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Validation of an assessment instrument for Latin American projects

Validación de un instrumento de evaluación de proyectos latinoamericanos

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Abstract: this research aims to adapt and validate the Project Implementation Profile (PIP) instrument for evaluating projects carried out in Latin America. Four hundred twenty professionals participated as leaders or team members in projects completed in 2020-2021. As the instrument was developed in English, a translation and retranslation procedure was used, in which professional and academic experts in project management participated, along with certified translators, for its adaptation to the Spanish-speaking population in Latin America. For the exploratory factor analysis, the unweighted least squares extraction method was selected, obtaining four critical success factors: Communication with the client, monitoring and planning, senior management, and technical capabilities, with Cronbach Alpha coefficients between .876 and 933. Subsequently, confirmatory factor analysis was applied, demonstrating that the instrument has convergent and discriminant validity and, consequently, can be used in academia for future research on project management and professionally to evaluate the performance of Ecuadorian projects, considering the limitation that the percentage of participation of projects from other Latin American countries in the study sample was 22%.

Keywords: project management

Resumen: esta investigación tiene por objeto adaptar y validar el instrumento denominado Perfil de Implementación del Proyecto (PIP) para la evaluación de proyectos realizados en Latinoamérica. Participaron 420 profesionales involucrados, ya sea como líderes o miembros de equipos, en proyectos culminados en el periodo 2020-2021. Como el instrumento fue elaborado en inglés se utilizó un procedimiento de traducción y re-traducción, en el cual participaron expertos profesionales y académicos en gestión de proyectos junto con traductores certificados, para su adaptación a la población hispanoparlante en Latinoamérica. Para el análisis factorial exploratorio se seleccionó el método de extracción de mínimos cuadrados no ponderados, obteniéndose cuatro factores críticos de éxito: Comunicación con el cliente, seguimiento y planeación, alta gerencia, y capacidades técnicas, con coeficientes Cronbach Alpha comprendidos entre .876 y .933. Posteriormente se aplicó el análisis factorial confirmatorio, el cual demostró que el instrumento posee validez convergente y discriminante y, en consecuencia, puede ser utilizado en la academia para futuras investigaciones sobre la gestión de proyectos, y en lo profesional para evaluar el desempeño de proyectos ecuatorianos, contemplando la limitación de que el porcentaje de participación de proyectos de otros países de Latinoamérica en la muestra de estudio fue del 22 %.

Palabras clave: gestión de proyectos, desempeño, factores críticos de éxito, criterios de éxito, Latinoamérica

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Introduction

Since the late 1960s, both academics and practitioners of project management have been interested in discovering what defines project failure or success (Avots, 1969), generating abundant literature on critical success factors (Aldrich, 1986; Ayat *et al*., 2021; Berssaneti and Carvalho, 2015; Correia and Martens, 2023; de Carvalho *et al*., 2015; Hughes *et al*., 2020; Ika, 2009; Ika and Pinto, 2023; Iriarte and Bayona, 2020; Khatatbeh, 2023; Lamprou and Vagiona, 2022; Leung *et al*., 2023; Pinto, 1990; Pinto and Covin, 1989; Pinto and Prescott, 1988, 1990; Pinto and Slevin, 1987; Sanchez *et al*., 2017; Sinesilassie *et al*., 2019; Slevin and Pinto, 1987; Williams, 2016; Yasin *et al*., 2009), and the project success criteria (Albert *et al*., 2017; Amies *et al*., 2023; Ika, 2009; Ika and Pinto, 2022; Jitpaiboon *et al*., 2019; Lamprou and Vagiona, 2022; Pinto and Prescott, 1990; Pinto and Slevin, 1988; Pollack *et al*., 2018; Shenhar and Holzmann, 2017; Thomas and Fernández, 2008; Varajão *et al*., 2022).

According to Müller and Turner (2010a, 2010b), critical success factors can be manipulated to increase the likelihood of project achievement, while the success criteria are the measurements under which project performance is evaluated. Slevin and Pinto (1986) interested in proposing a diagnostic tool for project managers, conceived a project implementation framework characterized by contemplating human and managerial aspects of successful project management, the Project Implementation Profile (PIP), based on ten critical success factors: Project Mission (M), Senior Management Support (AG), Project Schedule / Plan (PL), Customer Consultation (CC), Staff (PE), Technical Activities (TA), Customer Acceptance (CA), Follow-up and Feedback (SR), Communication (CO), and Problem Solving (RP). In its evaluation as a diagnostic instrument, it obtained high values of internal consistency of its factors, between .76 and .92. In addition, Pinto (1986) found that the ten factors contribute positively and significantly to the success of the projects.

Later, Pinto and Slevin (1988a, 1988b) incorporated into the PIP a construct to measure in parallel the success of the implementation of the project and its result (performance-D), from 12 items (success criteria) distributed in two categories: Project (the project meets the time and budget, and performs as expected) and client (the use of the project by the client, their satisfaction with the result, and the perceived impact of the project on organizational effectiveness).

Because of its versatility, PIP has been used to evaluate research and development projects (Pinto and Slevin, 1989), construction (Pinto and Mantel, 1990), technology and information (Chu and Banister, 1992; Mughal *et al*., 2019; Padilla *et al*., 2021; Rosacker and Olson, 2008), nongovernmental (Rusare and Jay, 2015), and health care (Nishimwe and McHunu, 2021). However, only two studies have presented reliability analysis of the instrument: Pinto and Prescott (1990) from the evaluation of 408 projects of North American companies, obtained Alpha Cronbach reliability indicators between .79 and .90 for critical success factors and .87 for the scale of success of the project; and the research of Padilla *et al.* (2021) that reported internal consistency indexes between .77 and .91 for the measurement of critical success factors of just over 200 projects carried out in Ecuador and Peru.

Research in Rwanda (Nishimwe and McHunu, 2021), Pakistan (Mughal *et al*., 2019), South Africa, Nigeria and Cameroon (Rusare and Jay, 2015), and Hong Kong (Chu and Banister, 1992) did not carry out a procedure for adapting and validating the PIP to the context, but the instrument, either in whole or in part, was used without modification, so the authors mention this fact as a limitation in their studies. On the contrary, Padilla *et al.* (2021) applied the PIP instrument, once they did the validation of content through a pilot test with directors of technology projects originating from Peru and Ecuador, modifying the wording of the questions to make them more understandable. A similar process was applied by Rosacker and Olson (2008) to validate the instrument in the context of a technology and information project of the US government sector.

The literature review shows that, with the exception of the study by Padilla *et al.* (2021), the PIP instrument, despite its proven versatility, has not been used to evaluate the critical success factors in project management or the criteria of success of the

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project in Latin American countries. Consequently, it is relevant to have an instrument adapted to the Latin American context and a complete validation process to facilitate the collection of information from those involved in the management of projects and their projects, and thus evaluate their critical factors of success and performance to identify strengths and opportunities for improvement, in order to contribute positively with the maturity of organizations in project management. Consequently, this research aims to adapt and validate the instrument called Project Implementation Profile (PIP) for projects carried out in Spanish-speaking countries in Latin America.

Materials and method

Participants

In this study, 420 professionals involved in project management participated voluntarily, either in the role of leader or team member, who were contacted between mid-July 2022 and the end of January 2023, through the membership department of the PMI Latin America chapters, the Latin American groups of topics associated with Project Management on LinkedIn, and academic directorates of postgraduate degrees in Project Management of the region, with the aim of obtaining a representative sample of the context of interest of this study. While most are Ecuadorians, 22% originate from other Latin American countries: Argentina (9%), Peru (10.2%), Colombia (0.2%), Chile (0.2%), Mexico (2%), Paraguay (0.2%), and Uruguay (0.2%). 35% are female, 67% are between 30 and 50 years old, 95% register university studies; and of these, 45% have a master's degree; 24% have an international certification in project management.

Out of the projects assessed, 59% were carried out for large companies, generating a variety of products and services: technology (24%), construction (21%), industrial (13%), commercial (10%), public services (8%), consulting (6%), education (6%), health (4%), and research and development (4%). Table 1 presents the typification of the projects analyzed, according to their duration and budget, considering the Burgan and Burgan criteria (2014), used in other research (Ishfaq *et al.*, 2022; Ng *et al.*, 2022; Wangsa *et al.*, 2022).

Table 1
Size of projects

Size	Duration	%	Budget	%	Team Members	%
Small	Less than 6 months	22.1	Less than US$ 100 000	43.1	Less than 5	11.9
Medium	Less than 1 year	26.4	Less than US$ 500 000	20.7	Less than 20	61.9
Large	1 year or more	51.4	$500,000 or more	36.2	20 or more	26.2

Instrument and procedure

For this study, the instrument called Project Implementation Profile (*PIP*) was used, which is made up of 62 items, 50 measure the critical success factors (five for each of the ten factors described in table 2) and 12 the criteria of success of the project. All items are evaluated on a seven-point Likert scale (strongly disagree (1) to strongly agree (7)). The instrument was requested from one of its authors, Jeffrey Pinto, who submitted the full version in its original language, English. Therefore, the translation and re-translation procedure was applied to adapt it to the Spanish-speaking population of Latin America (Tilburg and Hambleton, 1996). A certified translator in Spanish and English performed the Spanish translation of the original PIP.

Table 2
Project Implementation Profile (PIP)

Critical success factors
Project mission (M): initial clarity for the project team of the project objectives, alignment of the project objectives with the strategic objectives and overall management.
Top management support (AG): readiness of top management to grant resources and authority necessary for the success of the project.
Project schedule/plan (PL): details of the individual actions required for project management and management of resources, times, budget and risks.
Client Consultation (CC): communication, consultation and active listening of all parties involved about the progress, value, limitations and adjustments to the project.
Personnel (PE): search, evaluation, selection, and training of the personnel that make up the project team.
Technical tasks (TA): availability of technology and expertise required to carry out specific technical activities.
Client Acceptance (CA): sell the project to the intended end users and validate its usefulness to customers.
Monitoring and feedback (SR): timely delivery of comprehensive control information (budget compliance, schedule, staff and equipment usage, etc.) at every stage of the implementation process.
Communication (CO): all key actors are provided with a suitable network of contacts and the necessary data for the implementation of the project.
Trouble shooting (PR): sudden crisis management skills and plan updates.

Note. Slevin and Pinto (1986).

Subsequently, two focus groups were organized: one with seven professional and academic experts in project management (expert judges); and, the second with four project managers and postgraduates in project management (target audience), who were asked to read the translated instrument's items and indicate whether its wording was clear and logical. As a result of this content validation stage, two items were removed (one from the *mission* factor and one from the *performance* construct) and an item was added to the *follow-up and feedback* factor, leaving a total of 61 items. The revised PIP instrument was translated into English by another certified translator in Spanish and English. An expert in both languages and in the subject of project management compared both versions to ensure the semantic equivalence, before sending the revised instrument in English to the author, who confirmed that it could be used in this research.

Between July 2022 and January 2023, the tool was distributed through the *Question Pro* tool to the members of the chapters of the *Project Management Institute-PMI* Latin America, professionals registered on *LinkedIn*, and postgraduates in project management. A total of 420 people completed the questionnaire, with a response rate of 65%. The average completion time of the instrument was 13 minutes. SPSS 29.0 was used for data coding and exploratory factor analysis, and Smart PLS 4 for confirmatory analysis (Ringle *et al.*, 2022).

Results and discussion

Exploratory Factor Analysis

Descriptive statisticians and the Kolmogorov–Smirnov test determined that all PIP items did not have a normal distribution. Consequently, to examine the validity of constructs (Thompson, 2004), the unweighted least squares method was used for exploratory factor analysis (Watkins, 2021).

Out of the 50 items, seven (two from the Mission factor, two from the Personnel factor, and three from the Schedule/Plan factor) were eliminated for having figures below .5 (Hair *et al.*, 2018). While 19 items (one of the Mission factor, one of the Schedule/Plan factor, two of the Personnel factor, two of the Technical task factor, two of the Client Acceptance factor, one of the Follow-up

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and Feedback factor, all of the Communication and Trouble shooting factors) were eliminated by presenting loads higher than .4 in two or more factors at the same time (Hair *et al.*, 2018).

The matrix of factors with Varimax rotation of the critical success factors resulted in the extraction of four factors that explain 66.98% of the total variance. Factor scale reliability was measured through Cronbach's Alpha (Cronbach, 1951): Client communication (a = .931), monitoring and feedback (a = .933), top management (a = .914), and technical task (a = .876), and for global scale (a = .962), showing excellent results. The communalities fluctuated between .521 and .900, complying with the recommendation that they be higher than .5, meaning that the common variance is the one with the highest representativeness in the total variance. All items had factor loads greater than .4, confirming the relevance of the item to the factor (Hair *et al.*, 2018). The Kaiser-Meyer-Olkin index (KMO) was .962 and the Bartlett test result was statistically significant, showing that the sample adequacy for this analysis is met (see table 3).

Table 3

Exploratory factor analysis of PIP (critical success factors). Rotated factor matrix

Item	Factor			
	Client Communication	Monitoring and feedback	Top Management	Technical task
BQ2	0.658			
BC3	0.701			
CA4	0.672			
CC1	0.762			
CC2	0.692			
CC3	0.641			
QC4	0.707			
CC5	0.738			
M2		0.567		
PE3		0.471		
PL2		0.639		
SR1		0.706		
SR2		0.647		
SR3		0.683		
SR4		0.771		
SR5		0.766		
AG1			0.727	
AG2			0.707	
AG3			0.713	
AG4			0.742	
AG5			0.624	0.522
AT2				0.828
AT3				0.698
AT4				0.876
Cronbach's alpha	0.931	0.933	0.914	0.876

Note. Extraction method: Unweighted least squares. Rotation method: Varimax with Kaiser normalization. The rotation has converged in three iterations. Kaiser Meyer Olkin (KMO) = .962; Bartlett sphericity test (8107.55, p < .0001).

The matrix of factors with Varimax rotation resulted in the extraction of two factors that explain 71.87% of the total variance. High reliability rates were obtained for both the global scale and the Client and Project factors, which is positive for the study: a = .871, a = .915, and a = .802, respectively. The communalities fluctuated between .585 and .805 complying with the recommendation that they be higher than .5, which means that the common variance is the one with the greatest representativeness in the total variance. All items had factor loads greater than .4, confirming the relevance of the item to the factor. Out of the 11 items, five items (one from the Project factor and four from the Client factor) were eliminated because they had loads above .4 in two or more factors at the same time (Hair *et al.*, 2018). The Kaiser-Meyer-Olkin index (KMO) was .852 and the Bartlett test result was statistically significant, showing that the sample adequacy for this analysis is met (see table 4).

Table 4

Exploratory factor analysis of PIP (performance). Rotated factor matrix

Ítem	Factor	
	Customer	Project
D3	0.812	
D4	0.858	
D10	0.848	
D11	0.720	
D1		0.716
D2		0.848
Cronbach's alpha	0.915	0.802

Note. Extraction method: Unweighted least squares. Rotation method: Varimax with Kaiser normalization. The rotation has converged in three iterations. Kaiser Meyer Olkin (KMO) = .852; Bartlett sphericity test (1583.12, p < .0001).

At the end of this stage, an adapted PIP consisting of 30 items has been obtained: 24 measure the critical success factors, and six measure the performance of the project. Compared to the original PIP, a reduction of 32 items was evidenced, and the adjustment of ten to four critical success factors. Factor and performance scales account for 67% and 72% of the total variance, and register an a of .962 and .871, respectively. The internal consistency of the adapted scales show better results than those published by Pinto and Prescott (1990) and Padilla *et al.* (2021).

Confirmatory Factor Analysis

Pinto (1986) found that the ten critical success factors contributed positively and significantly to project performance (success). Since the exploratory factor analysis was completed, the ten factors became four: client consultation, monitoring and feedback, top management and technical tasks; it is proposed to perform the analysis of reliability, convergent and discriminant validity of the model presented in Figure 1.

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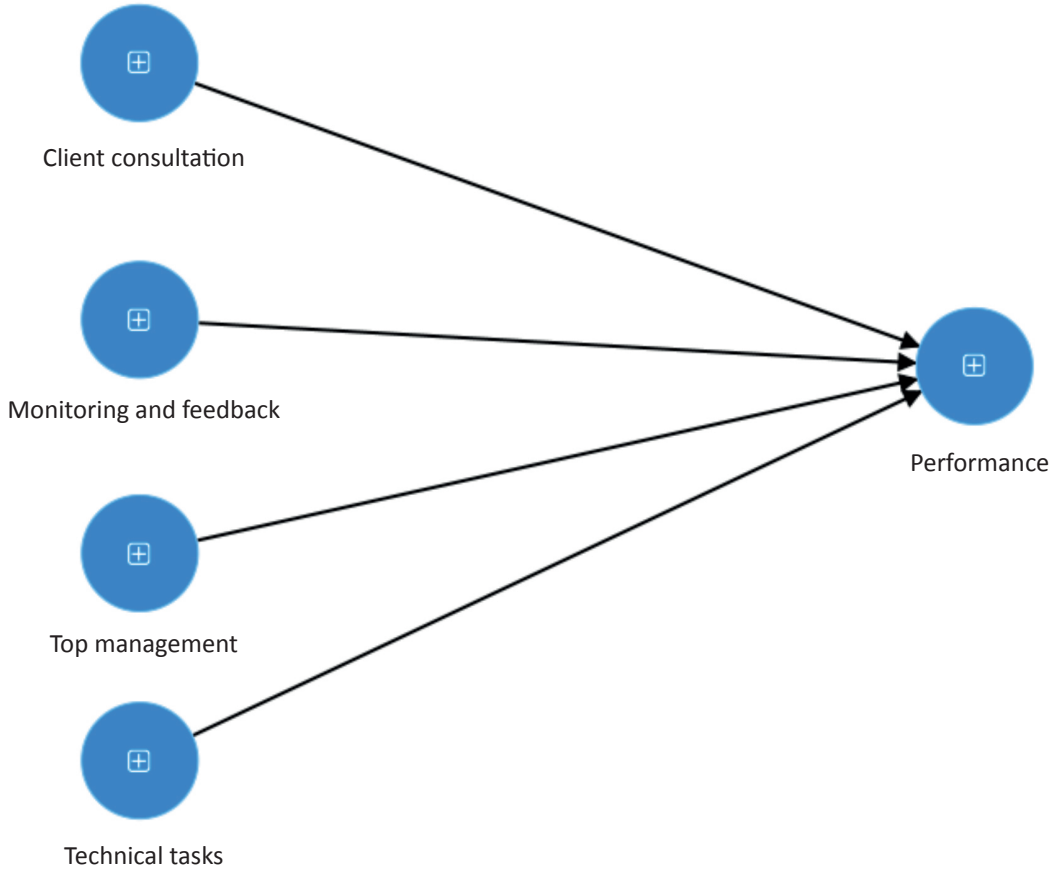
Figure 1
Proposed model



Proposed model: Convergent and discriminant validity

While Table 5 shows that all latent constructs exhibit Cronbach's Alpha and a composite reliability higher than .7 (Bagozzi *et al.*, 1998; Hair Jr. *et al.*, 2021), two items (CC5 and D1) do not register factor loads equal to or greater than .7 (Hair Jr. *et al.*, 2021; Hulland, 1999), therefore these items should be removed as they do not contribute to internal consistency. Regarding convergent validity, this exists when each group of items converges to measure the same construct (Anderson and Gerbing, 1988), this is confirmed for all subscales since they have an extracted mean variance (AVE) greater than .5. The existence of discriminant validity is established (see table 6), since the AVE of each construct is superior to its correlations with other latent variables, i.e., each measurement scale represents a dimension separately, and no item contributes at the same time to more than one dimension (Fornell & Larcker, 1981).

Table 5

Proposed model: factor loads, reliability and extracted mean variance

Subscales	Items	Factor loads	Cronbach's alpha (a)	Reliability (FC)	Mean Extracted Variance (AVE)
Client consultation	BQ2	0.85	0.932	0.935	0.629
	BC3	0.811			
	CA4	0.868			
	CC1	0.742			
	CC2	0.828			
	CC3	0.847			
	CC4	0.729			
	CC5	0.638			
Top management	AG1	0.842	0.915	0.916	0.682
	AG2	0.783			
	AG3	0.849			
	AG4	0.782			
	AG5	0.869			
Technical task	AT2	0.801	0.875	0.878	0.703
	AT3	0.865			
	AT4	0.848			
Monitoring and feedback	M2	0.745	0.933	0.936	0.637
	PE3	0.802			
	PL2	0.726			
	SR1	0.9			
	SR2	0.83			
	SR3	0.836			
	SR4	0.759			
	SR5	0.773			
Performance	D1	0.676	0.886	0.891	0.571
	D2	0.711			
	D3	0.738			
	D4	0.764			
	D10	0.82			
		0.814			

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Table 6
Proposed model: discriminatory validity

	Technical activities	Senior management	Communication with the customer	Monitoring and planning	Performance
Technical task	**0.839**				
Top management	0.752	**0.826**			
Client consultation	0.652	0.666	**0.793**		
Monitoring and feedback	0.712	0.748	0.774	**0.798**	
Performance	0.757	0.726	0.663	0.705	**0.756**

Corrected model: convergent and discriminant validity

In Table 7, once items CC5 and D1 have been removed, it is observed that the final subscales successfully comply with the internal consistency reliability tests, since they have a Cronbach's Alpha and a composite reliability higher than .7 (Bagozzi *et al*., 1998; Hair Jr. *et al*., 2021), and factor loads equal to or greater than .7 (Hair Jr. *et al*., 2021; Hulland, 1999). Regarding convergent validity, this is confirmed for all subscales with an AVE higher than .5 (Bagozzi *et al*., 1998; Hair Jr. *et al*., 2021). The corrected model meets the discriminant validity under Fornell and Larcker criteria (1981) (see table 8). Table 9 presents the contrast of the models, showing the improvement of absolute and incremental goodness-of-fit indices (SRMR. < .05; NFI closer to 1) and the predictive power of the respecified model by decreasing the BIC index that is much more rigorous than the Akaike criterion (Bentler and Bonett, 1980; Hair Jr. *et al*., 2021; Hu and Bentler, 1999).

Table 7
Corrected model: factor loads, reliability and extracted mean variance

Subscales	Items	Factor loads	Cronbach's alpha (a)	Composite Reliability (FC)	Mean Extracted Variance (AVE)
Client consultation	BQ2	0.855	0.924	0.926	0.633
	BC3	0.794			
	CA4	0.858			
	CC1	0.708			
	CC2	0.815			
	CC3	0.826			
	CC4	0.698			
Top management	AG1	0.827	0.915	0.916	0.682
	AG2	0.766			
	AG3	0.852			
	AG4	0.798			
	AG5	0.880			
Technical task	AT2	0.804	0.875	0.878	0.703
	AT3	0.866			
	AT4	0.844			

Subescalas	Items	Factor loads	Cronbach's alpha (a)	Composite Reliability (FC)	Mean Extracted Variance (AVE)
Monitoring and feedback	M2	0.741	0.933	0.936	0.637
	PE3	0.779			
	PL2	0.734			
	SR1	0.903			
	SR2	0.847			
	SR3	0.839			
	SR4	0.762			
	SR5	0.766			
Performance	D2	0.721	0.888	0.893	0.619
	D3	0.755			
	D4	0.786			
	D10	0.839			
	D11	0.828			

Table 8

Corrected model: discriminating validity

	Technical task	Top management	Client consultation	Monitoring and feedback	Performance
Technical task	**0.839**				
Top management	0.752	**0.826**			
Client consultation	0.663	0.671	**0.796**		
Monitoring and feedback	0.712	0.747	0.777	**0.798**	
Performance	0.752	0.704	0.663	0.683	**0.787**

Table 9

Adjustment rates of the tested models

Model	Original	Corrected
SRMR.	0.053	0.048
Chi-square	1552.884	1168.08
NFI	0.852	0.879
BIC Performance	-421.797	-396.846

Note. SRMR.=Standardized Root Mean Square Residual; NFI= Normed Fit Index; BIC= Bayesian Information Criterion.

At the end of this stage, a final adapted PIP consisting of 28 items is achieved: 23 measure the critical success factors, and five measure the project performance (see table 10). Compared to the original PIP, a reduction of 34 items was evidenced and the adjustment of ten to four critical success factors is maintained: client consultation, monitoring and feedback, top management, and technical task. Factor and performance scales register an AVE above .61, the composite reliability of factors is between .878 and .936, and the performance is .893. The internal consistency of

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the final adapted scales show better results than those published by Pinto and Prescott (1990) and Padilla *et al.* (2021). In addition to the fact that the adapted instrument has adequate consistency and validity indexes, it is highlighted that it is shorter, which gives rise to some advantages for the investigations in which it is used, such as: increase the response rate, improvement of the quality of the responses considering that it takes less time to complete it, ease of design of the instrument and data collection through online platforms or mobile applications; from the point of view of the researcher, data analysis is accelerated and less human and financial resources are required.

Table 10

Validated instrument adapted to the Latin American context

	Strongly disagree			Neutral			I agree
Top management	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Top management responded to requests for additional resources when needed.							
Top management shared the responsibility with the project team to ensure the success of the project.							
I agreed with top management regarding the degree of authority and responsibility they had in the project.							
Top management supported me during the project crises.							
The top management gave us the necessary authority to the project team and supported our decisions related to the project.							
Client consultation	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The usefulness of the project was validated with potential clients.							
An appropriate presentation of the project was made to the clients.							
Clients knew who to contact when there were problems or questions.							
Clients had the opportunity to collaborate with the team from the initial stage of project development.							
Clients were informed about the progress of the project.							
The value of the project was discussed with potential clients.							
The limitations of the project (why the project was not designed) were discussed with the clients.							
Technical tasks	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The engineers and other technical staff of the project were competent.							
The technology used to develop the project worked correctly.							
Suitable technology was selected for the project to be successful, including: equipment, training programs, etc.							
Monitoring and feedback	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The scope and essential objectives of the project were explained to the project team.							

	Strongly disagree			Neutral			I agree
Top management	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The project team staff understood how their performance was assessed.							
There was a detailed plan, including timelines, milestones, resource requirements, etc., for project fulfillment.							
All the important aspects of the project were monitored, including the measurements that allowed to visualize the progress of the project in a complete way (compliance with the budget and the schedule, use of personnel and equipment, team morale, etc.).							
Regular meetings were held to monitor the progress of the project and to improve team feedback.							
Real progress against the approved project schedule was regularly compared.							
Actual performance against the approved project budget was regularly compared.							
The outcome of the project reviews was regularly shared with all the staff who influenced the budget and schedule.							
Project performance	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The project was on budget.							
The project worked.							
The project is used by the intended customers.							
This project directly benefited the intended users.							
The results of this project represented a significant improvement in performance in relation to the way customers used to carry out their activities.							

Khan *et al.* (2013) point out that there is no universal model of success factors that can be used in all projects, leading to various proposals of factors in response to contextual and/or typifying variables. Notely, the critical success factors of the respecified instrument are among the most cited in the literature (Khan *et al.*, 2013; Pereira *et al.*, 2022). A similar situation arises with the criteria of success of the project, since there is no consensus on how to measure whether a project is successful, causing the existence of many criteria (Albert *et al.*, 2017), whose variation responds, also with the factors, to contextual and/or typing variables (Khan *et al.*, 2013; Müller and Jugdev, 2012; Müller and Turner, 2007). The criteria considered in the Performance of the respecified instrument construct are present in the analysis of contemporary literature by *Castro et al.* (2019).

Therefore, based on the instrument designed by Pinto, Slevin and Prescott, this study contributes with an adapted instrument with complete validation, mainly for the Ecuadorian context, because the participation of professionals from other countries in the region does not exceed 25% of the sample. This will make it easier for managers and others involved to assess critical success factors and success criteria, since both are necessary to achieve the objectives of their projects (Castro *et al.*, 2019).

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Conclusions

This research has resulted in a shorter adapted PIP than the original instrument. This respecified instrument enables its use in Spanish and has very good consistency, validity, and goodness of fit rates, which contributes to the academic field by facilitating the collection of data on the critical factors and criteria of success of the projects, particularly in the Ecuadorian context, considering that in the study sample this country represented approximately 80%. For future research, it is suggested to evaluate the structural model to confirm whether the four critical success factors results positively and significantly impact the performance of projects; use multigroup analysis techniques to make comparative studies by categorical variables such as role in the project, size of the beneficiary organization of the project, size of the project, development approach, among others, which will increase the presence of high-impact Ecuadorian publications in the area of Project Management. In addition, this research can be replicated in other countries of the region to have representative samples that allow obtaining a generalizable instrument to the Latin American context.

In terms of practical implications, project management professionals can use this tool to assess the critical factors and success criteria of their projects in less time and with fewer resources to identify in which aspects they are doing well, and in which they must take corrective actions and record lessons learned, so that projects are successful. Projects are those that make it easier for organizations to create or adapt to changes in the environment, and this leads to project management becoming a relevant factor in achieving organizational objectives (Sepúlveda-Rivillas *et al.*, 2022) and a source of sustainable competitive advantage (Mathur *et al.*, 2014).

Among the limitations of the study are the fact that approximately 80% of the sample comes from Ecuador, and that there was no representativeness of projects with an agile development approach, therefore, the instrument obtained can be applied to preferably evaluate Ecuadorian projects with a predictive or hybrid development approach.

Another limitation to consider is the variance bias of the common method, since the data of all the analyzed variables were collected from the same source, so the procedural remediations of Podsakoff *et al.* (2003) were followed as the careful construction of the items, and the request for reading and subsequent acceptance of informed consent to the participant prior to filling in the questionnaire, where anonymity is guaranteed and encouraged to respond objectively and honestly to minimize socially desirable responses.

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