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Managing Projects in Large Companies – Project Success Factors in the Crisis and Post Crisis Period: Evidence from Serbia and Slovenia

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ABSTRACT

This paper investigates project success factors (SF) and project success criteria (SC) in large firms and aims to identify which contribute the most to project success. The results of this study are based on a survey of large firms in Slovenia and Serbia. A sample of 175 large firms is included. The Mann-Whitney test was used to compare groups across countries and between the COVID-19 and post COVID-19 periods. A comparison study of project SF and SC between the period of COVID-19 crisis and post COVID-19 is presented. Findings suggest a high degree of alignment between both countries: both prioritise user appreciation as the most important project SC and clear goals and objectives were identified as the most critical project SF. The results also show that a well-defined project management process is the most critical factor for successful project implementation. Project managers were constantly the most dominant decision makers on projects during and after the COVID-19 period. Analysis shows no significant differences between project SF and SF during and after the COVID-19 period, indicating that large companies are resilient in managing project success.

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1. Introduction

In today's complex and ambiguous environments, projects are the key for firms to achieve and sustain a competitive advantage [1]. Ciric Lalic et al. [2] and others [3], [4] revealed that project success directly influences the success and overall performance of the firm. Cao et al. [1] argued that firms should balance their internal needs and external challenges to ensure project success and that only around 35% of the projects undertaken worldwide are successful. A narrow space in which the success of a project is impacted the most can be defined as a success factor [5]. The project Success Factor (SF) leads directly or indirectly to the success of the project. On the other hand, project Success Criteria (SC) are the measures of project success or failure after the project is executed [5].

Some authors [4], [6] discovered the role of Project Manager (PM), skills and competences, development of clear project goals/objectives and top management support are key factors in a project's success. Prior

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literature [4], [6] also revealed the importance of the *human side* of the project for project success. Time, cost and quality are no longer sufficient metrics for measuring project success [1], [5], [7], [8]. In highly dynamic business environment and rapid development new technologies present significant impact on project management practice. New digital technologies including Artificial Intelligence (AI), blockchain, machine learning, big data offer us solutions in project management and can significantly improve efficiency in project management [9], [10]. AI can improve project management practices in organizations by real-time data collection, thus real-time decision-making processes and authentic information [9]. On the other hand, blockchain technology can improve quality management, supports controlled access to information, and increases speed of communication. Blockchain can also reduce administrative costs, save time, improve data management and improve project risk management [10]. The problem is that firms and their management are unclear about how project success should be measured and that managers have a limited understanding of which are key project SF and SC. Studying and understanding of project SF and project SC can direct us to better decision making and increase the probability of project success.

The literature reveals that there is no universal list of project SF and project SC that led us to project success. Findings from project management practices in SMEs cannot be generalised to large firms [5], [11]. Large firms and projects are specific from many aspects: they have lower potential for flexibility, often have challenges in the field of closeness to the customer, have access to much more resources, greater economy of scale, a larger learning base, easier access to financial resources and are less vulnerable in comparison to SMEs, large firms spread risk over a larger project portfolio and use more advanced quality and project management systems [5]. Additionally, the majority of project activities are carried out in-house in large firms. Project challenges in large firms are related to issues such as how to manage large teams and how to efficiently coordinate tasks across many functional departments [7]. In the literature there is a gap regarding empirical evidence of project SF and project SC in large firms. Added value of our article in not only in the study of project SC and project SF, but comparison study between two countries including time period of pre-COV and post-COV period. This presents a context that remains underrepresented in the project management literature. As there has been a lack of research into how large firms ensure project success, a study of project SF and SC, especially for large firms, attracted our attention in this research to determine which project SF and SC company managers should focus upon to ensure project success further on and consequently improve the firm's performance.

The aim of this study is to analyse which project SF and project SC are critical for project success in large firms. In order to improve project success in crisis period, comparison study of project management practices between large firms in Slovenia and Serbia is presented.

Findings about the period from the COVID-19 crisis and post COVID-19 crisis are presented. Results can be helpful for project managers in large firms by supporting them towards better decision making, faster adoption to crisis situation and thus related improved project success rate and overall improved firm's performance in crisis. Slovenia and Serbia are transitional economies which share commonalities such as their cultural, political and social background and are export oriented economies [12]. In Slovenia in 2022, a total of 119,130 firms were registered and among them were 238 large firms [13]. In Serbia in 2022, a total of 203,158 firms were registered and among them were 653 large firms. The main criterion for a large firm was the number of employees (over 250 employees) [14].

2. Literature review

2.1 Project success factors (SF) and project success criteria (SC)

Clarke [6] revealed that effective collaboration among stakeholders is one of the key project SF. Rodrigues and Matos [4] claimed that project managers conflict resolution and leadership skills support the development of a collaborative and effective working environment and have detected these as key project SF. The latest findings of Piwowar-Sulej and Iqbal [15] and Abbasi et al. [16] highlighted the importance of "hard and soft" factors for project success (Table 1).

It is interesting that the latest findings of Kiani Mavi et al. [17] highlighted the importance of customer satisfaction for project success and suggest client satisfaction to be a key project SC. [18] Table 2 shows a literature review regarding the suggested project SC after the project is completed.

Fortune and White [19] revealed top management support and defining clear project objectives as being key project SC. According to Kiani Mavi et al. [18], firms should include factors such as effective-

Table 1. Project success factors (SF) – literature review

Project success factor (SF)	Authors
Clear goals/objectives Senior management support A full-time project manager (PM) Applying project planning techniques	[5]
Human side of a PM Social skills of a PM Interdisciplinary work and/or contact with stakeholders Managing stakeholder expectations	[6]
Ability to overcome challenges	[4], [6]
"Hard factors" - clear project objectives, effective project planning and adequate project budget "Soft factors" - the human side of projects	[15], [18]
Project and organisational capabilities Interconnection between IT	[11]
Balancing internal needs and external challenges Using digital technologies	[1]
The use of an agile methodology Time, Cost, Quality	[7]
Development of a climate of trust Collaboration and problem-solving qualities of PM Performance of PM	[4]
Sustainable project leadership–psychological empowerment	[15]

Table 2. Project success criteria (SC) - literature review

Project success criteria (SC)	Authors
The appreciation of the various parties involved both directly and indirectly in the project.	[5]
Top management support Clear and realistic objectives Efficient plan	[22]
Meeting quality standards and specification Achieving quality standards Appreciation by users	[5]
Relevance of the project Efficiency Effectiveness Sustainability	[23], [24]
Client satisfaction Fulfilment of objectives Benefits that the project provides to the firm	[21]

ness of the project, fulfilment of objectives, and benefits that the project provides to the firm among the key measures of project success.

2.2 Project management in the COVID-19 crisis and post COVID-19 crisis

Study of project management practices during crisis periods has, especially after the COVID-19 crisis (2019-2020), attracted the attention of many researchers [20]-[23]. COVID-19 crisis has not only affected society, but also firms, their decision making in crisis, priority setting and thus related decisions of managers. In order to improve understanding of how COVID-19 crisis impacted project management in firms, we have studied project SF and project SC in pre- and post-COVID-19 crisis. Results of our study have potential to improve decision making of manag-

ers, such as better project selection and prioritisation, to focus on key projects, to consider key project SF and project SF with goal to increase project success rate and improve firm's performance.

The literature has a lack of research into how the COVID-19 crisis impacted project SF and project SC, especially in large firms. Any crisis is complex and dynamic, requires quick decisions and represents a threat to a firm's survival [21]. Crises impact projects and their constraints (i.e. time, quality, costs) and can happen to any project. Li et al. [22] revealed that the COVID-19 epidemic had a negative impact on project schedules, financing and overall project performance. During a crisis, project managers have to adapt to changes in particular, in combination with past crisis experiences [24]. Projects during the COVID-19 crisis faced several challenges such as delays, supply chain disruptions, postponed approvals and inspections, travel restrictions, and regulatory issues, resulting in lower levels of performance [25]. COVID-19 impacted projects, as shown by reduced attention towards stakeholders. The post COVID-19 era (2022 and on) requires a re-think of project success based on the lessons learned from the COVID-19 crisis. So, we should examine what determines project success in a crisis, as suggested by Radujkovic and Sjekavica [26].

3. Methodology

Based on a literature review and the previous findings of Murphy and Ledwith [5], and Bjelica et al. [11], this study investigate project SF and project SC in large firms. This research addresses the following research questions (RQ):

RQ1: Which are the key project SF and SC in large firms?
RQ2: Who makes the key decisions on projects in large firms?
RQ3: Which project management tools are used by large firms?
RQ4: Are there any differences between Serbia and in Slovenia in relation to RQ1, 2 and 3?
RQ5: Are there any differences between the COVID-19 crisis period and the post COVID-19 crisis period in relation to RQ1, 2 and 3?

Questions involved single or multiple-choice formats, with some open-ended responses to capture the participants' views. A 4-point Likert scale was used to select the appropriate answer. Data were gathered separately for Serbia and Slovenia and then combined into a single database. To analyse large firms, micro and SMEs were excluded. We have used criteria such as the number of employees, which is over 250 employees for large firms. Data analysis was conducted using SPSS 29.0. The Mann-Whitney test was used to compare groups across countries and between COVID-19 and post COVID-19 periods. The research procedure involved three key steps: (1) evaluating sample adequacy, (2) cross-country comparison of SF and SC, and (3) analysis of the COVID-19 and post COVID-19 periods. A snowball sampling method was used and a sample of 175 large firms was gathered (Table 3), with requests to contribute sent via email, containing a cover letter and a link to an anonymous web survey. In Serbia, the large firms included in the survey were organizations with existing strategic cooperation ties with the Faculty of Organizational Sciences, extended by additional companies that responded to the distributed questionnaire. In Slovenia, large firms were identified from the official public database of business entities (AJPES).

In Slovenia, 43 out of 238 large companies participated in survey. Sample in Slovenia presents 18% of all large firms registered in Slovenia in 2022 (Table 3). In Serbia 132 out of 653 large companies participated in survey. Sample in Serbia presents 20% of all large firms registered in Serbia in 2022 (Table 3). On-line survey was sent directly to internal contacts, which introduced a snowball sampling effect– participants were encouraged to further distribute the survey with relevant colleagues involved in project management. Findings cover a broad range of project environments. Verbal consent was obtained from all respondents before participation. The Cronbach alpha values for project SC (0.68) and project SF (0.77) demonstrate an acceptable internal consistency (α>0.6). Project managers and practitioners were encouraged to complete the survey voluntarily, which indicates the possibility of self-selection bias, as those more interested in project management topics may have been more inclined to respond.

4. Results

4.1 Sample

The largest number of firms use a standard functional organisational structure, without a project management office (42%), while 58% of firms are focused on some kind of project orientation. 42% of projects last from 3 to 6 months and most often include from 1 to 10 people in project teams. Table 3.

Table 3. Organisational and project characteristics in large firms in Serbia and in Slovenia

Characteristic	% of sample Serbia (n=132)	% of sample Slovenia (n=43)	% of sample in total (n=175)
Organisational structure			
Projectized	40 (30%)	4 (9%)	44 (25%)
Project-matrix	32 (24%)	12 (28%)	44 (25%)
Project office	4 (3%)	9 (21%)	13 (7%)
Functional	56 (42%)	18 (42%)	74 (42%)
Project duration			
Under 3 months	25 (19%)	3 (7%)	28 (16%)
3-6 months	56 (42%)	17 (40%)	73 (42%)
6-12 months	25 (19%)	14 (33%)	39 (22%)
Over 12 months	26 (20%)	9 (21%)	35 (20%)
Project staffing			
1-10 people	90 (68%)	31 (72%)	121 (69%)
11-30	30 (23%)	8 (19%)	38 (22%)
over 30	12 (9%)	4 (9%)	16 (9%)
Type of project			
Technical, technological (NPD, production)	26 (20%)	25 (58%)	51 (29%)
Other technical (construction)	3 (2%)	3 (7%)	6 (3%)
ICT projects (computer, SW development)	38 (29%)	3 (7%)	41 (23%)
Services for other firms (logistics, marketing, etc.)	45 (34%)	3 (7%)	48 (27%)
Projects for the public sector (public orders, public tenders)	7 (5%)	6 (14%)	13 (7%)
Organisational projects (organising seminars, workshops)	7 (5%)	2 (5%)	9 (5%)
Projects in tourism	1 (1%)	0 (0%)	1 (1%)
Other	5 (4%)	1 (2%)	6 (3%)
Industry			
Services (public sector, NGO, Societies, Institutes)	5 (4%)	3 (7%)	8 (5%)
Industry – production firms (part production, assembly production, finished products)	27 (20%)	31 (72%)	58 (33%)
Industry – service firms (education, consulting, health, banking, tourism, logistics, informatics, trade)	100 (76%)	9 (21%)	109 (62%)

Additionally, industry composition further influences comparability across the two samples. While 76% of Serbian respondents come from service industries (e.g., education, consulting, health, banking, tourism, logistics, ICT), the Slovenian sample is predominantly production-based, with 72% of respondents representing manufacturing and related industries. Table 4 reveals data about the respondents to our survey.

Respondents in our sample are 42% project team members (Serbia) and 45% in Slovenia. Additionally, 29% of respondents from Serbia are company managers, while in Slovenia the % is zero.

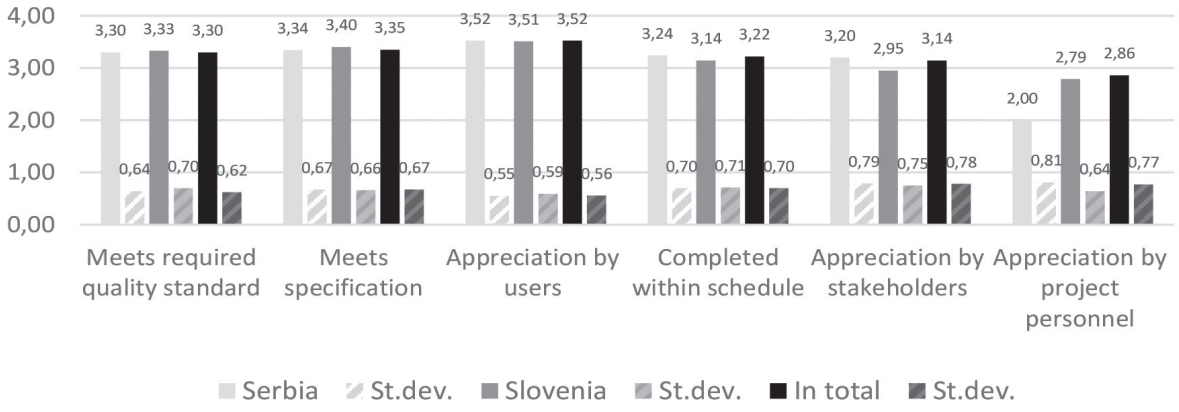
4.2 Project SF and SC analysis

The research results highlight that both Serbia and Slovenia prioritise user appreciation as the most important project success criterion (Avg.=3.52), followed by meeting specifications (Avg.=3.34), and required quality standards (Avg. =3.30), Figure 1.

Completing projects within schedule and stakeholder appreciation were rated slightly lower, with stakeholder appreciation scoring notably lower in Slovenia (Avg. =2.95) compared to Serbia (Avg. =3.20). Reasons for lower ranking of criteria stakeholder appreciation in Slovenia in comparison to Serbia can be justified from two perspectives; (1)

Table 4. Data about respondents in large firms in Serbia and in Slovenia

Data	% of sample Serbia (n=132)	% of sample Slovenia (n=43)	% of sample in total (n=175)
Level of education			
Secondary school	21 (16%)	5 (12%)	26 (15%)
Graduate (B.Sc.)	55 (42%)	32 (74%)	87 (50%)
Post graduate (MSc. MBA)	48 (36%)	5 (12%)	53 (30%)
PhD.	8 (6%)	1 (2%)	9 (5%)
Current position in the firm			
Owner/managing director	29 (22%)	0 (0%)	29 (17%)
Technical manager	2 (2%)	0 (0%)	2 (1%)
Business unit manager	1 (1%)	5 (12%)	6 (3%)
Process owner	17 (13%)	3 (7%)	20 (11%)
Project manager	18 (14%)	4 (9%)	22 (13%)
Project team member	55 (42%)	24 (56%)	79 (45%)
Other	10 (8%)	7 (16%)	17 (10%)

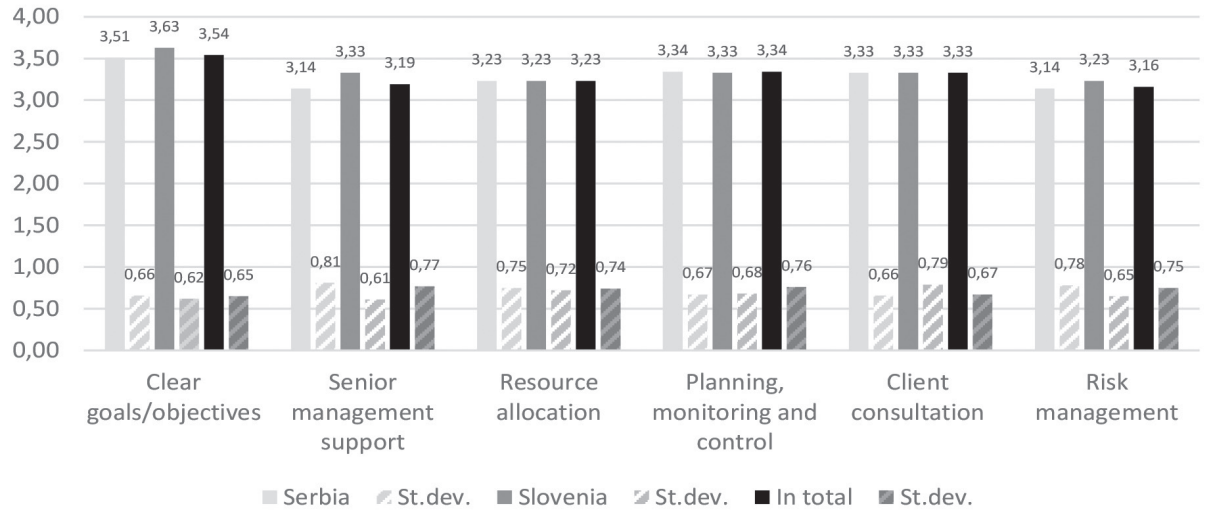


Note: 4 - stage Likert Scale: 1-rare, 2 ...,3..., 4-very frequent; Serbia (n=132), Slovenia (n=43), In total (n=175)

Figure 1. Project success criteria (SC) large firms in Serbia and in Slovenia

Industry profile of firms in sample and (2) type of projects which prevail in each country. Sample of large firms in Slovenia includes large proportion of production companies (72%). On the other hand, in the sample of firms from Serbia includes large proportion of service firms (76%) (Table 3). Additionally, there are also differences between type of projects which are most often executed in large firms in Slovenia and in Serbia. In large firms in Slovenia prevail internal technical and technological type of projects (58%), while in large firms in Serbia prevail other type of projects, such as services for other firms (logistics, marketing) (Table 3). The dominance of technically driven, production-based projects in large firms in Slovenia tends to reduce the visibility and perceived value of stakeholder contributions, while the service- and ICT-heavy project mix in Serbia encourages more active stakeholder involvement and higher levels of appreciation.

Appreciation by project personnel was the least emphasised criterion, particularly in Serbia (Avg. =2.00). Regarding success factors, clear goals and objectives were identified as the most critical (Avg.=3.54), alongside planning, monitoring, and control (Avg. =3.34). These findings reflect a strong emphasis on delivering quality and meeting client expectations while slightly de-emphasising internal team recognition. These findings suggest a high degree of alignment between the two countries in both SC and SF, with no statistically significant differences across the evaluated criteria and factors.



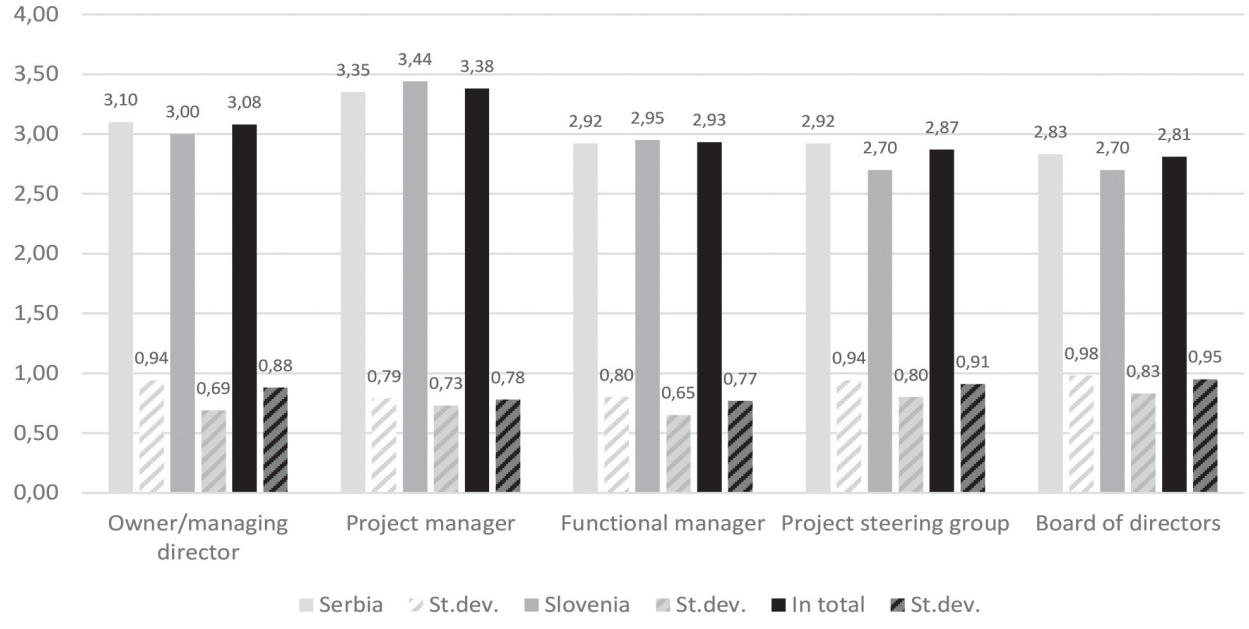
Note: 4 - stage Likert Scale: 1-rare, 2 ...,3..., 4-very frequent; Serbia (n=132), Slovenia (n=43), In total (n=175)

Figure 2. Project success factors (SF) in large firms in Serbia and in Slovenia

4.3 Decision makers on projects

Most influential decision makers in Serbia and Slovenia are project managers, while in Serbia they believe that the owner/managing director, project steering group and board of directors have a greater influence on decision-making than in Slovenia. Functional managers have equal influence on decision-making in both countries, Figure 3.

The findings reveal that project managers are perceived as the most influential decision-makers in both Serbia (Avg.=3.35) and Slovenia (Avg.=3.44), with a total average of 3.38, indicating their central role in the decision-making processes. Functional managers and project steering groups have moderate influence, with similar scores in both countries (Avg.=2.93 and Avg.=2.87, respectively). These results highlight the prominent role of project managers in decision-making, while other stakeholders, such as functional managers and steering groups, have more limited influence.



Note: 4-stage Likert Scale. 1-is not influential,2...,3...,4 - is very influential decision maker; Serbia (n=132), Slovenia (n=43), In total (n=175)

Figure 3. Key decision makers on projects in large firms in Serbia and in Slovenia

4.4 Project management practices in large firms

A well-defined project management process and close collaboration with the project client are the most important factors in project orientation in large companies in Serbia and Slovenia, while in Slovenia, organisational structure has more of an effect on the management of projects than it does in Serbia, Table 5.

The results show that a well-defined project management process is the most critical factor for successful project implementation, with the highest average scores in both Serbia (Avg.=3.58) and Slovenia (Avg.=.67). Close collaboration with project clients (Avg.=3.34) and previous experience (Avg.=3.21) are also recognised as key elements for effective project management. Projects are seen as less dependent on overcoming managerial mistakes (Avg.=2.57), and external factors such as market demand and government regulations are moderately impactful (Avg.=3.07). These findings underscore the importance of structured processes, experience, and collaboration for project success. Serbian large firms have, in 75% of cases, at least one full time project manager, while in Slovenia this is the case in 65% of situations. On the other hand, Slovenian companies, in 72% of cases, have defined procedures and processes in project management (i.e. project management manual, with described project management process, requirements, responsibilities, decision points, reporting), while in Serbia this is the case in 67% of companies, Figure 4.

The data unveils that most firms in Serbia (75%) and Slovenia (65%) have at least one full-time employed project manager, with a slightly higher occurrence in Serbia. Overall, 73% of firms across Serbia and Slovenia report having a full-time project manager. Moreover, 68% of firms have defined project management rules and procedures, such as a project management manual, with this being slightly more common in Slovenian firms (72%) than Serbian ones (67%). These findings reveal a strong emphasis on structured project management practices in the surveyed firms, although there is still room for improvement in formalising project management processes.

Table 5. Project management practices in large firms in Serbia and in Slovenia

Statement	Serbia (n=132)		Slovenia (n=43)		Total (n=175)	
	Avg. (1 – 4)	St.dev.	Avg. (1 – 4)	St.dev.	Avg. (1 – 4)	St.dev.
Previous experience is a key factor in implementing an effective system of project management	3.20	0.70	3.16	0.73	3.21	0.70
A well-defined project management process is a necessity for successful implementation of projects	3.58	0.55	3.67	0.52	3.61	0.55
Organisational structure affects the management of projects	3.06	0.78	3.37	0.54	3.14	0.74
Projects undertaken by my firm involve close collaboration with the external stakeholders	3.16	0.86	3.14	0.71	3.14	0.84
Success of projects within my firm depends on the skills of the project manager	3.13	0.71	3.23	0.65	3.15	0.70
Success of projects within my firm depends on close collaboration with the project client	3.37	0.66	3.23	0.53	3.34	0.63
Success criteria measures used by my firm are sufficient to determine project success	3.00	0.71	3.12	0.54	3.03	0.68
Sufficient research and analysis are carried out before undertaking a new project within my firm	3.12	0.83	2.91	0.78	3.07	0.82
Projects undertaken by my firm are very complex	3.19	0.75	3.16	0.53	3.19	0.70
Success of projects within my firm is mainly dependent on external factors (e.g. market demand, government regulations)	3.04	0.75	3.16	0.65	3.07	0.73
Projects within my firm are successful despite mistakes made by the general managers in the firm (e.g. poor support, slow decisions)	2.58	0.75	2.51	0.74	2.57	0.75

Note: 4-stage Likert Scale, 1-strongly disagree, 2...,3...,4 – very strongly agree

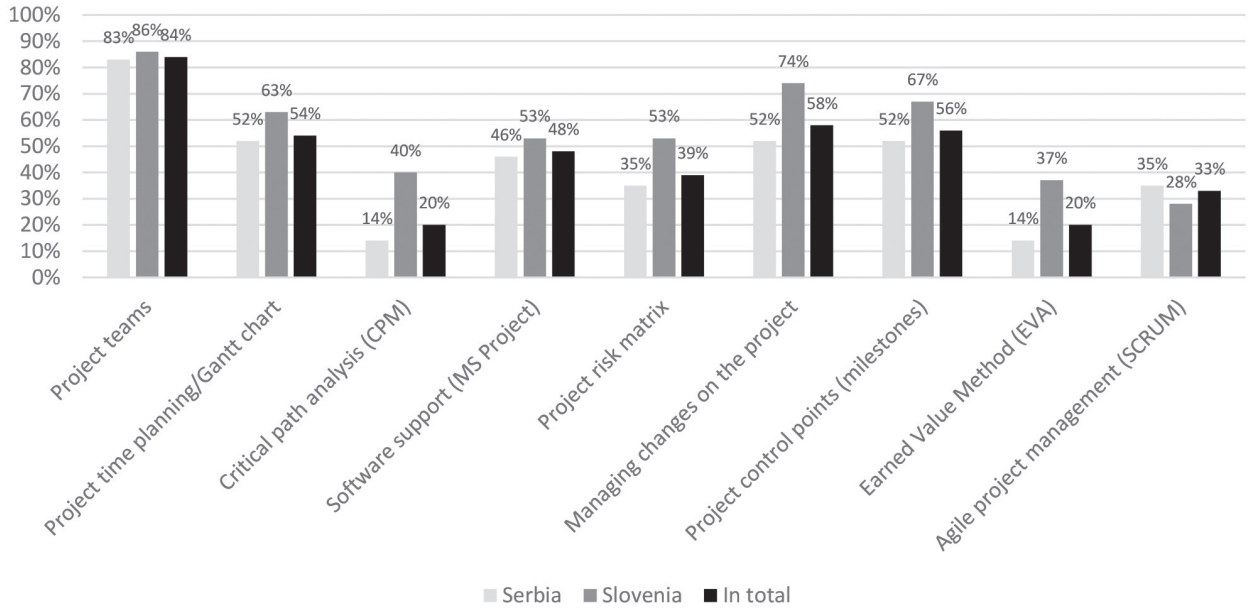
Note: Serbia (n=132), Slovenia (n=43), In total (n=175)

Figure 4. Deployment of a full-time project manager in large firms (% of firms using specific tool)

4.5 The use of project management tools in large firms

The most common forms of tools used include project teams (Serbia - 83%, Slovenia - 86%), managing changes on the project (Serbia - 52%, Slovenia - 74%), project control points (milestones) (Serbia - 52%, Slovenia – 67%). On the other hand, tools for advanced monitoring of Earned Value Method (EVA) projects are used the least in Serbia (14%), while Slovenia has a much better result in that segment (37%), Figure 5.

The analysis shows that project teams are the most used project management tool in firms, with 84% of respondents across Serbia and Slovenia reporting their use. Project time planning tools such as Gantt charts are used by 54% of firms, with a higher adoption in Slovenia (63%) than Serbia (52%). Soft-



Note: Serbia (n=132), Slovenia (n=43), In total (n=175)

Figure 5. The use of project management tools in large firms (% of firms using specific tool)

ware support, such as MS Project, is used by 48% of firms, while managing changes (58%) and control points/milestones (56%) are moderately implemented. Slovenia shows a higher usage of tools such as the risk matrix (53%) and managing changes (74%) compared to Serbia. Agile project management methods, such as SCRUM, are used by 33% of firms, with slightly higher usage in Serbia. These results suggest that while foundational tools such as project teams and time planning are extensively implemented, advanced tools such as EVA and CPM show an inferior level of engagement.

4.6 Project SF and SC in large firms during the COVID-19 crisis and after

During the COVID-19 crisis in 2021 and after it, in 2022, firms stated changes in project success criteria (SC) and success factors (SF). Among project SC, appreciation by users regularly ranked highest (2021: Avg.=3.49, 2022: Avg.=3.56), followed by meeting the required quality standards (2021: Avg.=3.27, 2022: Avg.=3.34), Table 6.

For project SF, clear goals/objectives remained critical (2021: Avg.=3.57, 2022: Avg.=3.49), followed by planning, monitoring, and control (2021: Avg.=3.38, 2022: Avg.=3.29). Risk management gained prominence post crisis (2021: Avg.=3.10, 2022: Avg.=3.23), reflecting an improved consideration of uncertainties. These findings highlight developing project priorities, emphasising user appreciation, risk management, and stakeholder involvement. The analysis of project success criteria (SC) and project success factors (SF) during the COVID-19 crisis (2021) and post COVID-19 (2022) shows no statistically significant differences ($p>0.05$).

4.7 Project SF and SC in large firms during the COVID-19 crisis and after

Project managers were constantly the most prevalent, with an average score of Avg.=3.39 in 2021 and Avg.=3.37 in 2022. Owners/managing directors followed as the second most influential group, keeping an unchanging average score of Avg.=3.08 through both years. Functional managers saw a minor increase in influence from Avg.=2.89 in 2021 to Avg.=2.97 in 2022, proposing an increasing role in decision-making post crisis, Table 7.

Influence from the project steering group and board of directors endured relatively constant, with minor disparities: the project steering group scored Avg.=2.88 in 2021 and Avg.=2.86 in 2022, while the board of directors increased slightly from Avg.=2.77 in 2021 to Avg.=2.85 in 2022. These results suggest that, while project managers regularly played a key

Table 6. Project success criteria (SC) and project success factors (SF) in large firms – during the COVID-19 crisis (2021) and after the COVID-19 crisis (2022)

Criteria	Total in 2021 (n=96) Serbia and Slovenia together		Total in 2022 (n=79) Serbia and Slovenia together		Asymp. Sig. (p)
	Avg. (1 – 4)	St.dev.	Avg. (1 – 4)	St.dev.	
Most important project SC					
Meets required quality standard	3.27	0.64	3.34	0.60	0.52
Meets specification	3.41	0.64	3.29	0.70	0.29
Appreciation by users	3.49	0.56	3.56	0.55	0.42
Completed within schedule	3.22	0.70	3.22	0.71	0.98
Appreciation by stakeholders	3.05	0.81	3.24	0.74	0.14
Appreciation by project personnel	2.83	0.72	2.89	0.83	0.55
Most important project SF					
Clear goals/objectives	3.57	0.61	3.49	0.70	0.52
Senior management support	3.17	0.75	3.22	0.80	0.59
Resource allocation	3.25	0.75	3.22	0.73	0.68
Planning, monitoring and control	3.38	0.68	3.29	0.66	0.35
Client consultation	3.30	0.70	3.35	0.64	0.71
Risk management	3.10	0.76	3.23	0.73	0.28

Note: 4 - stage Likert Scale: 1-rare, 2... ,3..., 4-very frequent

Table 7. Most influential decision makers in large firms - during the COVID-19 crisis (2021) and after the COVID-19 crisis (2022)

Most influential decision makers	Total in 2021 (n=96) Serbia and Slovenia together		Total in 2022 (n=79) Serbia and Slovenia together		Asymp. Sig. (p)
	Avg. (1 – 4)	St.dev.	Avg. (1 – 4)	St.dev.	
Owner/managing director	3.08	0.84	3.08	0.93	0.88
Project manager	3.39	0.73	3.37	0.83	0.87
Functional manager	2.89	0.78	2.97	0.75	0.51
Project steering group	2.88	0.92	2.86	0.90	0.98
Board of directors	2.77	0.98	2.85	0.91	0.62

Note: 4-stage Likert Scale. 1-is not influential,2,3,4 – is very influential decision maker

role, there was a slight change concerning the wider participation of other organisational leaders, such as functional managers and boards of directors, in decision-making post crisis. The analysis shows no statistically significant differences in the influence of decision-makers (owner/managing director, project manager, functional manager, project steering group, and board of directors) between Covid-19 and post Covid-19 ($p > 0.05$), Table 8.

During and after the COVID-19 crisis, firms regularly highlighted the significance of structured project management processes and collaboration with

Table 8. Levels of agreement - during the COVID-19 crisis (2021) and after the COVID-19 crisis (2022)

Statement	Total in 2021 (n=96) Serbia and Slovenia together		Total in 2022 (n=79) Serbia and Slovenia together		Asymp. Sig. (p)
	Avg. (1 – 4)	St.dev.	Avg. (1 – 4)	St.dev.	
Previous experience is a key factor in implementing an effective system of project management	3.29	0.69	3.11	0.70	0.07
A well-defined project management process is a necessity for successful implementation of projects	3.60	0.57	3.61	0.52	0.87
Organisational structure affects the management of projects	3.20	0.73	3.08	0.75	0.24
Projects undertaken by my firm involve close collaboration with the external stakeholders	3.14	0.85	3.15	0.82	0.93
Success of projects within my firm depends on the skills of the project manager	3.22	0.65	3.06	0.74	0.16
Success of projects within my firm depends on close collaboration with the project client	3.32	0.59	3.35	0.68	0.51
Success criteria measures used by my firm are sufficient to determine project success	3.04	0.69	3.03	0.66	0.87
Sufficient research and analysis are carried out before undertaking a new project within my firm	2.97	0.83	3.19	0.80	0.07
Projects undertaken by my firm are very complex	3.19	0.69	3.19	0.72	0.93
Success of projects within my firm is mainly dependent on external factors (e.g. market demand, government regulations)	3.11	0.71	3.03	0.75	0.50
Projects within my firm are successful despite mistakes made by the general managers in the firm (e.g. poor support, slow decision making)	2.52	0.75	2.63	0.75	0.40

Note: 4-stage Likert Scale, 1-strongly disagree, 2...,3...,4 – very strongly agree

stakeholders and clients for project success. There was a prominent post crisis intensification in the perceived adequacy of research and analysis before undertaking new projects, while the influence of external factors and managerial mistakes showed minor variations. Project complexity persisted consistently high, underlining the ongoing challenges firms face in managing their projects successfully.

The comparison of levels of agreement with various project management statements during the COVID-19 crisis (2021) and post COVID-19 (2022) reveals no statistically significant differences ($p>0.05$).

5. Discussion and conclusion

Our research results conducted in large firms in Slovenia and Serbia showed that improvement in project management maturity, in terms of well-defined project management processes and stakeholder engagement, were elements which influence periods of crisis and non-crisis. Current trends in AI shape the application of technology and knowledge regarding projects, and they are key elements in the success of projects [9]. Jupir et al. [27] found as a result of their research project among 232 project practitioners that there is a correlation between organisational culture, coordination, and project management certification as factors of project management success. During and following the COVID-19 pandemic, large firms have progressively reshaped project SC and project SF as a part of their strategies. Our research indicates that practices, tools, and success criteria did not show statistical significance between the COVID-19 and post COVID-19 periods, which implies that some established practices during COVID-19 still remain the same after the crisis. COVID-19 has caused a modification in well-known project management approaches in which resilience, technology, and commitment with stakeholders are dominant. One of the most significant project SC during the COVID-19 period was the use of technology. The modification in environments to the virtual has exposed the prerequisite for more digital knowledge between project team members, which is now observed as a significant SF [28], [29]. The capacity to change project approaches in reaction to external forces has been perceived as a vital success factor for sustaining project driving forces during the pandemic [30]. Furthermore, the welfare of project team members has extended its importance as an achievement measure. The life satisfaction of personnel has been expressively obstructed by COVID-19, requiring attention to the balance between daily engagement, personal life and the organisational system for project support [31]. Prior studies that have noted the importance of project success and the project leader's self-efficacy emphasise that project opportunity management influences those relationships [32].

With respect to the first research question, it was found that there are some common critical success factors: top management support, clear and direct communication, technical skills of project managers and their skills development [31]-[33]. Our research results showed that the most important project SC and SF in large firms during and after the COVID-19 pandemic cover the active usage of technology, proactive stakeholder commitment, flexibility in project management environment based on a changing situation, and a focus on the mental health of project team members. These components mutually provide improved project results and adaptability in the face of current challenges. Findings suggest a high degree of alignment between both countries, Serbia and Slovenia. The results also show that a well-defined project management process is the most critical factor for successful project implementation in large firms. Project managers were constantly the most dominant decision makers on projects during and after the COVID-19 period in large firms.

This paper is limited to the study of project SF and project SC in large firms in the countries Slovenia and Serbia. The study is limited by the sample of 175 firms included in the research. A survey was used as a research instrument. Project management practices from the COVID-19 crisis period and the post COVID-19 period time were included. Added value of our article in not only in the study of project SC and project SF, but in the comparison study between two countries including also time period such as pre-COV and post-COV period.

Theoretical implications of this research present a systematic overview of the literature in the field of project SF and SC in relation to large firms in the crisis and post crisis period of COVID-19. A comparison study between both countries, Serbia and Slovenia, offers us a better understanding of the key factors which impact project success in large firms. The research opens the possibility for further comparison studies in time. The research has also practical implications for managers and decision makers in firms. Results of our analysis from pre-COVID-19 and post-COVIS-19 can be helpful for the project managers such as: results can lead managers to improve their decision making, to improve project selection and prioritisation, to focus on key projects

with maximum benefits for firm and society, to consider key project SF in the crisis, focus on key project SC when measuring project success and improve managerial reactions and responsiveness in the crisis. Consequently, our findings can contribute to overall project success and improve overall firm's performance in the next crisis, similar to COVID-19 crisis.

Future research analysis should also include more various research methodology, the influence of AI technologies, governance, and implementation on project success, as well as the impact on team members and their life. Also, new trends in project management areas development should be considered, such as those detailed in the PMBOK 8 published by the Project Management Institute.

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