

# CHARACTERISTIC PROJECT MANAGEMENT MODEL FOUND IN CONSTRUCTION COMPANIES OF BOSNIA AND HERZEGOVINA

*Žanasa Ljevo, Mladen Vukomanović*

Preliminary notes

An estimated 20 % of the current Gross Domestic Product (GDP) in the world today appertains to the project management (PM). However, the legal norms in Bosnia and Herzegovina (BH) still do not acknowledge the project management sector. There is a heavy accent on this issue in the civil engineering sector, which is traditionally a project-oriented economy branch. The research results presented in this study disclose that the civil engineering sector in BH still does not recognize the project management area, and does not apply the PM in this sector's daily processes. Furthermore, the results indicate that solid understanding of the project phases and sub-phases is one of the key factors for the successful project completion and its efficient realization while utilizing all available resources to their full potential. The study also presents a distinctive phase model by which construction companies manage projects in BH, and points out a further need for establishment of a unified project management methodology, which would contribute in acceptance of the project management in BH.

**Keywords:** *Bosnia and Herzegovina, civil engineering, model, project, project management, research, results*

## Istraživanje karakterističnog modela za upravljanje projektima u građevinskim kompanijama u BiH

Prethodno priopćenje

Trenutno se procjenjuje da 20 % svjetskog BDP-a otpada na upravljanje projektima. Zakonske norme u Bosni i Hercegovini (BH) još uvijek ne prepoznaju područje upravljanja projektima, a posebno u građevinarstvu koje je tradicionalno projektno orijentirana grana. Ovaj rad predstavlja rezultate istraživanja, koji pokazuju kako građevinski sektor Bosne i Hercegovine još uvijek ne prepoznaje znanstvena područja koja se bave upravljanjem projektima, te ih ne koristi pri svakodnevnim procesima. Nadalje, rezultati su pokazali kako dobro poznavanje faza i podfaza projekta predstavlja jedan od ključnih faktora za uspješno okončanje projekta i njegovu uspješnu realizaciju s uključenim svim raspoloživim resursima. Rad također predstavlja karakterističan fazni model kojim građevinske kompanije u BiH upravljaju projektima. U daljnjim istraživanjima potrebno je istražiti stvaranje jedinstvene metodologije za upravljanje projektima koja bi pomogla prihvaćanju upravljanja projektima u BiH.

**Ključne riječi:** *Bosna i Hercegovina, građevinarstvo, istraživanje, model, projekt, rezultati, upravljanje projektima*

## 1 Introduction

Project management (PM), as a discipline, has been developing from different branches of economy (including civil engineering). Although the basic concepts were introduced a century ago, the basic PLOC principle (planning, leading, organizing and controlling) has been a wheeling project management discipline and is still present in the majority of the PM methodologies.

Establishment of different international associations for project management, during 1960s and 1970s, opened a pathway for a strong development of the project management profession. Construction industry, as a project-oriented industry, represents an important part in wheeling PM principles. However, there is currently a strong presence of failure to comply with the standards on the construction industry market today, in respect to the following: construction materials, quality and expertise of the work force, references for completion of certain trades, work experience and other related issues, which lead to unsuccessful overall results [1, 2].

The failure to complete the work within the anticipated deadline is consistently present in the construction sector, to a greater or lesser extent [3].

Besides the main factors, various other economic and demographic factors have influenced to some extent the current unfavourable situation of the construction sector. These factors include low utilization of available capacity, unfair competition, inability of proper compensation, delays in resolution of social issues arising within the construction companies, increased number of the disabled

population, illiquidity and slow performance of privatization [3].

Having all this in mind, this study researches the application of project management in the construction industry in Bosnia and Herzegovina (BH). This is required in order to establish a systematic approach for applying standardized project management.

Firstly, this study will review different aspects of project management. Furthermore, it will present and discuss the results of the survey conducted within the construction sector of BH regarding the application of PM. The collected information will be presented in a characteristic phase model for project management. Afterwards it will be tested in a case study of one construction company in BH and at the end of this article, a discussion will be provided, as well as the conclusion of the research results.

## 2 Review of the literature

### 2.1 Project definition

A project is defined as any single human endeavour, which has a clearly outlined goal and is therefore being completed in phases, within the predicted period and with the utilization of a certain number of various limited available resources [1, 2].

Project Management Institute (PMI) defines the project as a specified time commitment focused towards the production of a specific product, service, or result. It is clearly visible from this definition that a project is a temporary activity in nature, which means that it has its

beginning and its end, and is existent with the purpose of creating a specific product [4].

The International Organization for Standardization (ISO) defines a project as a single process consisting of a set of coordinated and controlled activities with a pre-determined start and end. A project needs to accomplish a certain goal driven by the specific need, within the environment consisting of limited time, expenses, and resources [5].

The International Project Management Association (IPMA) defines a project as an endeavour of limited time and expenses which have got to produce the precisely defined set of products in accordance to the targeted goals, recognized quality standard, and the market demand. One of the types of division within the typical project phases is: initializing, planning and designing, execution, monitoring and control, and finally the project closure. These steps are interdependent [6, 7].

This is illustrated in the following Fig. 1.

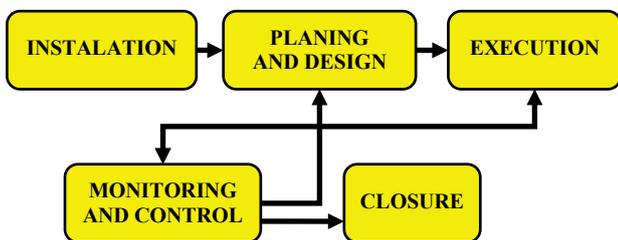


Figure 1 Closed loops in projects [6]

Every project can be viewed through certain phases. As per PMI, the phases occurring within projects, depending on the type of enterprise, are the following:

- Conception and initializing – defining project, identifying needs and capabilities, preparing alternatives and project organization;
- Planning and design – preparation of the initial plans and scathe, creation of the detailed design and completed plan;
- Execution and realization– implementation and co-ordination of all the activities and resources toward the project execution;
- Monitoring and control - involves managing and tracking the project;
- Finalization and close – performance of final activities and tasks in order to accomplish the project's purpose and meet the goals [1, 4, 8].

## 2.2 International associations for project management IPMA and PMI

IPMA - International Project Management Association was founded in 1965, under the name Internet, with the head office based in Zurich. The International Project Management Association (IPMA) held its first World Conference in Vienna in 1967. IPMA is the international non-profit organization for project management. It involves more than 50 different associations for the PM from each continent (56 countries), including the BH Association for Project Management. The IPMA actively promotes and advances project management within companies and associations

world-wide. To increase acknowledgment of PM profession, the IPMA certifies Project Managers on 4 levels, awards successful project teams and research projects, and offers a number of publications for project management. The IPMA is most importantly known for their project management standard – the IPMA Competence Baseline. IPMA defines project management as planning, organization, monitoring and control of all the project aspects, including the motivation of everyone involved to accomplish the project goal through a secure path, within the pre-arranged time, expense and performance criteria [9, 10].

The Project Management Institute (PMI) was established in 1967 with a mission to serve the interests of companies regarding project management. Although it is mostly present on the USA territory, this institution also acts globally through numerous branches in countries across the world. The PMI is involved in almost similar activities as the IPMA. The PMI is best known for their "Guide to the Project Management Body of Knowledge" standard, which ensures the project management leaders obtain the Project Management Professional (PMP) [4]. PMI defines project management as an application of knowledge, skill, and technology on project activities in order to accomplish the project goals [10, 11].

Project management, therefore, represents a balance between the project goals, the plan and the available resources [12].

The IPMA and PMI signed a memorandum in Rome regarding joint action in areas of research and education in PM, with the focus on accelerating the development of this profession [1].

Among other important associations for PM, which made a significant impact on this profession, was the British association for project management, established as INTERNET UK. However, it soon changed its name into Ltd. as the Association for Project Management (APM). Today APM operates as a dominant representative of the PM profession in Great Britain. Australia also established its own association in 1996 for PM, the Australian Institute of Project Management, which is also a member of IPMA [13].

## 2.3 Trends in project management

The PMI Research Conference 2000 published the results of the analyses of work compiled from 1960 to 1999 in the area of Project Management (PM). Fig. 2 reflects the estimated percentage of published literature within certain time frames.

Due to the lack of research and literature in 1960s, only 1 % of the work was published. With increased development and implementation of automated program support for UP, as well as research related to life cycles and procedures, PERT, WBS, the number of published works increased in 1970s by 7 %. With research on project expenses (design-to-cost, life cycle costing), Cost/Systems Criteria (C/SYSCO) and financial analyses (earned value) 29 % of the work was published in 1980s. The work published in 1990s (60 %) explores the area of human resources (team building, leadership development, and motivation), area of risk control, quality and

exchange of knowledge, etc. This all had an influence on drastic increase in quantity of published articles [14].

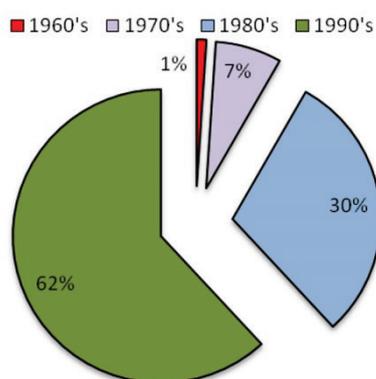


Figure 2 Published articles in given time frames [13]

From 1990 ÷ 2000 the following trends were apparent:

Increased interests in:

- Competency and commitment
- Interpersonal/behavioural
- Stakeholder identification and management
- Communications and communicational planning
- Performance measurements, goal specifications /objectives and benefits
- Cost management
- Project planning and control
- Risk management
- Quality management [14, 15, 16].

Increased attention regarding:

- Project management as a career
- Standards and qualifications
- Increased knowledge lexicon
- Utilization of the lexicon as a foundation for training
- Project evaluation and improvements [14, 15, 16].

Predictable trends from 2001 are:

- Increased standardization
- Increased usage of web technology in communication and collaboration
- Application of widely accepted terminology specific for UP in negotiation
- Outsourcing in large companies
- Increased number of non-standard projects
- Increased role of the project management leader, taking their management abilities into consideration
- Advanced education of project management leaders in companies and professional organizations
- Abandonment of super-projects
- Refinement of defining the project domains, business needs and measurable benefits
- Evaluation in project selection and prioritization
- Emphasis on formal education, certification and verification of a completed training
- Emphasis on risk management
- Emphasis on communication and collaboration
- Utilization of performance and earnings
- Research and development [14, 15, 16].

Recommendations:

- Reputation established through previous experiences

- Benchmarks
- Creation of appropriate programs and courses offered at universities
- Technology developments, techniques and procedures for determination, measurement of capital return and profits
- Strategic management [14, 17].

From the information above, it is evident that there is a decrease of interest for human resource management in respect to socializing, risk, prices, quality, etc. as these are regions that have been thoroughly researched and presented in multiple professional and scientific studies. The primary focus has now shifted to the development of standards, project measurement and strategy control.

### 3 Research methodology

The first step towards this research was to review the available literature, which consisted of literature gathering, studying, selecting, and analysing of the applicable literature.

A completed analysis of practicality within the construction companies was completed through surveys, interviews, and direct observations of practical experiences in the industry. Interviews were completed in 12 construction companies, and they consisted of 13 basic questions. Those individuals who participated in the interviews were directly involved in the projects their companies were performing or had completed. Analyses and implications on the concrete examples were done based on data obtained through interviews and survey responses. Based on the above-indicated research, a phase model for project management was created and tested on one concrete construction company. The graph presented below summarizes the steps taken for this research (Fig. 3) [18].

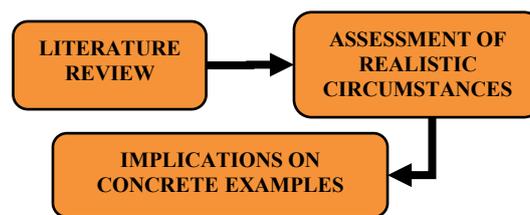


Figure 3 Summary of the research steps

### 4 Research question

Turner, Ledwith and Kelly researched in Ireland, Sweden, Austria and Romania whether project management is present in operations of small and medium size companies or is an exclusive characteristic of large corporations. The research targeted the countries that are currently in transition (such as BH) and where the small and medium entrepreneurs play a significant role in the overall domestic economy [19].

They show that 8 % of small companies consist of 10 to 30 people employed in PM area, only 4 % companies exceeded 30 people involved in PM, and a majority of 92 % had fewer than 10 people employed as a part of the PM team. The research results point out that there is a noticeable difference in human interaction and the

application of project management techniques, depending on the company (the multiple levels of management vary in relation to the company's size). Furthermore, it has been concluded that regardless of the company's size, project management is not being implemented in those companies whose owners are not interested in its implementation [19].

The following conclusions have been made through the research conducted in Great Britain:

1. Regarding project completion:
  - 64,4 % of projects are completed by the due date
  - 35,6 % of projects are completed within 1 to 12 months after predicted due date.
2. Regarding project expenses:
  - 74,8 % project are completed within the pre-calculated budget
  - 25,2 % projects cost higher than predicted.
3. Regarding project imperfections:
  - 1 % of projects encounter difficulties that result in project discontinuation,
  - 70,6 % of projects encounter moderate difficulties
  - 11,8 % of projects are completed without difficulties and imperfections [20].

All projects are performed and delivered under certain constraints. These constraints are scope, time and cost, traditionally [21].

The results outlined above are a strong indicator of the importance of project management.

The focus of the previously mentioned research was to answer the following questions:

*Does the size of the company influence its approach to project management and do construction companies approach changes according to different stages of the project's life cycle?*

**5 Research results**

**5.1 Survey sample**

Interviews were conducted in 12 construction companies in Bosnia and Herzegovina. They primarily focused on managers and civil engineers who were responsible for a project.

**Table 1** Division of companies per their size

		Small	Medium	Large
Number of employers	< 50	4		
	50 ÷ 250		6	
	> 250			2
Total assets' worth in KM	< 1 mil.	4		
	1 ÷ 2 mil.		5	
	> 2 mil.			3
Annual income in KM	< 2 mil.	4		
	2 ÷ 4 mil.		6	
	> 4 mil.			2
Total:		4	6	2

Those individuals were mainly in charge as heads of project bureau in the architectural companies, three of which were in a position of technical directors. Two of the companies included in the research were architectural and construction companies (project design, project performance and supervision). The remaining ten companies were from the civil engineering and building constructions branch of the industry, Tab. 1.

Based on the number of employees and their annual income, 83,3 % of the companies included in the research belong to small to medium companies and 2 companies were large.

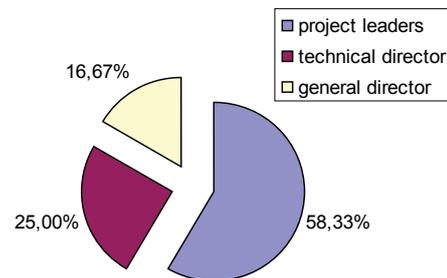
**5.2 Interview results**

Interviews were conducted in 12 construction companies with the management and project leader staff, in order to gather the following information:

- Do construction industry companies recognize and go through project phases and sub-phases depending on their role within the company?
- Does the company size have an influence on the recognitions and implementation of project phases and sub-phases?
- Is it possible to identify problems that could occur through the implementation of project phases and sub-phases?
- Is it possible to detect those problems [22]?

**5.2.1 Role in the company and project**

The interviews were aimed at the companies' owners, civil engineers project leaders, and their co-operators who were responsible for project management. In seven cases involving leading project managers/leaders of the project three were in the position of the technical director and two in the position of the general director, Fig. 4.



**Figure 4** Reflection of participants' position in percentages

Seven companies where the research was conducted were project designers and contractors; two were in the role of investors, project designers and contractors in projects over 2 000 000 EUR while three companies were in the same roles, but for a project under 500 000 EUR.

**5.2.2 Project phases**

58,33 % of the companies involved in project designing and project execution go through certain phases of defining, performing and guaranteed project deadline, while the remaining 41,67 % were in the role of the investors and they acknowledged the importance of development of each project phase for the quality of the completed project. 25 % of the construction companies that had the role of investors on mail-projects did not undergo all sub-phases of the conception, they only went through the sub-phases that were considered obligatory.

Four companies that were focused on project design and performance participated in the conception phase/ or sub-phase of the project idea development.

The remaining eight companies participated in the definition phase, especially in those sub-phases of the main project development, as well as the project realization.

All interviewed participants viewed participation in the definition of sub-phases as critically important, because only with its proper implementation it is going to be possible to notice flaws and problem areas. This is going to have an influence on the correction of those issues at the very beginning vs. starting with a performance phase itself when civil engineers on site usually primarily concentrate on the fulfilment of completion of the project within the due date and achieving the desired completion quality.

A sub-phase of defining the organizational model is considered crucially important in the performance phase, as the hierarchy between the employers (who is responsible for completion of reports concerning the project's progress) must be clearly defined.

Majority of companies strongly rely on their precisely created project performance designs/blue-prints, which represent their guidance towards a successful project completion. Individuals interviewed in two companies stated that defining the organizational model was not their companies' practice, they used only the dynamic plan stages of the project realization. Both of these companies were small, with limited human resources and mechanical equipment that only participated either in smaller-capacity projects or in completion of certain parts of bigger projects. All of the interviewed participants agreed that a well-developed sub-phase (performance-related) and well-created project performance designs/blue-prints are equally important in the sub-phase of building and as such are inseparable. All of the problems occurring during the building sub-phase have strong influence on the implementation of project building organizations, but well developed design for a project building organization is a stepping-stone towards a successful project completion. Companies which are not investing in project performance are not directly involved in the sub-phase of project realization and do not participate directly in the sub-phase of license usage. Therefore, only the responsible project designers have access to the building site/ when the committee technically inspects the object upon its finalization. Those companies who undertook the 'investors' role, as well as the project designers and performers on a certain project go through each of the project phases and inspect if all the project phases and sub-phases are perfectly harmonized. This enables the timely awareness of potential issues arising and therefore enables a timely-solution to the problem that could then minimize the impact of imperfections encountered. This shows that depending on their role within company, a company differently recognizes and goes through project phases and sub-phases. Interviews showed that the size of the company has an influence on the recognitions and implementation of project phases and sub-phases (indicating previous analysis, because small companies do not recognize and implement all project phases and sub-phases).

All interviewed participants agreed that previously described phases and sub-phases were sufficient and necessary in order to complete the task successfully.

When asked to define what they considered a successful company, 11 interviewees answered that the crucial factor was the completion of obligations to a mutual satisfaction of the investor and the project retaliator.

One interviewee from a small company indicated that time and qualities were the two factors representing the synonym of being successful. All participants of the interviews confirmed to be project leaders, but they disagreed when the same question was asked from a perspective of the project area they were involved with. Only six indicated multiple areas they were involved in within their companies' projects (human resources, expenses, quality), two participants mentioned procurement of goods, and one added risk management as well. Meanwhile, none of the participants mentioned the management area, but they were claiming that their company was involved in project management. No one indicated project coordination, management of the project domain nor did the communication coordination have certified project leaders. This term was recognized only in six companies while the other participants were not even familiarized with this term.

All interviewed participants agreed that it was possible to identify problems that could occur through the implementation of project phases and sub-phases and it was easier to remove them, as they were demonstrated through interviews.

## 6 Characteristic model for project management in Bosnia and Herzegovina

Certain guidelines for project management in BH were created based on the review of the gathered literature and the interviews conducted. This model is created on four basic phases with all sub-phases and steps involved, which will be presented in the scheme below (Figs. 5, 6 and 7). Four basic phases are conception, definition, execution and construction, and guaranteed due-date for completion. These phases are characteristic not only for BH but for any project's life cycle. The phase of the project closure could also be added, as it is described as a critical phase of the project's life cycle in the studied literature. As all the interview participants had omitted this project phase, it has not been included in this model formulation. The key importance of this model is that it presents a quick and effective, yet simple, sample of project realization from its very beginning to its completion. It also allows each step to be evaluated and therefore corrected to ensure the most positive impact of each phase on the finalized project. Each participant, regardless of the phases they are involved in, can then recognize the steps they need to take to complete their portion of the job effectively within the predicted period/due-date and expense budget.

The scheme presented below (Figs. 5, 6 and 7) has already proven as effective in project management, with its phases and sub-phases and their tests in Prominvest Ltd. Its privately owned company was founded in 1990 and primary focuses are the following areas: engineering, production, transport and installation of construction materials, concrete and prefabricated ferroconcrete. Presented in Figs. 5, 6 and 7 are schematic illustrations of the characteristic model for PM in BH [22].

Those companies which are either acting as investors or have hired other companies to act on their behalf, all undergo the initial, conception project phase, regardless of the fact that the same could be continued in the subsequent phases. The conclusion drawn from the interviews conducted was that the majority of the companies involved in these specific or subsequent phases have a supervision role over investors. Fig. 5 is the scheme that reflects the conception phase and the definition of all the steps involved [22].

At the completion of the conception phase, the primary focus is the development of ideas into adequate technical documentation (as a foundation for that project idea). This would further set the foundation for obtaining and the development of the project task, the solid base and the technology of the products if the project is going to be geared towards production or the purpose of the object needs to be defined by the investors with the help of the participants in this phase. Within the development of the project idea, it is important to prepare for the development of ideas as the base, after which the investor needs to accept the suggested solution. The next step is the design of the project, its revision, correction and

finally its approval and acceptance. As a condition for the site delivery, besides obtaining building permits, it is necessary to also gather the following- a traffic service agreement (civilian traffic solutions and permits), if applicable depending on project nature and purpose.

Afterwards, it is crucial to obtain the infrastructural consents, consent from the nature preservation associations (if applicable), as well as the consent to act in harmony with the ecological expectations and regulations. The next step involves setting the urban conditions, to which the investor companies have the right to appeal. After the changes are made, the urban conditions are defined. Afterwards, the development of the investment study and the performance study ensures the availability of sufficient finances and legal-property. All of the interview participants had undergone this phase with the assistance from the legal services only when they were in the role of the investor, while those companies involved in project performance were only vaguely familiar with this phase. Similar to the previous phase, the companies involved in the research only implemented the definition phase when they were in the role of the investors.

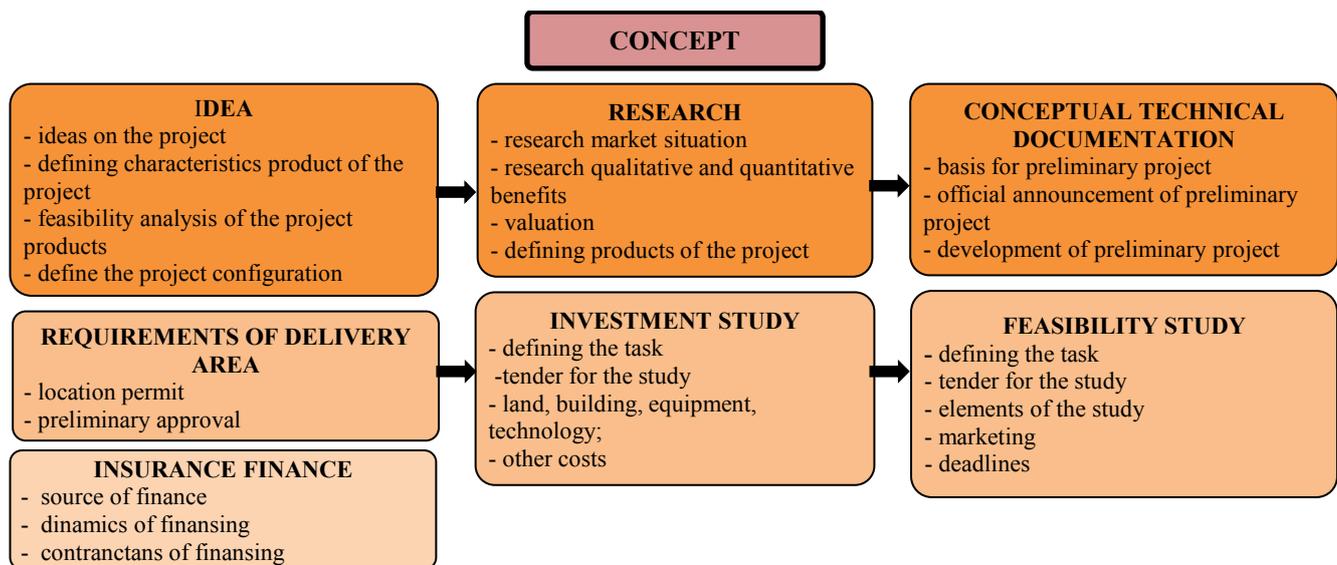


Figure 5 Project phases and sub-phases

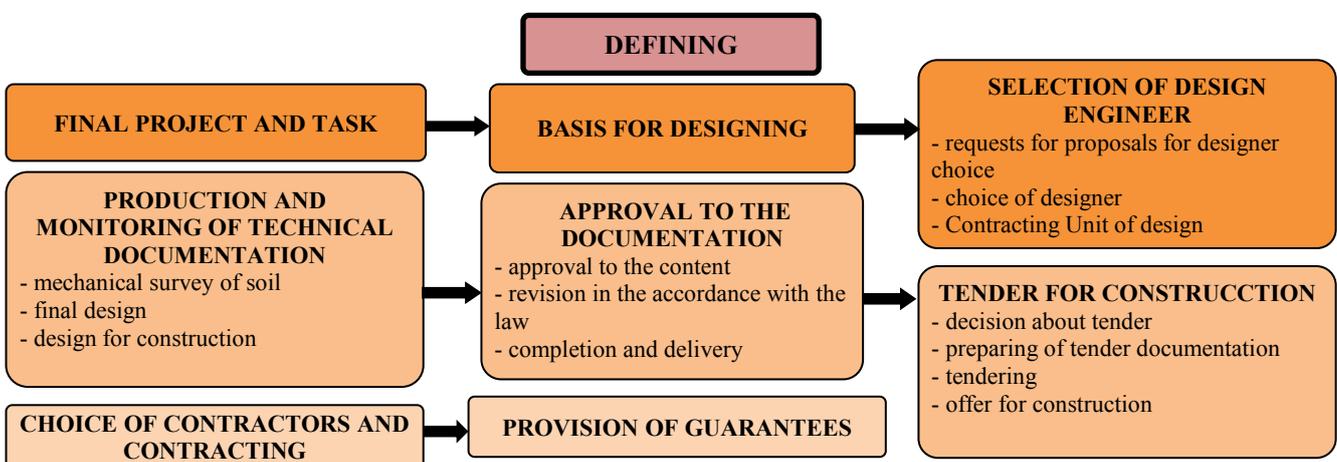


Figure 6 Project phases and sub-phases

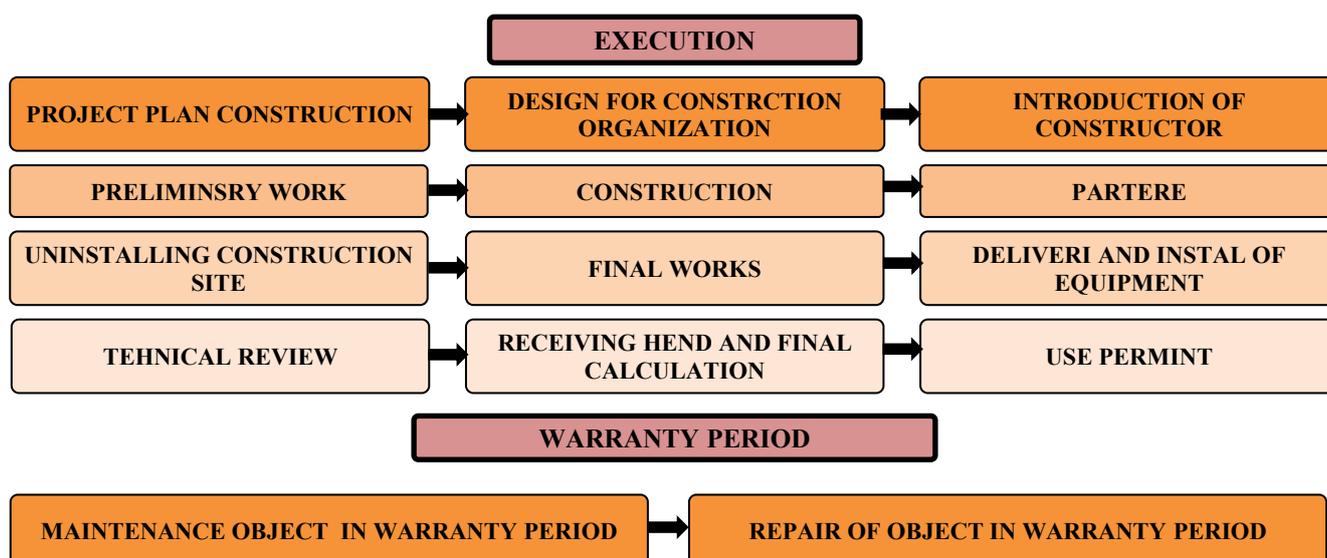


Figure 7 Project phases and sub-phases

As shown in Figs. 5 and 6, it can be concluded that the investors in BH are in the position to choose designers, with the help of their associates. It rarely occurs that the investor names the project manager who would also actively participate in the project choice. This is mainly because of the business culture currently present in BH, as well as the projects' size not being enough to accommodate the above discussed. Three of the interviewees even went as far as to claim that they were, in fact, project managers, which clearly showed that they did not recognize the role of project management- since those interviewees were the owners of construction companies involved in small project investment and realization (valued less than 500 000 EUR). Depending on the size of the project, the construction companies, bureaus, or experts hired by investors are responsible for the main project that consists of the following: architectural part of the project, construction and installation, contractual equipment and other applicable aspects. Three of the companies that were included in the interviews due to their involvement in the technology performance (involved in production of assembly elements), were also involved in the project execution, if permitted by their investors and head. In the large companies involved in the research, case study shows that the employees of this establishment pass through two phases (project bureau can fulfil the requests related to the architectural and building aspects of the project), while other designers are contracted for other kinds of projects. All of the interviewed participants were familiar with all the sub-phases of the project execution and construction (Fig. 7), which proved their well-rounded understanding of this project aspect. The emphasis was on the sub-phase of the design of the project performance plan, as its purpose in this phase is to serve as a guide in pointing out which stage of the project the company is currently at. Only three interviewed participants used some sort of computer software at this stage, such as MS Project, while nine participants did not recognize the need to use any of the computer software at this phase. In conclusion-without increasing the involvement and the implementation of programmed computer software for this purpose, PM cannot be present in BH.

The previously mentioned Prominvest Ltd. in the role of the designer (architectural-constructional or only the architectural phase of project development) and the executor (conception and definition) of specific project areas does not go through all the phases but it definitely implements all of the sub-phases of the performance and guarantees the time-frame of completion, as well as the definition of the sub-phase. In the cases where this company undertakes the investor's role, as well as the specific project experience in all the project phases (conception, definition, execution within the deadline) and through majority of the sub-phases (from the initial idea, the financial study, the execution, etc.) other companies or qualified individuals can get involved. Without available job advertisement, as a privately owned company, it can direct certain amount of competing job offers and choose the most suitable candidates. Because the company possesses a qualified sector of professionals, it is capable to perform on its own, excluding only the project execution. However, it remains actively involved in this phase.

## 7 Conclusion

As a general conclusion drawn from this study, companies within the construction industry implement phases and sub-phases as they find it suitable depending on their role in the project realization. They consider those phases and sub-phases beneficial and crucial in noticing possible project flaws and timely resolutions of the problems.

Findings from the literature review helped make the characteristic model of PM in BH. It was adjusted, corrected and modified using interviews and then it was tested, confirmed and accepted.

We can say that project management in BH is not accepted and acknowledged widely within this industry, primarily due to the current legal regulations. Construction companies in BH are not at an enviable stage of project management in both building and civil engineering sectors. Due to the current project execution of the corridor Vc throughout BH, an interesting research could be performed to analyse the current state of civil

engineering. That research could include the companies that were actively involved in the definition phase of the project in order to establish the way these companies are involved in project management in general. This would also allow deeper understating of what phases and sub-phases those companies are involved in and it would clarify crucial matters in the project execution. Furthermore, this research would analyse if the companies that are involved in the project consider the implementation and understanding of a certain project phase and sub-phase as imperative as it is in a successful project execution. In this case study, "successful" would be defined as an achievement of goals within the predicted due-dates, financial frames and, of course, satisfactory quality.

However, a significant progress in the project management sector in BH can only be achieved through the establishment and acceptance of IPMA association throughout BH. Furthermore, this could be achieved through the introduction of the related subjects in the educational system. This would serve as the stepping-stone towards a bigger acceptance, awareness, and knowledge of different aspects of the project management sector, especially within the civil engineers. The development of educated professional project managers and certified project leaders is an imperative. In the future, the education of the staff involved in project management can be carried out through the IPMA 4 LD certification systems, for example, where project management certifications would be offered, and this is one of the possibilities.

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### Authors' addresses

*mr. sc. Žaneta Ljevo*

University of Sarajevo  
Faculty of Civil Engineering  
Patriotske lige 30  
71000 Sarajevo, Bosnia and Herzegovina  
E-mail: zanesa.handzar@gf.unsa.ba

*doc. dr. sc. Mladen Vukomanović, Assistant Professor*

University of Zagreb  
Faculty of Civil Engineering  
Kaciceva 26  
10000 Zagreb, Croatia  
E-mail: mvukoman@grad.hr