Development Process of a Rubric for Assessment of Leadership Competences in Project Management Scenarios

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Abstract

In the field of Project Management, leadership competences have a significant impact on project execution, and are identified as a key factor in the success of an organization. In this regard, defining strategies and tools for development and assessment of leadership competences is a significant contribution to project management research and practice. Scenario-based learning is an interesting approach for development of a wide range of competences because it involves real problems and allows practitioners to face challenges based on their own professional experience. For the assessment process it is possible to identify indicators related to the competences to each scenario. The success of this process is influenced by the instrument that is being used and rubrics are one of the instruments that may be used for competence assessment. A rubric includes criteria and standards considering a specific scale on which different levels of assessment are established. This paper aims to describe the process of creating and validating a rubric, designed to assess leadership competences in project management scenarios, considering the Individual Competency Baseline (ICB). To illustrate this design and validation process, only one criteria of the rubric will be presented. The design of the rubric includes five phases, and includes internal validation based on an expert agreement, considering content, construct and criteria validation of the rubric. The expected outcomes of this work are the presentation of the results of the internal validation process that was conducted by two experts. As future work, the final version of the rubric will be developed as a contribution to assess leadership competences in project management scenarios.

Keywords: Rubrics; Scenarios; Project Management; Leadership Competence; Competences Assessment; Engineering Education.

1 Introduction

Project management is a globally recognized profession (PMI, 2017) in which guides and standards are used to describe tools, techniques and concepts that support the development of effective project management processes (Chen & Partington, 2006). The International Project Management Association (2015) is a global project management organization that, through the Individual Competence Baseline (ICB), defines the competences required by professionals in project, program, and portfolio management. Among the 29 competences mentioned, in three categories, it is possible to highlight the leadership competence for their importance to the success of projects. The ICB is a global standard widely used to certify, develop and assess professional competences (IPMA, 2015).

In general, competence assessment is the process that measures the capabilities of individuals in both professional and academic settings (Succar et al., 2013). Rubrics are indicated as one the tools that can be used in the assessment process (Ana et al., 2020), and it is very common in the educational area to assess performance and facilitate student learning (Reddy, 2010). However, rubrics can be used in other assessment contexts, for example, projects and programs (Dickinson & Adams, 2017).

The use of rubrics, and its development is an important approach to mitigate the subjectivity within the assessment processes (Reddy, 2010). It is important to note that when the rubric provides information that does not match with the assessment objective and what it is intended to assess, then it will be invalid (Russell & Airasian, 2012). In this sense, the rubric validation step is important in order to identify and estimate if there is the bias and distortion of the instrument (Reddy, 2010).

Considering the lack of studies on the development and validation of rubrics for the context of project management, and also considering the importance of leadership in this context, the aim of this article is to describe the process of creation and internal validation of a rubric, designed to assess leadership competences in project management scenarios.

The article is organized in six sections, the first section introduces and establishes the objective of the research, the second section presents a brief contextualization about the main concepts surrounding the theme of the study, the third section describes the methodology used in the process of development and internal validation of the rubric, the fourth section highlights how the process described in section three occurred, and finally the last section deals with the conclusions of the study. This is an ongoing project and for that reason only a part of the process will be described.

2 Background

Traditionally, project management is understood as the application of knowledge, skills, tools, and techniques to project activities to satisfy project requirements and enable project execution effectively and efficiently (PMI, 2017). Project managers' skills are correlated with job performance and can be improved through training or other development activities (González-Marcos et al., 2016). In practical terms, they can be defined as the ability to apply knowledge, skills, and abilities to various situations, in order to achieve the expected result with the project (IPMA, 2015; Črešnar & Nedelko, 2019). For a better understanding, the International Project Management Association (2015) proposes three dimensions about what a competence must to include:

1. Knowledge: is the body of information and experience that an individual possesses.
2. Skills: are the specific techniques that an individual knows that enable him to perform a task.
3. Ability: is the effective use of knowledge and skills in a given context.

In this sense, the International Association for Project Management (IPMA) defined through the study of Individual Competence Baseline (ICB, 2015) a specific set of competences (twenty-nine) for individuals working in the area of Project Management. The individual should have perspective competences that respond to the context of projects, personal competences that respond to personal topics, and project competences that respond to specific project management practices. The wide range of competences is divided into the three (3) dimensions:

Practice Competences (13): Project design, requirements and objectives, scope, time, organization and information, quality, finance, resources, procurement, plan and control, risk and opportunity, stakeholders and change and transformation.

People Competences (10): Self-reflection and self-management, personal integrity and reliability, personal communication, relationships and engagement, leadership, teamwork, conflict and crisis, resourcefulness, negotiation and results orientation.

Perspective Competences (5): Strategy, governance, structures and processes, compliance, standards and regulation, power and interest and culture and values.

According to Falaki (2020), leadership competences associated with personal competences, should be recognized as the core of project management. Several studies highlight the importance to create effective leadership, taking into account the competences and personal characteristics of the leader (Falaki, 2020). The leadership role of the project manager involves taking risks and initiatives in order to achieve the organizational goals and to ensure the sustainability of business (Latif et al., 2020). According to the Project Management Institute (PMI), organizations are looking for managers with additional leadership competences due to the complexity and competitiveness of the market (PMI, 2017).

In this sense, leadership competences are identified as a key factor in the success of an organization (Podgórska & Pichlak, 2019; Chatzglou et al., 2017). There is also an understanding of the significant impact of managers' performance for the project success, considering the expected competences, especially in terms of leadership

(Alvarenga et al., 2019). Leadership competences are necessary in the project manager role and practice, and are defined as "knowledge, skills, and behaviors needed to guide, motivate, and direct a team to help an organization achieve its organizational goals" (PMI, 2017).

ICB (2015) highlights the knowledge, skills, and abilities required for developing leadership competence as evidenced in Table 1 (IPMA, 2015).

Table 1. Knowledge, Skills and Abilities of the Leadership Competences

Knowledge	Skills and abilities
▪ Leadership models; ▪ Individual learning; ▪ Communication techniques; ▪ Coaching; ▪ Sense-making and sense-giving ▪ Bases of power; ▪ Decision taking (consensus, democracy/majority, compromise, authority, etc.)	▪ Personal self-awareness; ▪ Listening skills; ▪ Emotional strength; ▪ Capacity to express a set of values; ▪ Dealing with mistakes and failures; ▪ Sharing values; ▪ Creating team spirit; ▪ Methods and techniques for communication and leadership; ▪ Management of virtual teams.

Competence development is a fundamental need, but one that is designed by an individual pathway, where individuals are motivated and engaged in developing competences to improve their job performance and career opportunities. There is no one path to developing competences, but is a process that involves interaction between activities and project contexts (IPMA, 2015) and is carried out over the years with experience (Hermarij, 2013). There are different ways to measure competences in project management, these include psychometric instruments, project management knowledge testing, peer assessment, and assessment centers (González-Marcos et al., 2016). Fanelli et al. (2017) states that competence assessment is a key management strategy, which can produce valid results in terms of job motivation and quality in the work environment.

The competence assessment process is as complex as it is useful, and its complexity starts from the need to define precisely what is going to be assessed (Fanelli et al., 2017), it is also not so simple to design reliable and valid tools that make the process possible (Mathieu et al., 2011). There are three main decisions to be made in the assessment: what to assess, how to assess, and who assesses. In this sense, it is necessary to use methods to identify the knowledge and skills required by each competence, as well as to select the approach used in the assessment, according to the context. Furthermore, it is essential to clarify why the competence need to be assessed - *why* (Mathieu et al., 2011).

Rubrics can be used in the assessment process as a support tool (Ana et al., 2020). Are defined as "a type of matrix that provides scaled achievement or comprehension levels for a set of quality criteria or dimensions for a particular type of performance, for example, a paper, an oral presentation, or use of teamwork skills" (Allen & Tanner, 2006, p. 197). They can also be characterized by descriptive scoring schemes developed by raters to provide guidance for analyzing product or process performance (Brookhart, 1999; Moskal, 2000). According to the educational literature is used as a tool to describe and rank observable qualitative differences in performance analysis (Reddy, 2010).

From this perspective, the rubric provides a clear assessment structure for observation, describing in detail the performances to be assessed (Ana et al., 2020). This minimizes the discrepancies between raters (Melguizo-Moreno & Gallego-Ortega, 2020). Using rubrics in assessment processes makes it possible to communicate objectives with the stakeholders, highlighting what is expected and what behaviors are expected in different performance levels (Dickinson & Adams, 2017). According to Panadero & Jonsson (2020) they can be designed and implemented according to the intended use in the assessment, and there is no ideal rubric. However, there are general recommendations in the literature for their design and implementation.

Rubrics to be robust must be unbiased and free of distortion. For that reason, one of the steps of designing a rubric is the validation process. Validation represents the degree of accuracy that the assessment instrument measures what is intended (Reddy, 2010). According to Moskal & Leydens (2000) validation is traditionally

subdivided into three categories: content validity, construct validity and criteria validity. Content-related validation is concerned with how well the instrument collects appropriate criteria/samples from the content domain (Moskal & Leydens, 2000). This validation includes any validity strategy that focuses on gauging content, in order to verify the degree to which the instrument is a representative test of the content for the purpose or specification it was initially designed for (Brown, 2000). For example, a history exam in which the questions use complex sentence structures may unintentionally measure students' reading comprehension skills rather than their knowledge of history. A teacher who is interpreting a student's incorrect answer may conclude that the student does not have the appropriate history knowledge when, in fact, that student does not understand the questions. The teacher has misinterpreted the evidence - making the interpretation invalid (Moskal & Leydens, 2000).

To understand construct validity, one must understand what a construct is (Brown,2000). The construct relates to psychological construct processes that are internal to the individual, such as reasoning and creativity, Thus, if a scoring rubric is used to guide the assessment of these aspects then it should highlight criteria that address these processes (Moskal & Leydens, 2000).

Criteria-related validation checks whether the identified criteria supporting the assessment results correlate to a current or future fact. For example, when assessing individuals through simulated work environment experiences, the quality of the rubric takes into account if the assessment criteria address the components of the activity and if it is directly related to practice in the work environment. If the assessed receives high scores, it is suggested that he (assessed) will perform highly in the future work environment (Moskal & Leydens, 2000). Moskal & Leydens (2000) states that being aware of the types of validation evidence for a rubric throughout the development process, improves the adequacy of the interpretation of such a rubric when used. Therefore, it is very important to be aware that before the development of the instrument it is important to design the validation process, in order to design a consistent and effective rubric, in addition, a list of questions can be useful when assessing of a given rubric against its stated purpose.

3 Methodology

The objective of this study is to describe the process of creation and internal validation of a rubric, designed to assess leadership competences in project management scenarios.

In this study, we intend to assess the leadership competence, included in the people competences. The process of developing the rubric was designed in 5 phases based on studies by Reddy (2010); Moskal & Leydens (2000) and Melguizo-Moreno & Gallego-Ortega (2020). The first phase of the study refers to the definition of the competence to be evaluated, based on the International Project Management Association (IPMA) through the study of Individual Competence Baseline for Project, Program and Portfolio Management (ICB, 2015). In the second phase focused on the identification of the assessment criteria, considering the references for the development and construction of the criteria. This phase was inspired by Hermarij (2016) and the study of Individual Competence Baseline for Project, Program and Portfolio Management (ICB, 2015). In the third phase the development of the rating scale of the assessed criteria was developed, based on a five point scale: inadequate, lower than expected, reasonable, good, and excellent. The fourth phase, aimed at the design of the development of the rubric, and finally, the internal validation (fifth phase).

It is worth mentioning, that due to the temporality of the study (under development) the external validation process was not carried out, such process relies on the judgments of experts outside the present study to verify if the results found are pertinent to other points of view. On the other hand, the internal validation relies on the inputs from two experts and three dimensions were considered, namely: content, construct, and criteria.
In order to characterize the experts, we have Expert A is a professor and researcher with more than 20 years of experience in the academic world, with high-impact publications, projects and cooperation with universities and companies. Expert B a professor and researcher, whose research focuses on Competence-Based Curriculum, Leadership and School Organization.

Thus, this process starts from the reflection on the adequacy of the item regarding its relevance and representativeness. The reflections were based on the validation evidence suggested by Moskal and Leydens (2000) and considered the following questions:
With respect to the content validation process, three (3) questions were considered:

1. Do the assessment criteria address any extraneous content?
2. Do the assessment criteria for the scoring rubric address all aspects of the intended content?
3. Is there any content addressed in the task that should be assessed through the rubric, but is not?

Regarding the construct validation process, two (2) questions were considered:

4. Are all important indicators of the intended construct assessmented using the scoring scales?
5. Are any of the scoring criteria irrelevant to the construct of interest?

Finally, for the criteria validation process, four (4) questions were considered:

6. Are the indicators consistent with the criteria (communication) presented?
7. Can the indicators inherent to the criteria (communication) be assessed using the assessment instrument?
8. Does the criteria (communication) assess performance indicators related to professional practice?
9. Are there indicators that are not represented in the scoring scales?

Accordingly, a list of nine (9) questions was sent via email individually to each expert for further analysis of the results.

4 Design, Development and Internal Validation of a Rubric

Based on the literature review the rubric was designed, developed and partially validated. The steps of the developing and validating the rubric to assess leadership competences in project management scenarios will be discussed in this section. Initially, the results of the rubric design will be presented following the validation process.

4.1 The rubric design

The design process of the rubric follows 5 phases, namely:

(1) Definition of the competence to be assessed

(2) Identification of the assessment criteria

(3) Development of the rating scale of the assessed criteria

(4) Design of the rubric

(5) Internal validation of the rubric

In this study, the definition of competence to be assessed (phase 1), will be based on the International Project Management Association (IPMA) through the study of Individual Competence Baseline for Project, Program and Portfolio Management (ICB, 2015). Thus, the definition of leadership competences considered in this study is:

> "Providing direction and guidance to individuals and groups. It involves the ability to choose and apply appropriate style of management in different situations. Besides displaying leadership with his or her team, the individual needs to be seen as a leader in representing the project to senior management and other interested parties". (IPMA, 2015, p. 333).

Regarding the identification of the criteria for the development of the rubric (phase 2), the work developed by Hermarij (2016) and the study of Individual Competence Baseline for Project, Program and Portfolio Management (ICB, 2015) inspired the development and construction of the assessed criteria. The criteria of responsibility, demonstration of commitment, team/individual orientation and direction are some of the

examples of criteria included in the rubric. In this sense, we sought to use assessment criteria in a general way so that they can be applicable in different contexts (scenarios) for assessing leadership competences.

Phase 3, the development of the scale for the assessment criteria, was initially carried out considering the identification of levels of performance, in order to portray the assessment in a complete and comprehensive way. The most important aspect of the performance levels is the description of the quality of the performance that will be assessed. A second aspect of performance levels that was considered is how many levels the rubric should have. In this study, five point scale was considered: bad, beginner, intermediate, advanced and expert.

Once the number of levels was decided, a description of the expected performance for each level and criteria was developed. To do this, the setup used was to start describing the highest performing level, in this case, expert, then develop to the other levels in a descending order. Finally, a separate score was developed for each performance level.

Thus, the design of the rubric (phase 4) to assess leadership competences in Project Management contexts was initially conceived, with 7 criteria and 5 performance levels (scale). Finally, the purpose of this study comprises the internal validation of the rubric (phase 5) and will be described in the next section.

4.2 The Validation Process

In section three (3), we described which aspects according to Moskal and Leydens (2000) are used as evidence of rubric validation.

To illustrate the internal validation process, one criteria of the rubric, namely communication. The process of this process was developed using nine questions as a guide for this process, based on three dimensions: content validation, construct, and criteria.

The experts' suggestions regarding the content validation process states that the assessment criteria do not address extraneous content, however, it was evidenced that such criteria partially consider aspects of the intended content. Furthermore, there is no content that should be assessed by the rubric, but is not.

About the construct validation process, according to the experts, what was designed to be assessed is being represented in the assessment instrument. All important indicators of the intended construct are assessed, and no assessment criteria are irrelevant to the construct.

Finally, regarding the criteria validation process, the experts showed that the indicators are consistent, are considered on all the scoring scales, and are able to assess performances related to professional practice. They can also be assessed using the assessment instrument, although this then depends on the applicable context (scenario).

In addition, the experts suggested improving the performance description for all levels, and changing the levels to: Inadequate, Lower than expected, Reasonable, Good, Excellent. The results of the validation process are shown in Table 2.

Table 2. Communication Criteria

Criteria	Inadequate (0)	Lower than expected (1)	Reasonable (2)	Good (3)	Excellent (4)
Communication	Communication is not adequate, in that ideas are presented in a disorganized and diffuse way. It does not demonstrate any level of argumentation. The objectives are not explicit and clear.	Communication is below expectations, in that ideas are presented in a disorganized and incoherent way. It demonstrates a weak and incoherent argumentation. The objectives may not be explicit and clear, due to the difficulty in interpreting the discourse.	The communication is reasonable, in that the ideas are, in general, presented in a partially organized way. It shows an effort in the argumentation, although still incoherent. The objectives can be partially explicit and clear.	Communication is good, in that ideas are, in general, presented in an organized way. It demonstrates a coherent argumentation. Objectives are explicit and clear, with little room for misinterpretation.	Communication is excellent, in that ideas are presented in an organized and consistent manner. It demonstrates a coherent and reasoned argumentation. The objectives are explicit and clear, and are understood by the interlocutor.

5 Conclusion

The importance of assessing the competences of professionals working in Project Management is undeniable. Assessing the competences focused on leadership, through scenarios, becomes an excellent way to prepare professionals effectively for their practice.

Some of the main results of the study presented indicate that the rubric developed, according to the experts, the content is adequate for the purpose. However, it was evidenced that it partially considers aspects of the intended content. In relation to the construct validity issues of the rubric for the communication criteria there is consistency, and in relation to the validation of the criteria (communication) it is shown to be valid. Furthermore, the Individual Competency Baseline Reddy (2010), Moskal & Leydens (2000), and Melguizo-Moreno & Gallego-Ortega (2020) were the main reference bases to support, structure, and guide the internal validation of the rubric.

Finally, it is concluded that the development of rubrics allows the reproduction for other competences of Project Management, and can serve as support tools and help to develop reliable and valid methods in the assessment of competences. It is important to note that in this initial study, the reliability of the rubric was not discussed, so this study is still in progress.

Based on this first validation, it is possible to review all criteria and content, in order to present the final version of the rubric to be implemented in the scenarios-based learning. As future work, it is expected to improve reliability by external validation with experts.

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