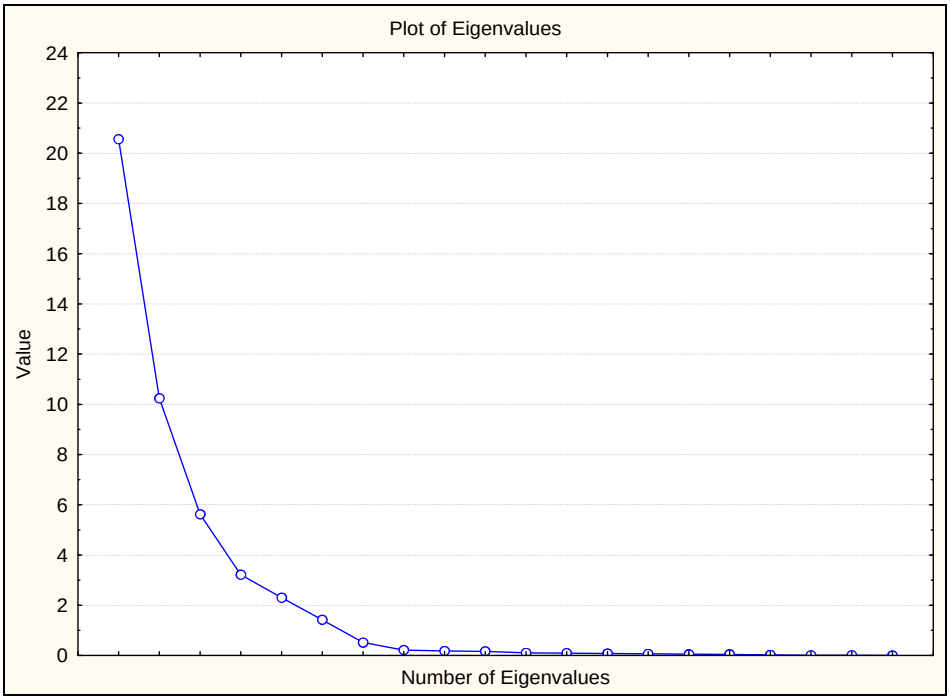

Figure 2. Plot of eigenvalues.

After the determination of eigenvalues, we estimated the factor loadings, initially without rotation and then with rotation so as to maximise the loadings and accentuate their structure. The sorted factor loadings for Varimax rotation are shown in Table 20.

Table 20

Sorted Factor Loadings for the Selected Set of Variables

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
V_3	0.761	0.252	0.193	0.199	0.201	-0.268
V_65	0.816	-0.010	0.223	0.266	0.229	0.095
V_66	0.809	-0.082	0.207	0.331	0.177	0.045
V_68	0.800	0.011	0.267	0.284	0.195	-0.042

Table 20 to be continued

V_69	0.763	-0.038	0.210	0.385	0.211	-0.088
V_70	0.827	-0.034	0.213	0.182	0.240	0.074
V_72	0.698	0.301	0.208	0.246	0.203	-0.353
V_97	0.611	-0.005	0.219	0.355	0.329	0.369
V_11	0.527	0.079	0.319	0.388	0.239	0.354
V_95	0.592	0.044	0.290	0.277	0.329	0.331
V_96	0.528	0.041	0.266	0.405	0.341	0.381
V_1	0.082	0.866	0.025	-0.029	0.087	0.206
V_10	0.125	0.677	-0.037	-0.055	-0.004	0.174
V_14	-0.054	0.888	-0.135	-0.085	-0.124	0.002
V_19	-0.012	0.907	-0.076	-0.056	-0.031	0.076
V_21	0.011	0.798	0.176	0.168	0.153	-0.279
V_22	-0.008	0.865	0.126	0.141	0.179	-0.250
V_24	-0.042	0.917	0.058	0.055	0.004	-0.070
V_74	0.001	0.929	0.017	0.048	0.052	-0.004
V_76	0.034	0.892	0.078	0.015	0.090	0.155
V_77	-0.017	0.891	0.097	0.088	0.122	-0.229
V_78	0.016	0.932	0.066	0.027	-0.006	-0.129
V_79	0.038	0.936	0.061	0.035	0.019	-0.073
V_12	0.091	0.161	0.899	0.046	0.088	-0.046
V_15	0.205	-0.102	0.855	0.200	0.192	0.073
V_16	0.286	-0.209	0.810	0.186	0.127	0.187
V_85	0.099	0.174	0.876	0.167	0.080	-0.112
V_101	0.323	-0.183	0.824	0.120	0.074	0.173
V_105	0.124	0.213	0.847	0.140	0.169	-0.157
V_108	0.199	-0.032	0.871	0.184	0.143	0.078
V_109	0.278	-0.043	0.855	0.136	0.167	0.128
V_110	0.225	0.031	0.877	0.100	0.146	0.116
V_111	0.264	-0.101	0.826	0.192	0.144	0.099
V_115	-0.007	0.305	0.826	0.133	0.112	-0.281
V_116	-0.010	0.256	0.845	0.107	0.103	-0.246
V_13	0.313	-0.049	0.154	0.831	0.171	0.152
V_25	0.291	-0.085	0.178	0.832	0.209	0.050
V_30	0.285	-0.141	0.198	0.822	0.161	0.067
V_32	0.107	0.160	0.157	0.846	0.228	-0.125
V_35	0.192	0.135	0.150	0.844	0.153	-0.111
V_36	0.058	0.316	0.188	0.800	0.135	-0.285
V_38	0.132	0.395	0.229	0.681	0.183	-0.287
V_39	0.254	-0.086	0.137	0.817	0.157	0.127
V_43	0.290	-0.024	0.091	0.821	0.152	0.151
V_83	0.266	-0.022	0.117	0.863	0.135	0.055
V_53	0.188	0.172	0.242	0.247	0.808	-0.104
V_55	0.348	-0.088	0.176	0.303	0.754	0.181
V_56	0.095	0.343	0.201	0.192	0.730	-0.369
V_57	0.349	0.007	0.232	0.312	0.716	0.105
V_58	0.380	0.033	0.235	0.178	0.768	0.142
V_62	0.335	-0.020	0.166	0.212	0.796	0.145
V_63	0.227	0.152	0.155	0.256	0.796	-0.162

However, the loadings of variables for Factor No. 6 proved to be too small to distinguish a specific variable. In contrast, the variables representing the 6th significant factor (see Table 14, Factor No. 15) from the previous analysis (i.e., Variables 11, 95, 96, and 97) merged with the 5th factor (see Table 14, Factor No. 7) creating an aggregated Factor No. 1 for the new analysis (see Table 20). Moreover, due to relatively significant loadings for other factors (e.g., 0.405 in relation to 0.528), such a combination is only conditional which has to be factored in when interpreting the results. Table 21 shows the list of variables grouped into factors and their loadings.

Table 21

Variables Selected by Means of EFA Method and Sorted Into Groups Constituting Factors

Var.	Variable name	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
3	Monitor the emergence of new technologies (availability of staff and their attitude towards new technologies; technical requirements defined by public administrations before obtaining permits for investments)	0.761				
65	Good and proven technology	0.816				
66	Availability of technologies in terms of their delivery time from the moment of placing an order	0.809				
68	Availability of technologies in terms of their reasonable time of delivery	0.800				
69	Availability of technology in terms of their warranty period	0.763				
70	Availability of technology in terms of their fast post-warranty service	0.827				
72	Use of modern design methods, e.g., BIM	0.698				
97	Corruption is at a low level	0.611				
11	Stability of the political system	0.527				
95	Political environment is secure, stable, effective and adapted to business needs	0.592				
96	Political system effectively responds to the economic challenges (i.e., government policy responds quickly and effectively to changes in the economy)	0.528				
1	Continuously monitor the national economic situation		0.866			
10	Stability of the economic system		0.677			
14	Predictability of state policies		0.888			
19	Access to bank guarantees to secure good performances of the agreements and completion of investment projects on time		0.907			
21	New taxes introduced sporadically		0.798			
22	New taxes introduced every four years		0.865			
24	New taxes introduced several times a year		0.917			
74	Average unemployment rate at which job finding takes3 months		0.929			
76	Low inflation rate		0.892			
77	Positive GDP growth over one year		0.891			
78	Positive GDP growth over one to two years		0.932			
79	Positive GDP growth over two to three years		0.936			
12	Stability of the social system			0.899		
15	Availability of qualified managers			0.855		
16	Availability of personnel for executive positions			0.810		
85	Social stability of the country			0.876		
101	Substantive assessment of a candidate as the basic criterion for filling positions in public administration, State Treasury and utility companies			0.824		
105	Adequate pro-social state policy			0.847		
108	HR policy pursued by the government, supporting the construction processes			0.871		
109	Working conditions			0.855		

Table 21 to be continued

110	Freedom of movement for workers	0.877		
111	Qualified workforce	0.826		
115	Visas issued to employees for the three-year period	0.826		
116	Visas issued to employees for the four-year period	0.845		
13	Stability of the legal system		0.831	
25	Stable, transparent and simplified tax law		0.832	
30	Easy-to-understand and well-ordered construction law		0.822	
32	Well-ordered construction code, prepared in a clear and unambiguous way		0.846	
35	Construction legislation changing several times a year		0.844	
36	Construction legislation changing once a year		0.800	
38	Construction legislation changing every four years		0.681	
39	Consistent legal provisions on investments processes		0.817	
43	Introduction of partnership agreements with self-government and state entities, and their honouring, which guarantees certainty of business transactions and, consequently, legal stability		0.821	
83	Long-term law and regulations stability (e.g., over decades)		0.863	
53	The time limit for issuing a decision on whether a given investment requires an environmental decision			0.808
55	Easy-to-understand, transparent and structured provisions of the Environmental Protection Act			0.754
56	Awareness of environmental legislation/procedures among managers			0.730
57	Simplified and well-structured environmental procedures			0.716
58	Procedure for obtaining a building permit, environmental decision or a water-legal permit, which should not take longer than 65 days (in accordance with the construction law)			0.768
62	Quick and effective environmental decision making			0.796
63	Comprehensible and transparent environmental decisions and legal acts that can be easily understood by employees (e.g., by foremen, facilities managers, works managers, site managers)			0.796

The exploratory factor analysis showed the existence of a hidden structure in the phenomenon under study. This structure is expressed by the five factors, characterised by the following variables:

- The first factor is characterised by Variables 3, 65, 66, 68, 69, 70, 72, 97, 11, 95, 96;
- The second factor is described by means of Variables 1, 10, 14, 19, 21, 22, 24, 74, 76, 77, 78, 79;
- The third factor consists of Variables 12, 15, 16, 85, 101, 105, 108, 109, 110, 111, 115, 116;
- The fourth factor is characterised by Variables 13, 25, 30, 32, 35, 36, 38, 39, 43, 83;
- The fifth factor is composed of Variables 13, 25, 30, 32, 35, 36, 38, 39, 43, 83: 53, 55, 56, 57, 58, 62, 63.

To sum up, five pivotal factors that are identified explain more than 80% of the volatility covered by the variables recognised within this structure (see Table 19). It is worth noting that the first factor explains almost 40% of the total variance and is the dominant one in the analysed structure, the second—more than 19%, the third slightly more than 10%, the fourth slightly more than 6%, and the fifth 4.43%, respectively.

The next stage consists of assigning names to the factors identified with the use of EFA. They have to reflect all variables that represent a given factor and the strength of the factor-variable relations. The study under consideration describes the following factors: the "availability of technology in a stable political system", "stability of the economic and tax system", "stable social system policy", "stability and transparency of the legal system", and a "well-targeted environmental policy".

Based on the obtained results we propose the empirical model of the impact of economic, environmental and legal policies on the management of the investment processes in the industrial construction sector is proposed, as shown in Figure 3.

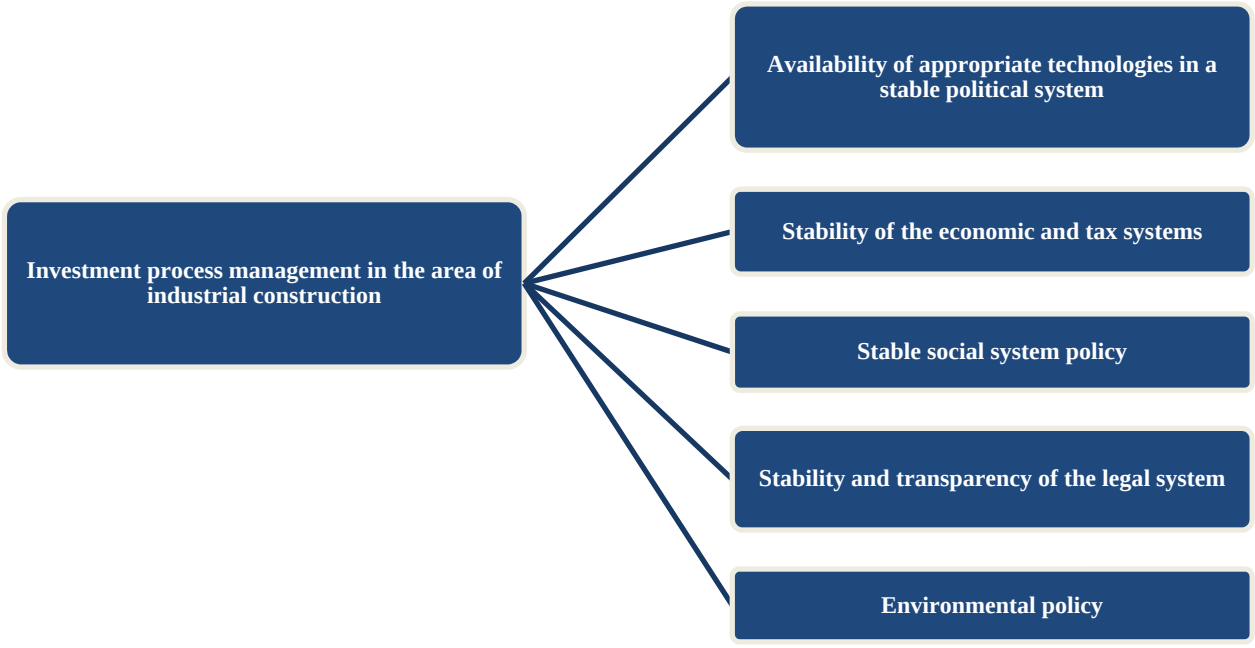

Figure 3. Statistically verified model of the impact of economic, environmental and legal policies on the investment processes management in the industrial construction sector.

Summary and Conclusions of the Study

The empirical study and its statistical verification by means of the exploratory factor analysis revealed the key factors influencing the management of the investment projects in the area of industrial construction in Poland. These factors have been diagnosed as the availability of technology in a stable political system, stability of the economic and tax systems, stable social system policy, stability and transparency of the legal system, and the well-targeted environmental policy.

The first factor "availability of technologies in a stable political system" is represented by: monitoring the emergence of new technologies, good and proven technologies, the availability of technologies (which implies an appropriate delivery date, a warranty term and an efficient post-warranty service), low impact of corruption, as well as the stability of the political system, which effectively respond to economic challenges.

The second factor "stability of the economic and tax systems" was represented in the study by the following variables: constant monitoring of the country's economic situation, stability of the economic system, predictability of state policies, access to bank guarantees to secure good implementation of construction contracts and timely completion of investment projects, new taxes introduced at appropriate time intervals, low average unemployment rate, low inflation rate or positive GDP growth.

The third factor "stable social system policy" points to the availability of qualified managerial staff, availability of personnel for executive positions, substantive assessment of candidates for positions in public

administration as well as in state-owned companies and municipal companies. It also takes into account an adequate pro-social policy of the state, appropriate personnel policy conducted by the government supporting construction processes, as well as appropriate working conditions and free movement of employees.

The management of the investment processes in the area of industrial construction is also strongly influenced by the fourth factor described as the "stability and transparency of the legal system". This factor was represented in the survey by such variables as: stable, transparent and simplified tax law applicable in the construction sector, structured construction code, clearly and unambiguously prepared, consistent legal regulations concerning investment processes, and the introduction and compliance with partnership agreements with local government and state entities.

The last significant factor (the fifth one), referred to as the "environmental policy" has been defined by the variables indicating: clear and structured provisions of the Environmental Protection Act, the term for issuing environmental permits/decisions, knowledge of environmental regulations/legal procedures in the field of environmental protection on the part of management, simplified and properly formulated environmental protection procedures, as well as appropriate procedures to obtain construction permits, environmental decisions or water and legal permits whose issuance according to the Construction Law shall not exceed 65 days, quick and effective environmental decisions and also comprehensible and transparent environmental decisions and legal acts.

All in all, the empirical study indicated factors that are pivotal for companies from the industrial construction sector. A key conclusion that can be drawn from this study is that efficient management of investment projects in the industrial construction industry is significantly influenced by properly shaped and stable economic, environmental and legal state policies.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

References

Akinsola, A. O., Potts, K. F., Ndekugri, I., & Harris, F. C. (1997). Identification and evaluation of factors influencing variations on building projects. *International Journal of Project Management, 15*(4), 263-267. Retrieved from https://doi.org/10.1016/S0263-7863(96)00081-6

Alzahrani, J. I., & Emsley, M. W. (2013). The impact of contractors' attributes on construction project success: A post construction evaluation. *International Journal of Project Management, 31*(2), 313-322. Retrieved from https://doi.org/10.1016/j.ijproman.2012.06.006

Banihashemi, S., Hosseini, M. R., Golizadeh, H., & Sankaran, S. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management, 35*(6), 1103-1119.

Belassi, W., & Tukel, O. I. (1996). A new framework for determining critical success/failure factors in projects. *International Journal of Project Management, 14*(3), 141-151. Retrieved from https://doi.org/10.1016/0263-7863(95)00064-X

Belout, A. (1998). Effects of human resource management on project effectiveness and success: Toward a new conceptual framework. *International Journal of Project Management, 16*(1), 21-26. Retrieved from https://doi.org/10.1016/S0263-7863(97)00011-2

Bryx, M. (2006). *Rynek nieruchomości. System i funkcjonowanie.* Warszawa: Wydawnictwo Poltext.

Chan, D. W., & Kumaraswamy, M. M. (1997). A comparative study of causes of time overruns in Hong Kong construction projects. *International Journal of Project Management, 15*(1), 55-63. Retrieved from https://doi.org/10.1016/S0263-7863(96)00039-7

Chan, A. P., Scott, D., & Lam, E. W. (2002). Framework of success criteria for design/build projects. *Journal of Management in Engineering, 18*(3), 120-128. Retrieved from https://doi.org/10.1061/(ASCE)0742-597X(2002)18:3(120)

Chan, A. P. C., Scott, D., & Chan, A. P. L. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management, 130*(1), 153-155. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(2004)130:1(153)

Chua, D. K. H., Kog, Y. C., & Loh, P. K. (1999). Critical success factors for different project objectives. *Journal of Construction Engineering and Management, 125*(3), 142-150. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(1999)125:3(142)

Dissanayaka, S. M., & Kumaraswamy, M. M. (1999). Evaluation of factors affecting time and cost performance in Hong Kong building projects. *Engineering, Construction and Architectural Management, 6*(3), 287-298. Retrieved from https://doi.org/10.1108/eb021119

Doloi, H., Sawhney, A., Iyer, K. C., & Rentala, S. (2012). Analysing factors affecting delays in Indian construction projects. *International Journal of Project Management, 30*(4), 479-489. Retrieved from https://doi.org/10.1016/j.ijproman.2011.10.004

Drzewiecka, J., & Pasławski, J. (2011). Analiza zakłóceń procesów budowlanych. *Budownictwo i Inżynieria Środowis*ka*, 2*(4). 475-479.

Duy Nguyen, L., Ogunlana, S. O., & Thi Xuan Lan, D. (2004). A study on project success factors in large construction projects in Vietnam. *Engineering, Construction and Architectural Management, 11*(6), 404-413. Retrieved from https://doi.org/10.1108/09699980410570166

Dziadosz, A., & Rejment, M. (2012). Wpływ zakłóceń na opóźnienia procesów budowlanych. Zeszyty Naukowe Politechniki Rzeszowskiej. *Budownictwo i Inżynieria Środowiska, 59*(3), 65-72.

Faridi, A. S., & El-Sayegh, S. M. (2006). Significant factors causing delay in the UAE construction industry. *Construction Management and Economics, 24*(11), 1167-1176. Retrieved from https://doi.org/10.1080/01446190600827033

Frankfort-Nachmias, C., & Nachmias, D. (2001). *Metody badawcze w naukach społecznych.* Poznaniu: ZYSK I S-KA Wydawnictwo.

Gunhan, S., & Arditi, D. (2005). Factors affecting international construction. *Journal of Construction Engineering and Management, 131*(3), 273-282. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(2005)131:3(273)

Hassan, A. Q. (1995). Don't burn that bridge. *Journal of Management in Engineering 11*(6), 22.

Hubbard, D. G. (1990). Successful utility project management from lessons learned. *Project Management Journal, 21*(3), 19-23.

Jaselskis, E. J., & Ashley, D. B. (1991). Optimal allocation of project management resources for achieving success. *Journal of Construction Engineering and Management, 117*(2), 321-340. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(1991)117:2(321)

Kaming, P. F., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1997). Factors influencing construction time and cost overruns on high-rise projects in Indonesia. *Construction Management & Economics, 15*(1), 83-94. Retrieved from https://doi.org/10.1080/014461997373132

Kapliński, O., & Zavadskas, E. (1997). Expert systems for construction processes. *Statyba, 3*(12), 49-61. Retrieved from https://doi.org/10.1080/13921525.1997.10531367

Kapliński, O., Dziadosz, A., & Zioberski, J. L. (2011). Próba standaryzacji procesu zarządzania na etapie planowania i realizacji przedsięwzięć budowlanych, Zeszyty Naukowe Politechniki Rzeszowskiej. *Budownictwo i Inżynieria Środowiska, 58*(3), 79-100.

Kumaraswamy, M. M., & Chan, W. M. (1999). Factors facilitating faster construction. *Journal of Construction Procurement, 5*(2), 88-98.

Leśniak, A., & Plebankiewicz, A. (2010). Opóźnienia w robotach budowlanych. *Zeszyty Naukowe WSOWL, 3*(1), 332-339.

Li, H., Cheng, E. W., & Love, P. E. (2000). Partnering research in construction. *Engineering, Construction and Architectural Management, 7*(1), 76-92. Retrieved from https://doi.org/10.1108/eb021134

Ludwiczak, A. (2017). What is not the real estate market—Problems of researchers. *Finanse, Rynki Finansowe, Ubezpieczenia, 1*(85), 351-361. doi:10.18276/frfu.2017.1.85-28

Metri, B. A. (2005). TQM critical success factors for construction firms. *Management: Journal of Contemporary Management Issues, 10*(2), 61-72

NIK. (2015). Informacja o wynikach kontroli. Realizacja Inwestycji dotyczących budowy terminalu do odbioru skroplonego gazu ziemnego w Świnoujściu.KGP-4101-05-00/2013. *Nr ewid. 187/2014/P/13/058/KGP*. Retrieved February 12, 2019, from https://www.nik.gov.pl/plik/id,8461,vp,10549.pdf

Paslawski, J. (2008). Flexibility approach in the runway pavement using FLEMANCO method. *Transport, 23*(4), 341-350. Retrieved from https://doi.org/10.3846/1648-4142.2008.23.341-350

Pasławski, J., & Jastrząb, T. (2009). *Elastyczność w zarządzaniu realizacją procesów budowlanych. Wydanie 437 z Rozprawy*. Politechnika Poznańska: Wydawnictwo Politechniki Poznańskiej.

Pastuszak, Z., Chadam, J., Phusavat, K., & Polkowska, M. (2013). Strategic project management as component of innovative organization. In *Active Citizenship by Knowledge Management & Innovation: Proceedings of the Management. Knowledge and Learning International Conference* (pp. 897-904). Lublin: ToKnowPress.

Pocock, J. B., Liu, L. Y., & Kim, M. K. (1997). Impact of management approach on project interaction and performance. *Journal of Construction Engineering and Management, 123*(4), 411-418. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(1997)123:4(411)

Pocock, J. B., Liu, L. Y., & Tang, W. H. (1997). Prediction of project performance based on degree of interaction. *Journal of Management in Engineering, 13*(2), 63-76. Retrieved from https://doi.org/10.1061/(ASCE)0742-597X(1997)13:2(63)

Rockart, J. F. (1982). The changing role of the information systems executive: A critical success factors perspective. *Sloan Mgmt. Review, 24*(1), 3-1.

Sanvido, V., Grobler, F., Pariff, K., Guvents, M., & Coyle, M. (1992). Critical success factors for construction projects. *Journal of Construction Engineering and Management, 118*(1), 94-111. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(1992)118:1(94)

Songer, A. D., & Molenaar, K. R. (1997). Project characteristics for successful public-sector design-build. *Journal of Construction Engineering and Management, 123*(1), 34-40. Retrieved from https://doi.org/10.1061/(ASCE)0733-9364(1997)123:1(34)

Sweis, G., Sweis R., Abu Hammad, A., & Shboul, A. (2008). Delays in construction projects: The case of Jordan. *International Journal of Project Management, 26*(1), 665-674. Retrieved from https://doi.org/10.1016/j.ijproman.2007.09.009

Toor, S. U. R., & Ogunlana, S. O. (2009). Construction professionals' perception of critical success factors for large-scale construction projects. *Construction Innovation, 9*(2), 149-167. Retrieved from https://doi.org/10.1108/14714170910950803

Walker, D. H. (1995). An investigation into construction time performance. *Construction Management and Economics, 13*(3), 263-274. Retrieved from https://doi.org/10.1080/01446199500000030

Walker, D. H., & Vines, M. W. (2000). Australian multi-unit residential project construction time performance factors. *Engineering, Construction and Architectural Management, 7*(3), 278-284. Retrieved from https://doi.org/10.1108/eb021152

Wing, C. K. (1997). The ranking of construction management journals. *Construction Management & Economics, 15*(4), 387-398. Retrieved from https://doi.org/10.1080/014461997372953