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CrEISPS - A framework of criteria for evaluating success in information systems projects

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Abstract

Organizations must succeed in Information Systems (IS) projects since they strongly influence their present and future. In this context, evaluating success is essential for good management, requiring well-defined criteria and procedures. Over the past decades, several studies focused on success criteria have been developed. However, there is still the need for an integrative and unified perspective on these contributions. This article proposes a framework of criteria for evaluating success in IS projects based on the results of a structured literature review. The main contribution is thus the compilation and organization of the success criteria in the CrEISPS framework to assist researchers and professionals in studying and defining success criteria for evaluating IS projects.

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Keywords: Success Criteria; Information Systems; Information Technology; Projects; Project Success; Project Management Success.

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1. Introduction

Information Systems (IS) projects are generators of value for organizations. However, due to their inherent complexity, the levels of success achieved have not always been the most desirable [1]. As a result, the success of projects is, for many years to date, a hot topic in the scientific literature.

There are several ways to evaluate the success of a project. For example, the evaluation has long considered criteria such as compliance with scope, cost, and time [2]. Other criteria, such as stakeholder satisfaction, have also been considered relevant in recent years [3; 4]. Some authors (e.g., Agarwal & Rathod [5]) state that specific criteria are more important than others. For instance, these authors mention that the fulfillment of the scope is the most relevant since it comprises the functionality and quality of the deliverables of a project.

Consequently, several perspectives exist on how to evaluate success and what criteria should be used to measure it. Although a large amount of work has been focused on identifying success criteria in IS projects, we could not find a shared and coherent set of criteria in these works, which hinders research and practice development. Furthermore, the literature critically reflecting on the results presented in the extant studies is scarce.

Our paper presents the framework CrEISPS – Criteria for Evaluating Information Systems Project Success. The framework uniformizes terminology and synthesizes and organizes the vast diversity and quantity of criteria described in the literature for assessing success. This article is helpful both for practitioners and students in evaluating the success of IS projects. It may also serve as a basis for future research on this topic.

The paper is structured as follows: Section 2 addresses the fundamental concepts; Section 3 describes the method; Section 4 presents the results; Section 5 presents the framework of success criteria; Section 6 discusses results; and the last section presents the contributions, limitations, and future research proposals.

2. Background

An IS is a combination of intelligent agents (human and/or artificial), processes, and Information Technology (IT) (hardware, software, and infrastructure) related to the dissemination and use of data, information, and knowledge in an organization. Accordingly, an IS project can be defined as a temporary socio-technical endeavor undertaken to improve an IS [6]. One of the main characteristics that differentiate these projects from others is that they are carried out to improve the organization and obtain business benefits through the implementation of IT. Therefore, IS projects present unique characteristics (e.g., the complexity level) [7].

IS projects are needed in almost every organization to create value since their main goal is to make business processes more efficient and effective [2]. Despite the importance of these projects for improving productivity, operational efficiency, and long-term performance [8], their success remains a matter of concern [1].

Regardless of the project, it is essential to have a set of criteria defined for success evaluation. To Baccarini [9], the success of a project has “hard” and “soft” dimensions. The hard dimension refers to the fact that some criteria, such as time, cost, and quality, are easier to measure, and reaching a consensus is relatively more straightforward. The soft dimension refers to aspects that are more difficult to measure, such as the satisfaction of the work team.

Various authors (e.g., Jugdev & Müller [10] and Pankratz & Basten [11])) state that the success of a project is directly linked to criteria that are used in its evaluation. In several works, we find expressions such as “Iron Triangle,” “triple constraint,” and “golden triangle,” which represent the fundamental criteria to evaluate the success of a project, being these the fulfillment of the cost, time, and scope or quality of the project [2; 11]. In addition to these criteria, stakeholder satisfaction has become increasingly important for evaluating a project’s success [4; 10; 11].

Baccarini & Collins [12] sought to identify how people in different areas of activity define “success in projects.” As a result, they realized that many projects are poorly evaluated since their evaluation only makes use of the “Iron Triangle” and the customer satisfaction criterion “takes a back seat.” Moreover, they state that there is a need to educate those who manage projects and that there are more relevant criteria for evaluating success besides time, cost, and quality. Another study conducted with several stakeholder groups to assess the most important criteria to evaluate the success of IS projects concluded that the scope compliance criterion is the most important to evaluate the work required to complete a project [5].

It should be noted that the concepts of success criteria and success factors are often confused, but in reality, they are quite different and have different purposes. Success criteria are the focus of this paper and are success measures, while success factors refer to factors that have or can impact the success of projects [13].

3. Method

A structured literature review was conducted and included the following steps [14]: (1) Formulate the research question; (2) Define inclusion and exclusion criteria; (3) Select and access the literature; (4) Assess the quality of the literature included in the review; and (5) Analyze, synthesize, and disseminate the results.

The underlying research question was: "What are the criteria for evaluating IS projects' success discussed in the literature?". The review used clear and rigorous criteria to identify, evaluate, and synthesize the literature.

Considering their comprehensive coverage of relevant sources, WebScience, Scopus, and AIS eLibrary (AISeL) were selected from the existing search engines. The search terms were defined in four steps: (1) identification of the search expressions, selecting the most appropriate terms; (2) identification of synonyms and acronyms referring to the topic; (3) combination of the expressions, using logical operators; (4) adjustment of the search terms according to the search engine. Although the literature review would be focused on IS projects, at this stage, it was decided not to limit the search to IS projects to get richer results. The following search strings were then used:

- Scopus: "(criteria OR criterion) AND success AND evaluation AND (project management)," "(criteria OR criterion) AND success AND project AND (information AND system)," "(criteria OR criterion) AND success AND project AND ((information AND system) OR (information AND technology)) AND evaluation," and "(criteria OR criterion) AND success AND evaluation AND (information AND system) AND project." The search focused on the title, abstract, and keyword fields ("TITLE-ABS-KEY").
- Web of Science database: "((("criteria" OR "criterion") AND success) AND evaluation) AND (project management)," "((("criteria" OR "criterion") AND success) AND evaluation) AND ((information system) OR (information technology))," and "((criteria AND success AND evaluation) AND (project success)) AND ((information system) OR (information technology))." The search was conducted focusing on the title, with "English" as the filter language.
- AIS eLibrary: "success criteria and information system and project," "success criteria and information technology and project," "criteria or criterion and success and information system and project success," and "criteria or criterion and success and evaluation and information system and project and indicators and technology."

Initially, 1024 unique articles were identified. Next, filtering was performed to eliminate duplicate articles and to exclude articles written in languages other than English. After this filtering, the title of each article was read, eliminating those outside the scope of the search. In case of doubt, the abstract of each article was also read. After completing these steps, we obtained 62 articles to be analyzed.

A spreadsheet was created with the full details of each article (e.g., reference, year, authors, outlet, study sample, type of research, type of project, etc.) and the complete list of the criteria identified. Then, all the criteria were analyzed, standardized, and categorized, resulting in the criteria framework. Cross-reference tables were also maintained to keep track of the sources of each criterion. Finally, a brief description was developed for each criterion.

4. Results

Despite the scope of this study being IS projects, it was decided to include studies focused on all areas for a more comprehensive literature review. However, only the identified criteria applicable to IS projects were included in the final results. Figure 1 shows the evolution over time of the number of articles focused on success criteria, starting with the oldest. It can be seen that there has been a significant variation in the articles over the years, but the interest in the subject remains high.

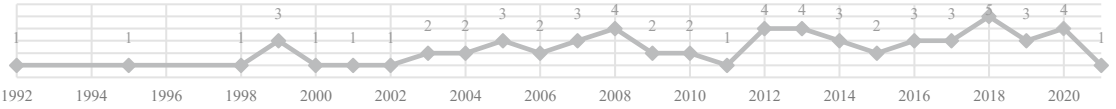


Fig. 1. Number of articles (per year).

4.1. Type of projects

Each article was classified according to the types of projects (see Appendix A). All studies have success criteria in common because, regardless of the project, some criteria, such as cost, time, and quality compliance, need to be considered. Three types of projects were identified: (1) IS: success criteria related to IS projects; (2) Not specified/General: general success criteria, which do not focus on any specific area; and (3) Non-IS: success criteria referring to several areas not related to IS.

Figure 2 shows the distribution of the articles according to the type of project considered in each study. 33 (~53%) of the articles analyzed correspond to projects related to the area of IS, 24 (~39%) correspond to projects in which the area of activity is not specified, and, finally, 5 (~8%) of the articles concern projects that are not related to IS, such as, for example, projects in the area of construction or healthcare.



Fig. 2. Articles per type of project.

Figure 3 presents, by project type, the number of success criteria identified in each article over time. The IS area presents the most significant number of articles (33 out of 62 analyzed) and a higher number of success criteria identified in the literature.

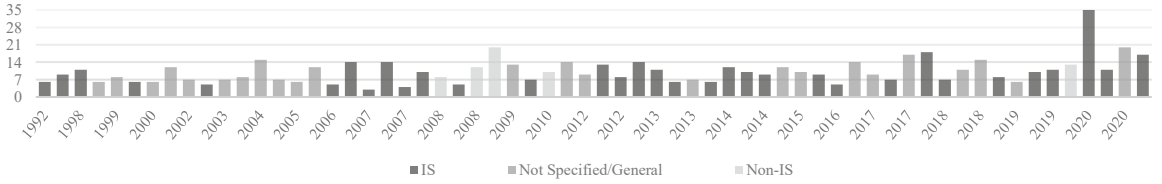


Fig. 3. Number of success criteria identified per type of project over time (per year).

4.2. Type of research

Figure 4 shows the articles' distribution according to the research type (see Appendix B for details). About 32% of the studies are of the "Literature Review" type, corresponding to 20 articles of the 62 analyzed. Next, the articles related to "Survey" type research present a value of nearly 26% (16). The articles "Not Defined" and "Case Study" show the lowest values, with about 21% both.



Fig. 4. Articles per type of research.

4.3. Number of success criteria

Figure 5 shows the highest number of success criteria identified in the studies per year (see Appendix C for details). For example, in 2004, of the two articles found, the one with the highest number of success criteria (15) was Baccarini & Collins [12]. Thus, this is the value represented in the graph for that year. It should also be noted that over the years, the number of success criteria identified by the various authors has been increasing, probably due to the increase in the scope and complexity of projects and a greater awareness of the concept of success.

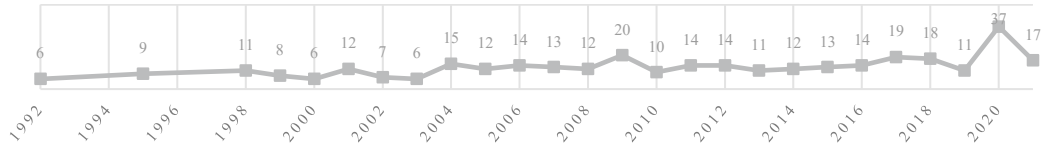


Fig. 5. Number of success criteria identified in articles (per year).

4.4. Geographic distribution of studies

Of the 62 articles analyzed, only 37 identified the country of the sample (see Appendix D for details). However, the number of studies identified per country is higher than 37, which is justified by the fact that there are studies conducted in more than one country. Notably, most studies focused on the European continent (17). Many countries do not have any studies.

4.5. Sample type and size

The studies have samples with different types of participants. Figure 6 shows the percentage of participant types per study (see Appendix E for details). The project manager is present in 93% of the samples, standing out from all other participants. Project managers have an in-depth perspective of the various aspects relevant to the project's success, hence their crucial role in these studies.

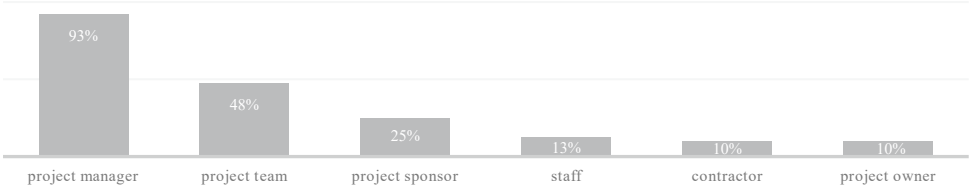


Fig. 6. Studies' sample – type of participants.

Regarding the sample sizes, a high variation is noticed, as depicted in Figure 7 (see Appendix F for details). The article of Müller & Turner [15], which is related to projects in the area of IS, has the highest number of participants (959). The article with the lowest sample size (10) is from Barclay & Osei-Bryson [16], also focusing IS projects. There is a high discrepancy in the number of participants in each sample (from 10 to 959), partially justified by the research type. Still, there is also a large number of studies that did not identify the sample size.

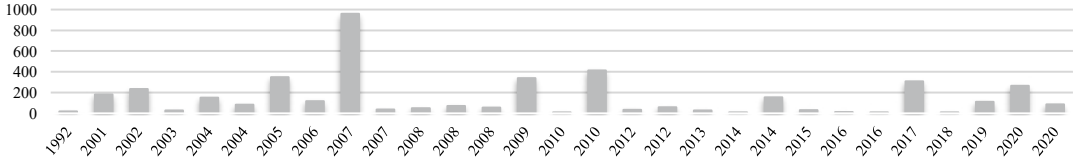


Fig. 7. Sample size (per year).

4.6. Criteria standardisation

After identifying the criteria, it was realized that several authors refer to the same criteria but use different expressions. Thus, it was necessary to standardize and organize the criteria into categories, as shown in Table 1.

Table 1. Standardization and categorization of success criteria.

ID	Category	Success Criteria	Frequency	% of articles
1	Iron Triangle	cost compliance	62	100%
2		time compliance	60	97%
3		scope compliance	42	68%
4	Satisfaction	stakeholder satisfaction	20	32%
5		user satisfaction	22	35%
6		customer/client satisfaction	43	69%
7		team satisfaction	12	19%
8		sponsor satisfaction	3	5%
9		steering group satisfaction	2	3%
10		line manager satisfaction	1	2%
11		supplier satisfaction	7	11%
12		company satisfaction	1	2%
13	Outcomes	impact on customer	6	10%
14		team impact	3	5%
15		organizational/business impact	7	11%
16		environmental impact	10	16%
17		individual impact	1	2%
18		system use	6	10%
19	Benefits	stakeholder benefits	9	15%
20		customer/client benefits	8	13%
21		user benefits	4	6%
22		organization benefits	9	15%
23		business benefits	9	15%
24		business success	10	16%
25		profit	22	35%
26		competitive advantage	2	3%
27		business value	2	3%
28		business performance	2	3%
29		economic value	2	3%
30	Quality	quality on product	3	5%
31		system quality	6	10%
32		service quality	4	6%
33		operational quality	1	2%
34		information quality	4	6%
35		leadership quality	1	2%
36		process efficiency	5	8%
37		quality	49	79%
38		performance	25	40%
39	Other	good communication	1	2%
40		self-defined criteria	1	2%
41		preparation for future	9	15%
42		safety	7	11%
43		project termination is well-achieved	1	2%
44		system implementation	1	2%

Figure 8 shows the sum of unique success criteria identified in the articles from the nineties to the actuality. It can be seen that there is an evolution since new success criteria have been identified over the years. The graph shows the sum of the unique success criteria found in the literature, reaching a total of 44, corresponding to the number of criteria presented in Table 1. In recent years, there has been a stabilization since no new success criteria have been identified in addition to those that had already been presented.

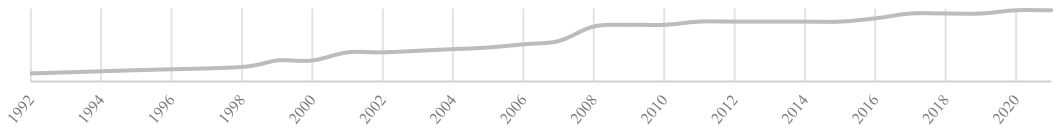
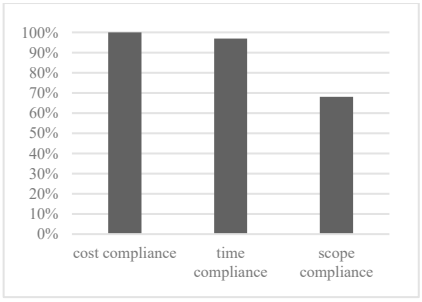


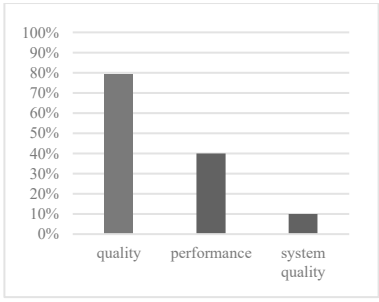
Fig. 8. Sum of unique criteria (trend).

4.7. Most common criteria

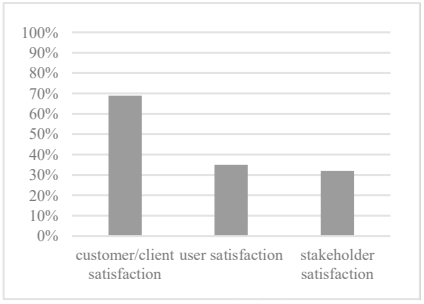
Figure 9 shows the top three criteria per category, considering the percentage of studies that identified them. There is a significant difference between criteria, such as, for example, "cost compliance" (Figure 9a), which is present in 100% of the articles (i.e., of the 62 articles analyzed, this criterion appears in all of them), and system quality (Figure 9b), that only appears in 10% (rounded value).



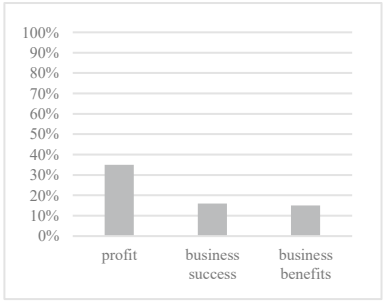
a) Iron Triangle



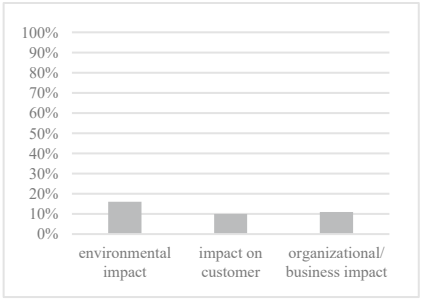
b) Quality



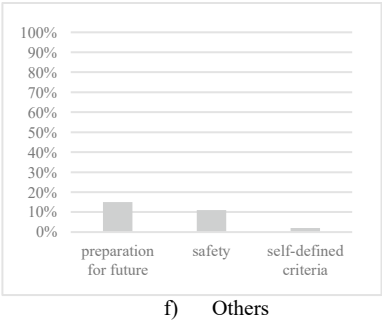
c) Satisfaction



d) Benefits



e) Outcomes



f) Others

Fig. 9. Percentage of studies including the most common (top 3) criteria (per category).

5. Framework of criteria for evaluating success in IS projects

Figure 10 shows the CrEISPS framework, resulting from the reviewed literature's search, analysis, synthesis, standardization, and organization of criteria for evaluating success in IS projects. Next, the definition of each criterion is presented. For a better understanding, the criteria are organized into the same categories used in Table 1: Iron Triangle, Satisfaction, Impacts, Benefits, Performance and Quality, and Other.



Fig. 10. CrEISP – Criteria for Evaluating Information Systems Project Success.

Iron Triangle - criteria related to cost compliance, scope compliance, and time compliance

- Cost compliance: Compliance with the cost (comparing what was planned regarding cost with what was executed).
- Scope compliance: Compliance with the scope (comparing what was planned regarding scope with what was executed).
- Time compliance: Compliance with the time (comparing what was planned regarding time with what was executed).

Satisfaction - criteria related to the stakeholders' satisfaction (including users, team, etc.)

- Stakeholder satisfaction: Level of satisfaction of a stakeholder with the project.
- User satisfaction: The level of user satisfaction with the project's deliverables.
- Customer/Client satisfaction: Level of satisfaction of a customer with the project.
- Team satisfaction: Level of satisfaction of the work team with the project.
- Sponsor satisfaction: Level of satisfaction of the sponsor with the project.
- Steering group satisfaction: Level of satisfaction of the steering group with the project.
- Line-manager satisfaction: Level of satisfaction of an operations manager with the project.
- Supplier satisfaction: Level of satisfaction of a supplier with the project.
- Company satisfaction: Level of satisfaction of the company with the project.

Impacts - criteria related to a project's impact (such as individual impact)
- Impact on the customer: Impact of the project on the customer.
- Team impact: Impact of the project on the work team.
- Organizational/Business impact: Impact of the project on the organization or business.
- Environmental impact: Impact of the project on the organizational environment.
- Individual impact: Impact of the project on individual users.

Benefits - criteria related to the benefits that a project has (such as user benefits. To note that benefits are also impacts)
- Stakeholder's benefits: Benefits to a stakeholder arising from the project.
- Customer/Client benefits: Benefits to the customer arising from the project.
- User benefits: Benefits to a user arising from the project.
- Organisation benefits: Benefits to the organization arising from the project.
- Business benefits: Business benefits arising from the project.
- Business success: Business success arising from the project.
- Profit: Profit arising from the project.
- Competitive advantage: Competitive advantage arising from the project.
- Business value: Added value to the business arising from the project
- Business performance: Business performance arising from the project.
- Economic value: Economic value to the organization arising from the project.

Performance and Quality- criteria related to product quality, system quality, service quality, etc.
- Quality of product quality: Quality of products resulting from the project.
- System quality: Quality of the systems resulting from the project.
- Service quality: Quality of service resulting from the project.
- Operational quality: Quality of the operations resulting from the project.
- Information quality: Quality of the information resulting from the project.
- Leadership quality: Quality of project leadership.
- Process efficiency (project management): Efficiency of the project management process.
- Process efficiency (project execution): Efficiency of the project execution process.
- Quality (process): Quality achieved in the project's processes.
- Quality (deliverables): Quality achieved in the project's deliverables.
- Performance: Performance achieved in the project (e.g., technical/product).

Other – miscellaneous criteria (such as self-defined criteria)
- Good direct communication: Good communication between stakeholders, allowing relationships to be developed and strengthened.
- Preparation for the future: Development of the organization's capabilities, preparing it for future challenges.
- Safety: Compliance with safety standards.
- Project termination is well achieved: Completion of the project with normality and acceptance by the stakeholders.
- System Implementation: Successful system implementation.
- System use: Use of the system resulting from the project.
- Self-defined criteria: Custom criteria for each project.

6. Discussion

The literature review clarified that many different success criteria are mentioned in the academic literature. Still, they are not organized or standardized since each author presents their point of view, using different words and expressions for the same criteria. This makes it more difficult to have consistency among the various criteria to evaluate the success of a project.

Regarding the samples, there is a large discrepancy in the number of study participants, regardless of the country where these studies were conducted. Only about 48% (30) of studies list the number of participants. The remaining (32) either do not inform about the number of participants or are literature reviews (in the latter cases, there is no sample to report on). The number of sample participants has been getting smaller over the years. In addition, the number of studies that do not mention the number of participants has also increased over time.

After thoroughly reviewing the various studies, 152 success criteria were identified. However, several often referred to the same criterion through different terms/expressions. After the standardization/consolidation process, 44 unique success criteria were obtained.

The analysis carried out showed the evolution of the identification of new success criteria. As more studies have been published and IS evolved, there has also been an increase in the number of success criteria identified by the authors in the various studies. In the 1990s, the number of success criteria identified was significantly lower than in recent years. For example, before 1998, only nine unique success criteria had been identified. By 2006, the number had risen to 23. The conclusion is that the number of success criteria has been increasing over time, probably due to larger scopes of projects, which are becoming more diversified, complex, and extensive. The greater awareness of the success facets [3; 24] can also explain the increasing number of criteria.

Regardless of the type of project under analysis, there are some success criteria that all share, such as "cost compliance," "time compliance," and "scope compliance." For example, the studies of Elattar [17] and Pankratz & Basten [11], despite focusing on different types of projects, present shared success criteria, such as, for example, "user satisfaction," "quality," "cost compliance," among others. This result is because some success criteria are independent of the type of project and, at the same time, fundamental to the success of any project. More peculiar success criteria are also identified by only one or two authors, such as "competitive advantage."

Regarding the types of projects identified in the various articles, it is possible to conclude that the projects with more articles/studies are those dedicated to the IS area. Possibly, this is because these projects are more complex [18] and very diverse. In addition, the projects that present the highest number of success criteria also refer to the IS area.

One aspect that stands out from the analysis is the priority/relevance of criteria that differ from author to author. In the case of Agarwal & Rathod [5], the scope compliance criterion is considered the most important for evaluating the success of a project. On the other hand, Pankratz & Basten [11] consider the stakeholder satisfaction criterion as the most fundamental for project evaluation. Generally, the "Iron Triangle" concept is the most commonly used for success evaluation [19; 20]. In addition, stakeholder satisfaction has become one of the main criteria for evaluating success [21; 22] since stakeholders are the ones who, at the end of the project, will judge if the result is in accordance with what was expected. They may also have a different perception of the achievement of the project's objectives.

We agree with Wateridge [23] when he states that it is impossible to define a universal set of criteria for evaluating project success since they will differ from project to project due to various aspects, such as, for example, the project's complexity. Thus, since each project is unique, the CrEISPS framework should be viewed and used as a reference basis for defining criteria according to each project's particular circumstances and not as a "universal" model of criteria. For instance, the framework can be used at the beginning of the project to help define success criteria so that stakeholders have appropriate benchmarks for measuring success.

7. Conclusion

The concept of success in IS projects is multidimensional. It depends on the criteria used in each project, the stakeholders' perception, the project phase, and many other aspects [1; 24]. It is essential to keep all these aspects in mind when evaluating the success of a project.

The main result of this article is the CrEISPS framework of criteria for evaluating the success of IS projects, which compiles, standardizes, and organizes several criteria identified in the literature. The framework not only adds to the body of knowledge in IS project management but can also aid IS practitioners when defining the success criteria to evaluate their projects. It should be noted that this framework is not a universal model, not exempting the need in each particular project to define the relevant criteria that should be considered and that new particular

success criteria may emerge. It should also be stressed that success criteria will dictate the success or failure of a project, even despite the "real" result. Success Management processes are fundamental in this context [3].

As with every research, this study is not free of limitations that open space for future research. 1) The proposed framework is generic enough to be considered in various IS projects. However, different types of IS projects (e.g., implementation of an ERP vs. customized development of an IT application) may require specific criteria. Thus, it would be interesting to create extensions of the presented framework for particular types of projects. 2) The framework's standardized criteria are described and presented without detailing performance indicators. It would be essential to complement the presented definitions with those indicators. 3) Finally, there is the opportunity to test the framework in other project types – the framework seems to apply to projects other than IS, but this requires further research.

Appendix A. Type of project (articles)

Type of Project	Article references
IS	[1]; [2]; [3]; [4]; [5]; [11]; [15]; [16]; [19]; [22]; [23]; [24]; [25]; [26]; [27]; [28]; [29]; [30]; [31]; [32]; [33]; [34]; [35]; [36]; [37]; [38]; [39]; [40]; [41]; [42]; [43]
General	[9]; [10]; [12]; [13]; [21]; [44]; [45]; [46]; [47]; [48]; [49]; [50]; [51]; [52]; [53]; [54]; [55]; [56]; [57]; [58]; [59]; [60]; [61]; [62]; [63]
Non-IS	[17]; [64]; [65]; [66]; [67]

Appendix B. Type of research (articles)

Type of search	Article references
Literature Review	[1]; [3]; [11]; [13]; [17]; [22]; [30]; [31]; [36]; [37]; [42]; [44]; [46]; [47]; [52]; [54]; [55]; [59]; [62]; [67]
Case Study	[15]; [26]; [28]; [29]; [33]; [35]; [39]; [45]; [48]; [50]; [56]; [57]; [60]
Not Defined	[2]; [10]; [9]; [23]; [24]; [27]; [32]; [34]; [38]; [40]; [63]; [65]; [68]
Survey	[4]; [5]; [12]; [16]; [19]; [21]; [25]; [41]; [43]; [49]; [51]; [53]; [58]; [61] [64]; [66]

Appendix C. Number of criteria per article

Year	Article reference	Number of Success Criteria	Number of Standardized Criteria
1992	[25]	6	5
1995	[41]	9	4
1998	[23]	11	8
1999	[56]	6	5
	[2]	6	4
	[9]	8	4
2000	[51]	6	3
2001	[57]	12	8
2002	[53]	7	3
2003	[45]	7	4
	[26]	5	3
2004	[12]	15	11
	[61]	8	5
2005	[48]	7	4
	[10]	6	6
	[63]	12	9
2006	[37]	5	4
	[5]	14	5
2007	[32]	3	2
	[15]	14	10
	[30]	4	3
2008	[65]	8	3
	[39]	10	7
	[66]	12	10
2009	[21]	13	7
	[17]	20	8
2010	[16]	7	6
	[64]	10	7
2011	[55]	14	11
2012	[28]	14	9
	[40]	8	7
	[13]	9	8
	[42]	13	8
2013	[22]	11	9
	[35]	6	4
	[50]	7	6
	[38]	6	5
2014	[34]	12	9
	[49]	10	7
	[29]	6	5
2015	[47]	12	11
	[60]	10	8
2016	[19]	9	8

Year	Article reference	Number of Success Criteria	Number of Standardized Criteria
	[36]	5	4
	[62]	14	12
2017	[27]	7	4
	[44]	17	14
	[58]	9	7
2018	[11]	18	12
	[24]	8	6
	[52]	15	12
	[54]	11	9
2019	[33]	11	8
	[46]	6	5
	[31]	10	7
2020	[1]	35	24
	[59]	20	15
	[43]	11	8
	[67]	13	10
2021	[4]	18	15

Appendix D. Sample – Countries

Country	Articles references
USA, UK, Australia, New Zealand	[25]
UK	[23]; [41]; [48]; [51]; [53]
NA	[1]; [2]; [9]; [10]; [16]; [17]; [22]; [24]; [27]; [32]; [38]; [42]; [44]; [45]; [46]; [47]; [54]; [56]; [57]; [58]; [62]; [63]; [67]
India, Asia	[26]
Australia	[12]; [37]; [39]; [55]
South Africa	[61]
India	[5]
USA, New Zealand, Australia	[15]
USA, Japan	[30]
Malaysia, China, India	[65]
Ghana	[66]
Australia, UK, USA, India	[21]
USA	[64]
New Zealand	[28]
Malaysia	[40]
Australia, Malaysia	[13]
Poland	[35]
Germany	[11]; [34]; [50]
Hungary, Germany, Czech Republic	[49]
Dubai	[29]
Algeria	[60]
India	[19]
Brazil	[36]; [59]
Greece	[52]
Turkey	[33]
USA, China, Dubai, UK, Japan, Canada, Russia	[31]
Cape Verde, Guinea Bissau, São Tomé and Príncipe, East Timor	[43]
Portugal	[4]

Appendix E. Sample – Type of participants

Type of project	Article reference	Project manager	Project team	Project sponsor	Contractor	Project owner	Staff	Other
IS	[15]	x		x				
	[11]	x						
	[19]	x		x	x			x
	[25]	x						x
	[16]	x	x				x	x
	[36]	x	x					x
	[34]	x						x
	[33]	x					x	x
	[35]	x	x	x				x
	[26]	x	x					
	[28]	x	x	x			x	x
	[30]	x					x	x
	[39]	x		x				x
	[41]	x	x	x				x
	[23]	x	x					
	[37]	x					x	x
	[5]	x		x				x
	[40]							x
	[29]	x						
	[31]	x	x					

Type of project	Article reference	Project manager	Project team	Project sponsor	Contractor	Project owner	Staff	Other
	[43]	x						x
Non-Specified/General	[45]	x	x					
	[48]	x	x	x	x			
	[49]	x	x			x	x	x
	[50]	x						x
	[51]	x		x				
	[53]	x						x
	[21]	x	x					x
	[55]	x	x					x
	[12]	x	x	x		x		
	[57]	x	x		x		x	x
	[58]	x						
	[59]	x	x					
	[60]				x	x		x
	[61]	x	x					x
	[62]	x						
	[17]				x	x		x
Non-IS	[64]	x	x					
	[65]	x	x					x
	[66]	x						x

Appendix F. Sample – Size

Year	Article reference	Sample size (number of participants)
1992	[25]	20
1995	[41]	NA
1998	[23]	NA
2000	[51]	NA
2001	[57]	182
2002	[53]	236
2003	[45]	NA
2004	[26]	27
	[12]	150
2005	[61]	82
	[48]	350
2006	[37]	116
	[5]	NA
2007	[15]	959
	[30]	37
2008	[65]	50
	[39]	72
	[66]	57
2009	[21]	340
	[17]	NA

Year	Article reference	Number of participants
2010	[16]	10
	[64]	412
2011	[55]	NA
2012	[28]	33
	[40]	59
2013	[35]	28
	[50]	NA
2014	[34]	11
	[49]	NA
	[29]	154
2015	[60]	30
2016	[19]	12
	[36]	NA
	[62]	11
2017	[58]	310
2018	[11]	11
2019	[33]	110
	[31]	NA
2020	[59]	264
	[43]	87

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