Interdisciplinary Description of Complex Systems 22(3), 316-322, 2025

SAFETY AS A CRITICAL SUCCESS FACTOR IN INFRASTRUCTURE PROJECTS

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DOI: 10.7906/indecs.22.3.13
Regular article

Received: 20 January 2024.
Accepted: 28 October 2024.

ABSTRACT

In today's rapidly changing corporate environment, companies must operate by maintaining and increasing their competitiveness, while performing under constant pressure for further development. How can they achieve their goals?

According to the literature, companies must synchronize corporate culture with organizational structure in order to operate successfully and efficiently.

The purpose of this study is to determine what can be called success and what factors can contribute to efficient and safe operation.

KEY WORDS

infrastructure projects, success factor, management, safety

CLASSIFICATION

ACM: 10003456.10003457.10003567.10010990

APA: 2229

JEL: L21

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REVIEWING THE LITERATURE ON ENTREPRENEURIAL SUCCESS

What does the success of a company mean? What makes a company successful? We might ask to whom success means, and what it means to them. The Cambridge Dictionary defines success as the achievement of desired results, or someone or something that achieves positive results [1]. In general, business leaders set strategic goals for their companies. These goals are related to expansion, increased profitability, and revenue growth. Achieving these set goals is the success itself.

What can help a company achieve its objectives? For each strategic objective, there are some imperative influences or drivers associated with its successful achievement. This is where critical success factors come into play.

Chauhan et al. identify critical success factors in the automotive industry such as organising education and awareness, clear strategy, early shared plans and full communication, shared goals, process change, and firm hold [2].

Nagy et al. also identify some success factors. The internal success factor of a company is knowledge, motivation and synchronised internal operations. Globally, the long-term success of business operations lies in the effective work of managers [3].

"Critical success factors are the essential driving forces or influences that play a key role in the desired success for the business organization. In addition, critical success factors enable the organization's strategic plan to be implemented" [4].

According to E. Anjomshoa's findings, the following key performance indicators determine success in the field of construction projects: marketing and advertising, financial dimensions, creativity, technical and operational capabilities, and the social and political climate [5].

Based on this literature review, another aspect of sustainable success appears. Rebello et al. refer to the implementation of various standardised management systems as a sustainable success and development of organisations. This is a difficult but not impossible goal for companies [6].

Handayani et al. create an Ishikawa diagram of critical project factors for project implementation success, Figure 1 [7].

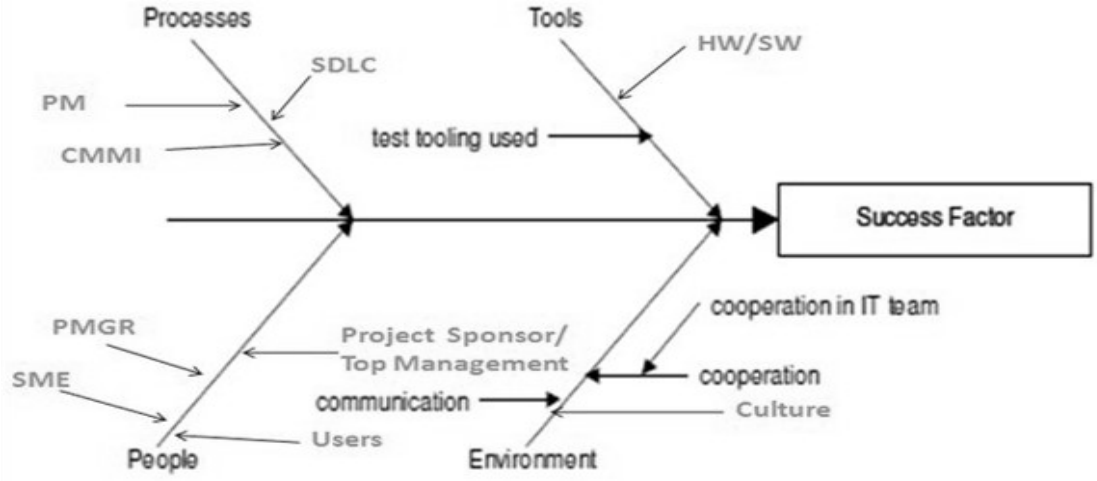

Figure 1. Ishikawa diagram of critical project factors [7].

After a brief review of the relevant literature, it can be concluded that many researchers have tried to interpret success. Success is a combination of several factors, as we see in Figure 1: processes, tools, people, environment, and their elements. These factors are sometimes referred to as critical success factors. Our research question is whether such critical success factors can be identified in the case of construction projects.

ANALYSIS OF THE SUCCESS OF CONSTRUCTION COMPANIES

Projects have been taken from four broad areas of expertise, and, in particular, infrastructure projects have been examined. The thematic areas in which our research team has experience are transport infrastructure construction, energy networks, communication networks (e.g. 3G, 4G and 5G) and computer networks, including projects related to supercomputers.

An additional condition is that the projects have been successfully completed, i.e. that they have achieved their original overall objective. The infrastructure was built. But has the project been a success?

Major infrastructure projects are often carried out as joint ventures between consortium partners. Project companies, or project-based organisations, are created for these specific projects. That is how the success of the project companies is characterised by the success of the project.

The success of a project can be measured in many ways. In the 1960s, for example, the success of a project was measured purely technically – whether the product worked or not. That was one measure of success [8]. If we apply this way of thinking to a construction project, the success of the project is the following: the construction is finished, and the construct is built and operated. However, this simple case no longer exists.

We need to identify the areas that are most important and relevant to the strategic objectives. According to the classification shown in the second figure, there are temporal critical success factors, managerial critical success factors, as well as external and industrial success factors [4]. Temporality means that companies need to adapt to temporary situations in order to ensure business continuity [4]. For any organisation to thrive, it is vital that its leaders are excellent [4]. Political, social, economic, environmental, legal and technical dimensions are among the external critical success factors [4]. Point D refers to the ability to respond to trends in the industry and the needs of consumers [4]. We have also found some general critical business success factors. These generic factors can be concretised and summarised as follows: capital, supplier relationships, liquidity, staff training - it can be seen that the literature cited emphasises the role and excellence of the project manager, but the role and excellence of the project team and its members cannot be neglected, location, financial management, marketing innovation, technological capabilities, market knowledge, production lines, staff commitment, and timeliness are key parameters [4].

This view does not necessarily take into account that in organisations employees, team members, and project participants can also influence the success of the company.

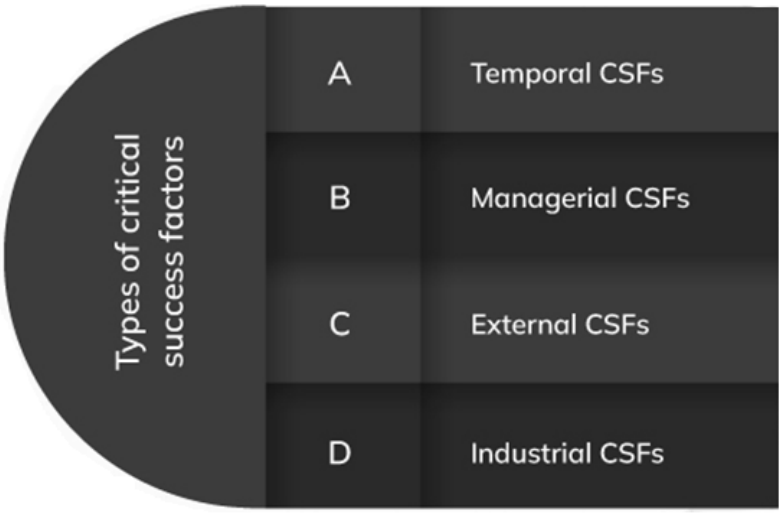

Figure 2. Types of Critical Success Factors [4].

As the goal changes, so does the concept of success and the factors required to achieve it. An important aspect of our research is to examine the success of construction projects. In the case of construction projects, as shown in Figure 3, the critical success factors that can be identified are the project budget, compliance and approvals, layout and design, expertise, quality control, safety, and timely completion.

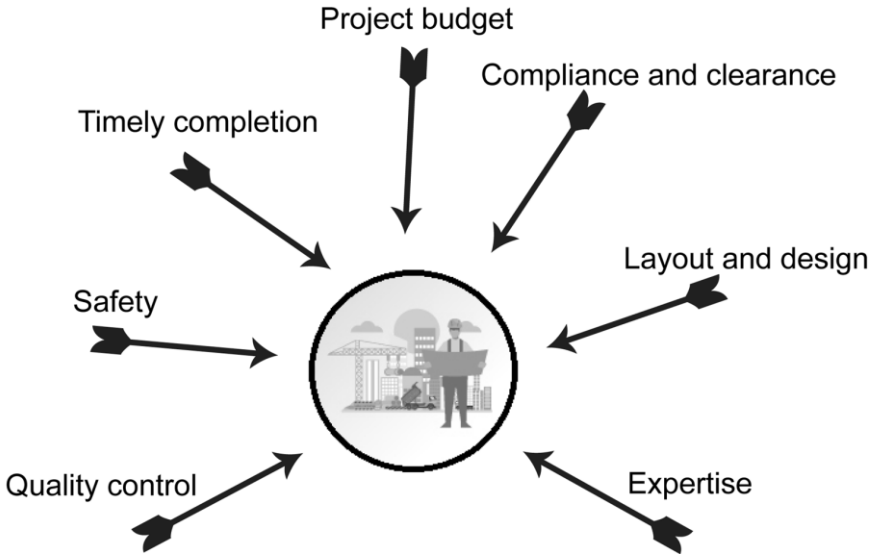

Figure 3. Critical Success Factors for Construction Projects [4].

We can examine any of the critical success factors listed. In this article, however, we would like to examine in depth a parameter that we believe is less studied in project sciences. This critical success factor is safety, or sometimes security.

UNDERSTANDING SAFETY AS A SUCCESS FACTOR IN CONSTRUCTION PROJECTS

What does safety mean for the success of a construction project? An inadequate construction project can lead to accidents. Safety is the most important parameter in a railway construction project, for example, not only during construction but also after the project is completed.

Large infrastructure projects involve significant financial outlay. Social acceptance of the projects is therefore important. A project can be successful if there are no ongoing problems with its implementation. A good example of this is the critical success factors in the safety management of high-rise construction projects in China [9].

To this day, thousands of people die every year in work-related accidents in Europe and around the world. The European statistics are shown in Figure 4.

According to some sources, “construction remains a field with the highest number of fatalities in the US, hence safety remains a critical factor for success in any construction project. Hence, workplace safety needs to be looked after at all times” [4].

In construction projects, safety programs can be a good alternative. Following the example of Iraq in reducing injuries and fatalities, the safety program is seen as an important first step in addressing this challenge [10].

The Indonesian example goes further by focusing on the company’s safety culture and identifying success factors that contribute to creating the right level of safety within the organisation [11].

	Non-fatal accidents at work involving at least four calendar days of absence from work			Fatal accidents at work
	Total	Men	Women	Total
EU	2 886 507	1 970 298	915 117	3 347
Belgium	62 038	43 544	18 493	47
Bulgaria	1 953	1 338	615	70
Czechia	36 704	25 283	11 406	88
Denmark	85 309	42 094	42 760	43
Germany	810 127	601 988	207 682	435
Estonia	5 478	3 907	1 571	13
Ireland	16 505	9 873	6 517	34
Greece	4 476	3 247	1 229	22
Spain	457 435	322 379	135 056	376
France	655 024	409 833	245 191	674
Croatia	9 697	6 218	3 477	35
Italy	272 787	190 056	82 731	601
Cyprus	1 428	1 081	347	5
Latvia	2 272	1 538	734	38
Lithuania	4 483	2 821	1 617	49
Luxembourg	6 474	5 064	1 410	7
Hungary	23 518	15 222	8 296	82
Malta	1 587	1 256	331	9
Netherlands	82 420	48 575	33 844	25
Austria	55 490	43 941	11 549	105
Poland	67 929	42 610	25 319	220
Portugal	113 976	82 063	31 913	93
Romania	2 779	1 982	797	172
Slovenia	14 197	9 302	4 895	14
Slovakia	8 050	5 247	2 803	32
Finland	36 994	24 346	12 648	19
Sweden	47 378	25 491	21 887	39
Iceland	1 151	724	427	2
Norway	10 938	6 512	4 427	39
Switzerland	93 978	72 986	20 992	35

Figure 4. Number of non-fatal and fatal accidents at work, 2021 [12].

Eleven success indices as defined by Nguyen and Chovichien, one of which is safety. These examples are mostly related to occupational health and safety. In our research, we have focused on whether safety can have additional meaningful content for project success,Figure 5.

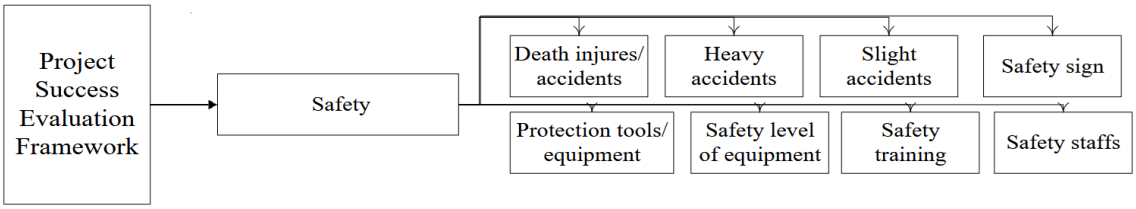

Figure 5. Nguyen and Chovichien's Evaluation Framework for Project Success (a highlighted detail) [13].

According to recent research, a broader framework of security can be defined: budget security (project security, functional security and budget line security, schedule security, project management security [14]), quality assurance [15], technical project performance reliability [16], availability of labour [17], ensuring satisfaction, establishing environmental sustainability security [15], information security, company secrecy, and conflict-free completion of projects.

These concepts are all related to safety, as well as safety and security science.

CONCLUSION – MEASURING PROJECT SUCCESS

Our aim with this research article is to encourage organisations to identify successful patterns of operation. By identifying best practices, organisations can optimise and replicate processes more effectively. Understanding the characteristics of a successful construction process, while fostering a positive working environment, provides insights into communication, resource allocation, and decision making.

Traditionally, time, cost, scope, and quality have been the main indicators of a project's success. A project is successful when its objectives have been achieved. Another aspect of success is the satisfaction of the project stakeholders [18].

The problem might lie within the project lifecycle. The basic stages of the project lifecycle include starting a project, organising and pre-working the project, doing the work, and finishing the project [18]. The general project lifecycle ends when the project is completed. Sometimes the success of the project can be measured in the post-project life. For a company that only operates as a project company, such as a joint venture for a large infrastructure project, it is difficult to measure success.

In conclusion, defining and understanding what success means can be difficult. Setting achievable goals is an important step. On the road to success, we need to identify those factors that need attention and prioritisation in order to achieve success. Our research shows that a number of critical success factors can be identified, and safety is certainly one of these factors in the context of construction projects. Our future research aims to find out what critical success factors are needed to achieve safety as a goal, whether in the context of developing or creating a safety-critical facility.

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