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Project management competencies and their impact on competitiveness and productivity: Evidence from southwestern Colombia

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This study uses the PMI® framework as a reference to analyse the impact of Project Management (PM) competencies on organisational competitiveness and productivity in southwestern Colombia. The research evaluates three key dimensions: Organisational Practices in PM (PMP), Skills, Attitudes and Values (HABI) and their influence on Business Competitiveness (COMPE) and Productivity and Innovation Indicators (PROD). A survey was conducted with 221 CESMAG University Project Management Postgraduate Programme graduates (2016–2023). Data were collected using Likert-type scales and analysed using structural equation modelling (PLS-SEM) to ensure the reliability and validity of the constructs. The results confirm that both organisational practices and individual competencies significantly enhance competitiveness and productivity. PMP was found to have a positive effect on strategic performance indicators, while HABI was found to have an even stronger influence on innovation and value creation. These findings emphasise the strategic importance of postgraduate training in project management (PM) for regional development. Beyond academic contributions, the study provides actionable insights for businesses, universities and policymakers, demonstrating how strengthening PM competencies can foster innovation, operational efficiency and sustainable competitiveness in emerging economies.

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1. Introduction

Research on projects is diversifying at a rapid pace (Geraldi & Söderlund, 2018). In the context of modern globalisation and economic integration, enterprises are increasingly facing heightened competition and fluctuating consumer demand. In order to ensure financial and economic stability while minimising commercial risks, companies must adopt contemporary development strategies and foster collaboration with other market participants. This requires enhanced management practices, particularly those that prioritise production diversification strategies. The diversification process is inherently innovative and requires new systemic techniques, advanced technologies and the reorganization of labour and production systems (Chemirbayeva et al., 2020). Higher education institutions offer a wide range of project management courses. These range from bachelor's degree programmes that only briefly touch upon the profession, to doctoral studies that are exclusively focused on PM (Nijhuis et al., 2018). This article specifically examines the impact of competitive practices on project management competencies within Colombia's southwestern region. Project management (PM) practices are drawn from various methodological communities, each offering distinct principles and guidelines. While some are well-established and systematically developed, others are more ad hoc, yet still share common methodological foundations (Ahimbisibwe et al., 2015). The Project Management Institute (PMI®) has set out a collection of best practices designed to promote efficient project management. These are detailed in the Project Management Body of Knowledge (PMBOK®) (Project Management Institute, 2021). Despite the global expansion of PM standards, there is limited empirical evidence on their concrete impact in emerging economies and regional contexts, such as southwestern Colombia.

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An increased number of industrial and developmental activities in the form of projects has revealed the importance of project management science, whereby planning and direction are carried out in terms of time, cost and other characteristics, such as quality, through the application of knowledge, skills, tools and techniques, in order to meet the needs and expectations of project stakeholders (Farhang Moghaddam, 2019).

This research addresses this gap by analysing the extent to which project management competencies drive productivity and competitiveness in Nariño, Colombia. Grounded in the Project Management Institute (PMI) framework, this study examines how project management practices (PMP) and professional capabilities contribute to organisational performance. Specifically, a structural model incorporating three core dimensions was applied: PMP; the behavioural and cognitive traits of project managers — referred to as Skills, Attitudes and Values (HABI) — and their influence on two key outcomes: Business Competitiveness (COMPA) and Productivity and Innovation Indicators (PROD).

The variables were operationalised using Likert-type scales and validated through reliability assessments and confirmatory factor analysis. These constructs were informed by established theoretical indicators, including organisational maturity in project management (PM), professional competencies, innovation, and perceived organisational results. The central research objective is to understand the extent to which postgraduate training in project management enhances organisational performance, thereby generating empirical evidence to inform academic and professional decision-making processes.

To achieve this, the variables were operationalised using Likert-type scales and validated through structural techniques. Unlike prior studies that primarily assess the technical adoption of PM standards, this research emphasises the combined effect of institutional practices and individual competencies on regional competitiveness. Data were collected from 221 graduates of CESMAG University's PM postgraduate program (2016–2023) and analyzed with Structural Equation Modeling (PLS-SEM), ensuring robustness in assessing complex interrelationships (Hair et al., 2021).

The contribution of this study is threefold. First, it empirically demonstrates the extent to which postgraduate training in project management enhances organizational performance in an emerging economy. Second, it identifies educational gaps and opportunities for curricular improvement aimed at better aligning competencies with professional practice. Finally, it provides evidence-based recommendations for policymakers, universities, and organizations to leverage project management as a strategic axis for sustainable regional development.

2. Literature review

Anchored in the Resource-Based View (RBV) (Barney, 1991), this study conceptualizes Project Management Practices (PMP) and competencies as intangible resources that can provide sustained competitive advantage when they meet the VRIN criteria (valuable, rare, inimitable, and non-substitutable). Complementarily, Human Capital Theory (Becker, 1964) supports the rationale for investing in postgraduate education to enhance knowledge, skills, and values at the individual level. Finally, Dynamic Capabilities Theory (Teece et al., 2009) highlights how organizations integrate and reconfigure such competencies to improve innovation and productivity in turbulent environments. Together, these theoretical perspectives provide a robust foundation to analyse the relationship between project management competencies and organizational outcomes in emerging economies such as Colombia.

2.1 Project Management (PM)

The PM is one of the oldest activities of humankind, resulting in achievements such as the pyramids, ancient cities, cathedrals, mosques, the Great Wall of China, space exploration, and the internet (De Rezende et al., 2018). PM consists of planning and coordinating activities to ensure that implementation processes are rationally managed (Bai & Sarkis, 2013). It has been increasingly adopted by enterprises worldwide (H. M. Wang et al., 2014). Several authors have noted the expanding nature of PM research and its evolution over the past two decades (Cameron et al., 2015). The diversity of empirical settings and theoretical approaches has led to a wide variety of concepts—such as projectification, programmification, and project ecologies—which reflect both new perspectives and empirical phenomena (Geraldi & Söderlund, 2018). Despite its long existence as practice, PM only recently consolidated as an academic discipline (De Rezende et al., 2018).

PM has expanded beyond its traditional domains in construction and engineering into fields such as IT, education, health care, and even surgery (Hodgson, 2002). Its professionalization accelerated in the 1960s and 1970s (Gaddis, 2021; Hodgson, 2002). This trajectory built the foundations of modern project and program management (Turner et al., 2009). International standards such as PMI®, PRINCE2, and IPMA have since become the most widespread (Kostalova et al., 2018), with PMI's PMBOK® Guide (Project Management Institute, 2021) as a global benchmark.

2.2 Project Management Maturity Assessment

PM is now seen as a strategic driver of competitiveness, innovation, and efficiency (Coccia & Rolfo, 2009). Adoption of PMI® methodologies helps align projects with organizational objectives (Severo et al., 2020). Project Management Maturity (PMM) is defined as the systematic ability to apply PM principles to improve adaptability and performance(Kerzner., 2013). Kerzner's PMM Model proposes a five-level evolution from ad hoc management to full optimization, incorporating both culture and competencies.

Competency-based maturity considers:

- Knowledge: theoretical understanding of PMBOK® knowledge areas.
- Skills: ability to apply knowledge in practice (Boyatzis., 1982).
- Abilities: expertise through practice, enabling decision-making and coordination under uncertainty (Spencer & Spencer., 1993).
- Attitudes: internal dispositions such as resilience and responsibility(Kolb, 1984).
- Values: ethical principles, e.g., integrity and fairness (Project Management Institute, 2021).

PMI® Talent Triangle emphasizes technical PM, leadership, and strategic/business management as essential for holistic professional development (Project Management Institute, 2021).

2.3 Competitive Impact

PM research demonstrates close links with practice and impact on organizations (Teo, 2005). Competition drives organizations to seek efficiency in all operations (Sousa et al., 2018), making PM a critical enabler of strategic goal achievement (Neverauskas & Railaite, 2013). Studies confirm that PM contributes to productivity, quality, and profitability (Forbes & Ahmed, 2010b), while Management by Projects (MBP) applies PM methods to enhance competitiveness (H. Wang et al., 2019).

Regaining relevance and impact has been identified as an important issue for business and management schools. The example of PM research is instructive for these organizations in that PM is clearly viewed as being 'close to practice' and therefore relevant, and engaged with a number of large organizations in which it is clearly having an impact (Teo, 2005).

As a result of fierce competition, companies are striving for internal efficiency in all their functions and operations. Different theoretical perspectives for management exist, and there are always new expectations and requirements such as in the management of production ramp-up (Kontio & Haapasalo, 2005). Competitiveness is a key factor for an organization's success.(Sousa et al., 2018). More and more public and private sectors organizations become interested in the project management and its influence to reaching of organizational strategic goals. (Neverauskas & Railaite, 2013), the organizations seek to identify factors that can contribute to the successful implementation of process improvement programs and factors that have been the focus of relevant studies (de Guimarães et al., 2017), as an example, during the past several decades, the manufacturing and service industries significantly increased their levels of productivity, quality, and profitability through the application of process improvement techniques and information technology (Forbes & Ahmed, 2010b), besides a number of reasons increasedthe interest in locating the position of resources. Worldwide competition, tighter schedules, and shrinking budgets demanded more accurate performance of work at an increased overall level of productivity (Teizer et al., 2007). Management by Project (MBP) uses technical methods of modern PM to manage various tasks and activities that are considered as projects. It is an effective way to solve management problems and improve management levels and enterprise competitiveness (H. Wang et al., 2019).

2.4 Productive Impact

Knowledge Management (KM) plays a fundamental role in linking PM with productivity and innovation (Koç et al., 2019; Li et al., 2019). KM strengthens absorptive capacity and supports organizational learning, which enhances project efficiency and fosters innovation. Institutions also channel entrepreneurial talent toward productive activities that stimulate growth (Bosma et al., 2018). Effective KM strategies ensure sustainability of projects and increase innovation capacity (Ekambaram et al., 2018).

The success of KM arises from experiential knowledge. KM researchers use this knowledge as input, intertwine it with theory, and transform it into academic knowledge that can serve both academia and professional practice (Koç et al., 2019). Organizational efficiency heavily depends on the success of knowledge management. It has been demonstrated that KM is an essential requirement for explaining social and economic trends such as globalization and ubiquitous computing, serving

as a substantive response to contemporary challenges (Koç et al., 2019). In an increasingly complex business environment, organizations must adopt innovative PM cultures to enhance efficiency and sustainability.

In other hands, this approach enables organizations to efficiently manage their activities, foster innovation, and strengthen sustainable development (Wang et al., 2019). The Relationship Between Knowledge Management and Innovation in Projects In a knowledge-driven economy, KM plays a critical role in enhancing project management productivity and innovation performance. Research findings indicate that KM significantly influences a firm's absorptive capacity, which in turn drives innovation. Through explorative, transformational, and developmental learning, organizations can maximize knowledge utilization, improve decision-making processes, and achieve sustainable competitive advantages (Li et al., 2019).

The ability to integrate knowledge positively impacts various types of innovation, including: Technological innovation, managerial innovation, organizational innovation, institutional innovation and market innovation.

The Role of knowledge management (KM) in Business Productivity Institutions play a crucial role in talent toward productive entrepreneurship, which generates innovation and contributes to aggregate economic growth (Bensch et al., 2012). Institutions channel entrepreneurial talent towards productive entrepreneurship, which includes entrepreneurship that generates innovation and ultimately, aggregate economic growth (Bosma et al., 2018).

PM Competencies have a direct relationship with success in innovation and technology transfer. At the same time, resources, capabilities, and strategic decisions indirectly influence business success through these competencies (Demirdöğen & Işık, 2016). In this context, KM supports organizations in adapting to changes, increasing productivity, and fostering innovation. Effective KM optimizes decision-making and ensures the sustainability of business projects (Ekambaram et al., 2018).

KM is a fundamental pillar for productive efficiency and PM. Through KM-based strategies, organizations can enhance their innovation capacity, optimize project execution, and ensure sustainability in a competitive and ever-changing environment. Moreover, the relationship between KM and productive entrepreneurship highlights the importance of a favourable institutional ecosystem for the development of new ideas and value creation. The role of the project manager becomes critical in coordinating technical, financial, and time-related aspects to achieve desired outcomes, demonstrating that effective project management, supported by a solid KM strategy, is key to business success (Gaddis, 2021).

2.5 Competencies in Project Management

Competencies have been central in management for over 25 years (Stevenson & Starkweather, 2010). Success in PM depends on combining hard skills (planning, control) with soft skills (leadership, communication, emotional intelligence) (Amoah & Marimon, 2021; Magano et al., 2020). Research highlights the fragmentation of PM knowledge when each new approach is framed as entirely novel (Söderlund & Maylor, 2012). Current trends advocate balancing technical tools (e.g., Earned Value Techniques) with interpersonal skills and care in project leadership (Söderlund & Maylor, 2012).

PM education is routinely included in study plans at both economic and technical faculties of universities. The lessons are usually designed in accordance with one of the International Project Management Standards and focus on both technical skills and soft skills. (Kostalova et al., 2018). Research shows that achieving PM success depends on the project manager being a knowledge worker (KW)—i.e., possessing and utilizing both 'hard' and 'soft' skills and competencies to manage assigned projects. (Amoah & Marimon, 2021). PM is an evolving discipline where its participants are more interested in the competencies of its project managers and teams. Consequently, there has been a demand for standard individual competencies, such as the ‘Project Management competency development framework’ and the ‘APM competence framework.’ Such standards, coupled with published research, suggest extensive lists of competencies, forming a fragmented body of knowledge (Magano et al., 2020). PM research becomes too occupied with the novel approaches, framing every technique and approach as completely new, thereby making limited use of existing theories and prior research (Söderlund & Maylor, 2012). The result is a breakdown of knowledge accumulation (Söderlund & Maylor, 2012). PM research and teaching are to a great extent making use of both the hard side of management, for instance in various kinds of Earned Value Techniques, planning techniques, control instruments, and so on, but also increasingly concerned with the soft side of things, including the emotions of projects, care in project management, and so on (Söderlund & Maylor, 2012).

The evaluation of competencies has been a central topic in business management for over 25 years (Stevenson & Atarkweather, 2009). In the field of PM, research has often become overly focused on novel approaches, framing each technique as entirely new and, consequently, making limited use of existing theories and prior studies. This has led to a fragmentation in knowledge accumulation within the discipline (Söderlund & Maylor, 2012).

Despite the increasing number of new tools and methodologies, PM research and education incorporate both the technical aspects, such as Earned Value Techniques, planning, and control instruments, as well as the human dimensions, including

the emotional aspects of projects and care in project management (Söderlund & Maylor, 2012). This comprehensive approach is essential to address the dynamic challenges faced by project managers today.

2.6 Project Management Skills

Competence in PM is defined as a cluster of knowledge, abilities, skills, and attitudes required to deliver project outcomes (Sebt et al., 2010, as cited in Amoah & Marimon, 2021). Skills such as leadership, teamwork, motivation, decision-making, and cultural awareness are critical (Amponsah, 2010, as cited in Amoah & Marimon, 2021). PMBOK® 7th Edition emphasizes behavioral competencies such as stewardship, systems thinking, and adaptability, reinforcing the role of emotional intelligence and value delivery in leadership (Project Management Institute, 2021).

Studies show that behavioral competencies often outweigh formal education or certification in determining project success (Stevenson & Starkweather, 2010). Generation Z training should focus on emotional intelligence, teamwork, and adaptability (Magano et al., 2020). Furthermore, integrating multiple PM standards (e.g., PMBOK®, ICB3, PRINCE2) improves performance assessment and organizational learning (Sanjuan & Froese, 2013).

In sum, modern PM requires a hybrid skillset—combining technical expertise with adaptability, leadership, and stakeholder orientation—to address the challenges of increasingly dynamic environments.

In PM, competence is defined as a key cluster of related knowledge, abilities or skills, experience, attitudes, and other personal attributes and features that are needed by a project manager in order to deliver high quality project performance" Sebt et al., 2010, as cited in (Amoah & Marimon, 2021). PM are expected to apply a combination of ethical, interpersonal, and conceptual skills to analyse situations and interact properly. These include "leadership, team building, motivation, communication, decision making, political and cultural awareness, negotiation, trust building, conflict management and coaching" Amponsah, 2010, as cited in (Amoah & Marimon, 2021).

In this way, the PMBOK® Guide Seventh Edition introduces a principle-based approach to PM, shifting focus from prescriptive processes to performance domains and behavioural competencies**.** Among these, "stewardship, team performance, tailoring, and a systems thinking mindset" are emphasized as critical behavioural attributes for modern project leaders (Project Management Institute, 2021)

Furthermore, the PMBOK® 7th edition recognizes that "project managers must demonstrate a holistic view of leadership, integrating emotional intelligence, adaptability, and value delivery" (Project Management Intitute, 2021, p. 28).

In other hands, (Stevenson & Starkweather, 2010) in a nationwide study of IT executives, identified a core competency index which includes; "leadership, the ability to communicate at multiple levels, verbal and written skills, attitude, and the ability to deal with ambiguity and change" (p. 666). These skills were consistently ranked higher than formal education or certification, reinforcing the idea that behavioural competencies are often the most decisive in complex project environments.

From an educational perspective, (Magano et al., 2020) emphasize the importance of training in emotional intelligence, teamwork, flexibility, and problem-solving, especially among Generation Z students. These traits, when aligned with PM education, foster adaptive and collaborative professionals capable of thriving in multidisciplinary project teams.

Complementing these perspectives, (Sanjuan & Froese, 2013)advocate for the integration of multiple PM standards, including PMBOK®, ICB3, ISO 9000 and PRINCE2 into performance assessment tools. Their research highlights the need for competencies that support both project success and organizational learning**,** particularly in sectors like construction where the application of best practices remains inconsistent.

2.7 Hypothesis statement

The literature reviewed underscores the strategic role of PM in enhancing competitiveness, productivity, and innovation. Anchored in the Resource-Based View (Barney, 1991), PMP are conceptualized as intangible resources that, when effectively deployed, can generate sustained competitive advantage. Empirical evidence shows that standardized methodologies such as the PMBOK® Guide strengthen alignment between projects and organizational objectives, thereby improving competitiveness (Severo et al., 2020). Consequently, we hypothesize that:

H_1: *Project Management Practices (PMP) have a positive effect on Business Competitiveness (COMPE).*

Moreover, PM methodologies have been linked to improvements in productivity and innovation, particularly through enhanced efficiency, quality, and process optimization (Forbes & Ahmed, 2010a; Sousa et al., 2018). From the perspective

of Dynamic Capabilities (Teece et al., 2009), PMP provide organizations with mechanisms to adapt and reconfigure resources in turbulent environments, leading to higher performance outcomes. Therefore, we propose that:

H_2: *Project Management Practices (PMP) positively influence indicators of success, innovation, and productivity (PROD).*

At the individual level, Human Capital Theory (Becker, 1964) emphasizes the value of education and training in shaping competencies that improve organizational results. Specifically, behavioural attributes—skills, attitudes, and values (HABI)—are central to project success, as they enable leadership, decision-making, and team collaboration (Amoah & Marimon, 2021). Building on this, we hypothesize that:

H_3: *Skills, Attitudes, and Values in Project Management (HABI) positively impact Business Competitiveness (COMPE).*

Finally, competencies such as resilience, adaptability, and responsibility are particularly relevant in contexts where innovation and knowledge transfer are critical drivers of performance (Demirdogen & Isik, 2016; Ekambaram et al., 2018). Consistent with the PMI® Talent Triangle, these competencies enhance productivity and innovation outcomes, leading us to hypothesize that:

H_4: *Skills, Attitudes, and Values in Project Management (HABI) positively influence indicators of success, innovation, and productivity (PROD).*

3. Methodology

3.1 Research Design

The study employed a quantitative and cross-sectional design to evaluate the impact of PM competencies on organizational competitiveness and productivity. Data were collected through a structured survey administered to 221 valid respondents, all graduates of the Project Management postgraduate program at CESMAG University between 2016 and 2023. The sample size was determined to ensure statistical robustness for multivariate analysis.

Variables were operationalized using Likert-type scales, covering three main constructs: Project Management Practices (PMP), Skills, Attitudes and Values (HABI), and their influence on Business Competitiveness (COMPA) and Productivity and Innovation Indicators (PROD). The measurement model was validated through confirmatory factor analysis, reliability tests, and discriminant validity assessments.

To analyse the interrelationships among constructs, Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied, using SmartPLS software. This method is particularly suitable for predictive research with complex models and medium-sized samples. The approach follows the recommendations of (Hair et al., 2021) and is further supported by methodological advances in PLS-SEM discussed by (Henseler et al., 2015).

The sample consisted mainly of young graduates, mostly men 62.5%, with a gender gap of 25 percentage points compared to women 37.5%. Regarding place of origin, 53.3% were born in the city of Pasto, department of Nariño, Colombia, and 27.2% in other municipalities of Nariño, reflecting a predominantly regional profile with some geographical diversity.

The largest share of participants fell within the 25–29 age group 33.7%, followed by 21–24 years 17.3%, confirming the predominance of young adults recently entering the labor market.

From a socioeconomic perspective, 64.5% belonged to social strata 2 and 3, while 21.2% were from stratum 1, suggesting that most respondents come from low- and middle-income households. Concerning their main activity, 39.4% combined work and study, and 27.9% had formal employment, with a global employment rate of 79.8%. However, 52% expressed an intention to change jobs, primarily motivated by expectations of professional growth 30%.

At the organizational level, employment was polarized: 62.5% worked in either microenterprises or large firms, while fewer were employed in small 17.3% and medium-sized enterprises 20.2%. In terms of sectoral distribution, 66.3% worked in the private sector, 31.7% in the public sector, and only 2% in NGOs. Likewise, 51% were employed in organizations with a local scope, followed by 26% regional, 20.2% national, and only 2.9% in international firms, reflecting a low level of global market integration.

The service sector was the most represented at 30.77%, followed by construction 20.19% and commerce 11.54%. Other sectors included electricity, gas, and water 7.69%, public service 6.73%, mining and energy 2.88%, communications 2.88%, and transport 1.92%. Specialized activities such as agriculture, automotive, science and technology, education, and health represented less than 1% each.

Table 1
Descriptive Statistics

Demographics	Categories	Frequency (%)
Gender	Male	62.5
	Female	37.5
Age	20–24	17.3
	25–29	33.7
	30–34	(remaining %) → *if available*
Origin	Born in Pasto	53.3
	Other municipalities of Nariño	27.2
	Other regions	19.5
Socioeconomic Stratum	Stratum 1	21.2
	Strata 2–3	64.5
	Strata 4+	14.3
Main Activity	Work + study	39.4
	Formal employment	27.9
	Other (informal, unemployed, etc.)	32.7
Employment by Firm Size	Micro and large enterprises	62.5
	Small enterprises	17.3
	Medium enterprises	20.2
Sector	Private	66.3
	Public	31.7
	NGOs	2.0
Organizational Scope	Local	51.0
	Regional	26.0
	National	20.2
	International	2.9
Industry Sector	Services	30.77
	Construction	20.19
	Commerce	11.54
	Electricity, gas, water	7.69
	Public service	6.73
	Mining and energy	2.88
	Communications	2.88
	Transport	1.92
	Other (agriculture, automotive, science/tech,	<1 each

Participation in the study was voluntary and anonymous, with all respondents providing informed consent prior to data collection. The research protocol was reviewed and approved by the institutional academic committee, ensuring full compliance with ethical standards for social science research.

3.2 Sample and Data Collection

This research was conducted through several interrelated stages. The first stage involved the development of the conceptual framework, the identification of variables, and the definition of constructs based on the literature review. The second stage focused on the design of the questionnaire items, and the final stage aimed to test the reliability of the data collection instrument. According to (Hair et al., 2014), the design of the measurement instrument is fundamental for ensuring the validity and reliability of the constructs in empirical studies.

The study population consisted of graduates from the PM Postgraduate Program at CESMAG University, covering the period from the first academic semester of 2016 to the first semester of 2023, with a total population of 368 graduates. The survey was administered virtually via Google Forms, yielding a total of 221 valid responses. A sampling error of 5% was established for the total sample, with a confidence level of 95% and success/failure proportions ($p = 0.5$; $q = 0.5$). The sampling method was non-probabilistic, employing convenience and snowball sampling techniques.

3.3 Measures

The questionnaire consisted of four dimensions developed from validated instruments in prior studies. Project Management Practices (PMP) included five items adapted from (de Guimarães et al., 2017) and (Severo et al., 2020), measuring the degree of methodological adoption, managerial support, and standardization of project processes within organizations. Skills, Attitudes, and Values in Project Management (HABI) comprised sixteen items based on (Amoah & Marimon, 2021) and (Stevenson & Starkweather, 2010), assessing behavioral, technical, and ethical competencies such as leadership, communication, adaptability, and professional certification. Business Competitiveness (COMPE) contained five items derived from (Severo et al., 2020), focusing on comparative performance indicators including profitability, efficiency, and cost management. Finally, Success and Innovation Indicators – Productivity (PROD) included nine items adapted from (Demirdöğen & Işık, 2016), measuring organizational innovation, productivity, and perceived value creation.

All constructs were measured using five-point Likert-type scales, where 1 = strongly disagree and 5 = strongly agree**.** This format allowed respondents to express the intensity of their agreement with each statement. The dimensions were expanded and refined through expert review with academics and practitioners in PM to ensure content validity and contextual adaptation to the regional business environment of southwestern Colombia.

3.4 Data Analysis

Data analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique with SmartPLS 4 (Ringle, C. M.; Wende, S.; Becker, 2024). Reliability and validity were assessed through Cronbach's alpha, composite reliability (CR), and Average Variance Extracted (AVE). All reliability coefficients exceeded 0.70 and AVE values were above 0.50, confirming internal consistency and convergent validity.

Discriminant validity was verified using both the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT), with all HTMT values below the 0.90 threshold, indicating satisfactory construct differentiation.

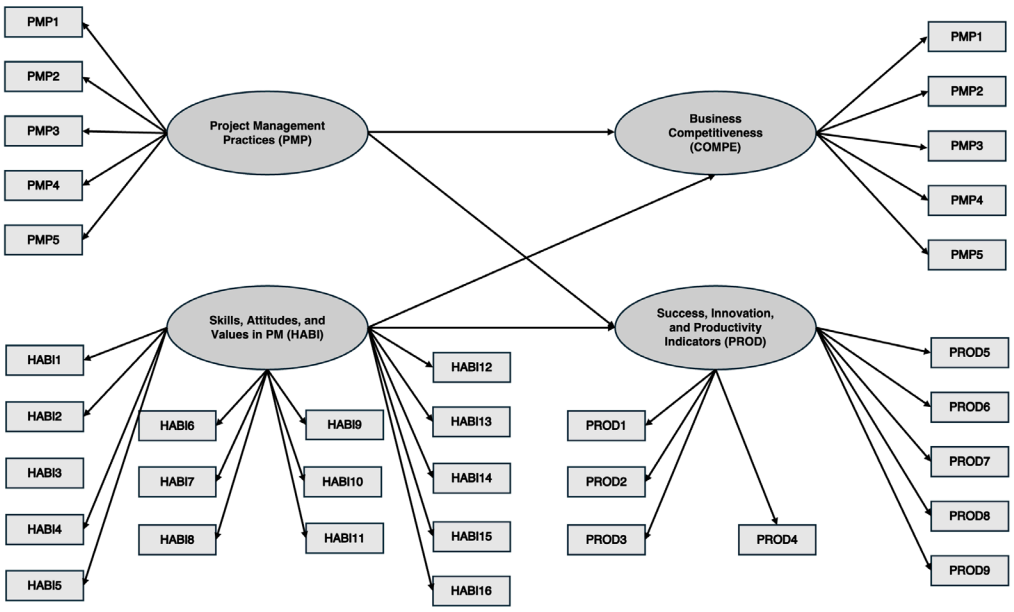
The structural model was tested via bootstrapping to obtain t-values and significance levels ($p < 0.01$). All hypothesized relationships were statistically significant, supporting the proposed model. The model explained substantial variance in the endogenous constructs, with adjusted R^2 values of 0.424 for business competitiveness and 0.542 for productivity and innovation, demonstrating strong explanatory power.

4. Results Findings

Grounded in the principles of competitiveness, productivity, and the strategic role of PM competencies, this study addresses the following central research question: To what extent do PM practices and professional competencies influence the competitiveness and productivity of organizations in regional contexts?

To explore this question, the study analyses the relationships among Project Management Practices (PMP), the Skills, Attitudes, and Values in Project Management (HABI), and two critical outcomes: Business Competitiveness (COMPE) and Success, Innovation, and Productivity Indicators (PROD).

The empirical analysis draws on data from 221 graduates of a postgraduate program in PM in the department of Nariño, Colombia. The evaluation was conducted using Structural Equation Modelling (PLS-SEM). This section presents the results of testing four research hypotheses, which examine the extent to which organizational PM practices and individual competencies contribute to enhanced organizational performance and competitive capacity in the region.



Note. The analysis was conducted using SmartPLS 4 software(Ringle et al., 2024).

Fig. 1. PLS Structural Model to Analyse the Influence of PM Practices and Competencies on Organizational Competitiveness and Productivity.

The structural model enables the simultaneous analysis of two exogenous constructs PMP and HABI and their influence on two endogenous constructs COMPE and PROD. Each construct is composed of multiple observable indicators measured on a Likert scale, allowing for the estimation of latent variables through reflective measurement models. The proposed structure identifies both direct and indirect (mediated) effects, offering a more comprehensive understanding of how managerial competencies impact organizational outcomes. This model is particularly relevant in regional contexts such as the department of Nariño, as it provides empirical evidence of the strategic role of the PM in enhancing business competitiveness and productivity.

Table 2
Construct Reliability and Validity

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
COMPE	0,931	0,931	0,948	0,783
HABI	0,964	0,966	0,967	0,651
PMP	0,903	0,907	0,928	0,722
PROD	0,954	0,954	0,961	0,731

Note. The reliability and convergent validity coefficients were calculated using structural equation modelling with partial least squares (PLS-SEM), utilizing SmartPLS 4 software (Ringle, C. M.; Wende, S.; Becker, 2024). The reported values include Cronbach's alpha, composite reliability (rho_c), alternative composite consistency (rho_a), and average variance extracted (AVE) for each construct. All reliability values exceed the recommended minimum threshold of 0.70, and all AVE values are above 0.50, indicating adequate internal consistency and convergent validity. The reliability and validity analysis confirms the robustness and consistency of all constructs included in the model—Business Competitiveness (COMPE), Skills, Attitudes and Values (HABI), Project Management Practices (PMP), and Productivity and Innovation Indicators (PROD). The high coefficients obtained across the different indicators demonstrate that the measurement model was appropriately specified and that the items effectively capture the theoretical essence of each construct. In particular, HABI presents the highest reliability indices, evidencing a strong internal consistency in the measurement of behavioural and professional competencies. This suggests that respondents interpreted the related items coherently, emphasizing the importance of soft skills, leadership, ethics, and adaptability as key elements in project management performance.

COMPE and PROD also display high internal consistency and strong convergent validity, indicating that the items used to measure competitiveness and productivity reliably reflect organizational outcomes linked to efficiency, innovation, and market positioning. These constructs function as critical indicators of organizational success, showing that firms adopting structured project management approaches tend to achieve better strategic and operational results.
Meanwhile, PMP shows solid reliability and convergence values, confirming that the institutionalization of project management methodologies within organizations is both measurable and consistent. This reinforces the role of methodological discipline and managerial commitment as determinants of effective project implementation and performance.

The average variance extracted (AVE) values, all exceeding the standard minimum threshold, demonstrate that each construct explains a substantial proportion of its own variance, validating the adequacy of the reflective measurement model. This confirms that the observed indicators share a high degree of commonality and that the latent constructs are empirically sound.

In summary, the results from this table provide strong evidence of the psychometric soundness of the model. Both individual competencies (HABI) and organizational practices (PMP) are measured with high reliability and validity, establishing a firm foundation for analysing their influence on competitiveness and productivity in the subsequent structural model.

Table 3
Heterotrait-Monotrait Ratio (HTMT) Matrix

Construct	COMPE	HABI	PMP	PROD
COMPE				
HABI	0,610			
PMP	0,637	0,633		
PROD	0,826	0,725	0,648	

Note. The Heterotrait-Monotrait Ratio (HTMT) matrix was used to assess the discriminant validity among the model constructs, calculated using PLS-SEM in SmartPLS 4 (Ringle et al., 2024) Values below 0.90 are considered acceptable, a criterion that is met in all cases, indicating adequate discriminant validity among the constructs COMPE, HABI, PMP, and PROD.

The discriminant validity assessment, based on the Heterotrait-Monotrait (HTMT) ratio, demonstrates that all constructs in the model are empirically distinct yet conceptually related dimensions of organizational performance. All correlation values remain below the recommended threshold of 0.90, confirming satisfactory discriminant validity across the model. The strongest relationship is observed between COMPE and PROD (HTMT = 0.826), indicating that competitiveness and productivity are closely linked phenomena within organizational dynamics. This strong association suggests that companies achieving higher productivity and innovation outcomes also tend to display superior competitive positioning in their respective markets. It reflects the mutually reinforcing nature of efficiency, innovation, and strategic differentiation as interconnected results of effective PM.

The correlations between PMP and the other constructs—particularly COMPE (0.637) and HABI (0.633)—highlight the mediating role of PM practices in translating individual competencies into tangible organizational results. In other words, the institutionalization of structured PM methodologies serves as a bridge between human capital (skills and attitudes) and organizational competitiveness, reinforcing the systemic character of performance improvement.

Meanwhile, the relationship between HABI and PROD (0.725) is moderately strong, showing that behavioural and professional competencies positively influence productivity and innovation, although these outcomes are also shaped by broader organizational practices and strategies. This pattern indicates that while individual competencies are essential drivers of performance, their impact becomes more pronounced when embedded within structured project management systems.

Overall, the HTMT analysis confirms that the model's constructs are not only statistically distinct but also conceptually coherent, representing complementary aspects of organizational capability. The balance between differentiation and interdependence across these dimensions reinforces the theoretical soundness of the structural model and supports its validity for explaining how project management competencies contribute to competitiveness and productivity.

Table 4

HTMT Matrix for the Assessment of Discriminant Validity Among the Model's Constructs

Construct	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
HABI → COMPE	0,36	0,352	0,09	3,973	0
HABI → PROD	0,526	0,511	0,092	5,727	0
PMP → COMPE	0,375	0,379	0,068	5,488	0
PMP → PROD	0,295	0,3	0,057	5,194	0

Note. The table presents the HTMT (Heterotrait-Monotrait Ratio) index values used to assess discriminant validity among the model's latent constructs. The values were calculated using PLS-SEM with SmartPLS 4 software (Ringle, C. M.; Wende, S.; Becker, 2024). All coefficients are below the recommended threshold of 0.90, indicating adequate discriminant validity among the analysed constructs.

The structural equation modeling (SEM) results reveal statistically significant and robust relationships among all analyzed constructs, confirming the theoretical assumptions proposed in the research model. Each path coefficient demonstrates a positive and meaningful influence, with p-values below 0.01, indicating high confidence in the relationships identified.

The Skills, Attitudes, and Values (HABI) construct exhibits the strongest impact on both dependent variables. Its effect on Productivity and Innovation (PROD) ($\beta = 0.526$, $t = 5.727$) is particularly notable, suggesting that behavioral and cognitive competencies play a decisive role in enhancing organizational performance. This implies that PM who demonstrate leadership, communication, adaptability, and ethical integrity contribute significantly to higher levels of efficiency and innovation within their organizations. Moreover, the positive influence of HABI on Competitiveness (COMPE) ($\beta = 0.36$, $t = 3.973$) underscores the importance of human capital as a strategic asset, reinforcing that personal and professional competencies are key differentiators in competitive environments.

Similarly, Project Management Practices (PMP) show a positive and statistically significant relationship with both Competitiveness ($\beta = 0.375$, $t = 5.488$) and Productivity ($\beta = 0.295$, $t = 5.194$). These findings indicate that organizations adopting formalized and standardized project management methodologies tend to achieve greater operational efficiency, improved coordination, and better resource utilization. Such practices foster consistency and strategic alignment, directly contributing to enhanced competitiveness and sustained performance outcomes.

Collectively, the results provide strong empirical support for all proposed hypotheses. The simultaneous significance of both organizational and individual factors demonstrates that sustainable competitiveness and productivity emerge from the interaction between institutionalized project management practices and the behavioral competencies of PM. In this sense, HABI acts as a powerful internal driver of innovation and value creation, while PMP establishes the structural foundation that allows these competencies to translate into measurable organizational results.

Overall, the structural model confirms that the synergy between professional competencies and standardized management practices constitutes a critical pathway for strengthening organizational competitiveness and productivity, particularly in regional and emerging economic contexts.

The analysis of factor loadings and measurement indicators confirms the robustness and reliability of the reflective measurement model. All observed variables show strong and statistically significant loadings, exceeding the minimum recommended threshold of 0.70 (Hair et al., 2021), which indicates that each item consistently represents its respective latent construct. The high t-values across all indicators ($p < 0.01$) further validate the precision and stability of the measurement instrument.

Within the Project Management Practices (PMP) dimension, the items display excellent internal consistency, evidencing that PM is effectively institutionalized within the organizations analyzed. The strongest indicators correspond to managerial support, the use of standardized methodologies, and the systematic control of costs and schedules. These results suggest that organizations embracing structured project management systems are better positioned to ensure quality, meet deadlines, and minimize scope deviations—core components of professional maturity in project execution.

For the Skills, Attitudes, and Values (HABI) dimension, all items load significantly, highlighting the multidimensional nature of professional competencies in project management. Communication skills, leadership, ethical integrity, and adaptability emerge as central factors explaining this construct's reliability. The strong internal consistency (CA = 0.964; CR = 0.967) demonstrates that soft skills and behavioural attributes are coherently integrated within the professional profiles of project managers. These findings reinforce that interpersonal and ethical competencies are just as critical as technical expertise for effective project performance.

Table 5

Reliability and Convergent Validity of the Measurement Instrument

Dimension	Questions	Code	Loading	Weight	t-value	CA	CR	AVE
Project Management Practices (de Guimarães et al., 2017; Severo et al., 2020)	In my enterprise, the managers admit the project management needs due to the implementation advantages of such methodology	PMP 1	0,833	0,254	31,477	0,931	0,928	0,722
	Our managers have good knowledge of the project management principles and they support the lectures, courses and articles by attending meetings and through the projects' team reports.	PMP 2	0,894	0,257	56,85			
	Our managers were trained and instructed in project management. They are committed to this management and to the deadline observance established for the reaching of objectives. They also dismiss their employees to attend training sessions on project management	PMP 3	0,859	0,224	43,042			
	My enterprise has a methodology of project management and uses the concept of phases or life circle of a project. We use support software and keep committed to early planning aiming at quality, and we do whatever possible to minimise scope deviation in the projects.	PMP 4	0,861	0,22	36,692			
	My enterprise has a system to manage cost and project chronogram with variation control in relation to the objectives planned and follow-up reports. We keep a project management file to improve our employees' qualifications, which is considered a professional role.	PMP 5	0,797	0,221	21,865			
Skills, Attitudes, and Values in Project Management (Amoah & Marimon, 2021; Stevenson & Atarkweather, 2009)	Ability to communicate at multiple levels	HABI 1	0,818	0,09	12,106	0,964	0,967	0,651
	Ability to manage ambiguity and change	HABI 2	0,787	0,074	13,805			
	Ability to escalate problems or decisions	HABI 3	0,874	0,084	11,546			
	Attitude	HABI 4	0,771	0,078	17,997			
	Cultural compatibility	HABI 5	0,831	0,073	21,311			
	Education	HABI 6	0,767	0,076	16,359			
	Experience	HABI 7	0,854	0,074	12			
	Leadership	HABI 8	0,787	0,087	18,336			
	Duration of prior commitments	HABI 9	0,809	0,075	17,807			
	Size of previous teams	HABI 10	0,834	0,077	19,472			
	Project Management Professional (PMP) certification	HABI 11	0,828	0,064	14,31			
	Technical knowledge	HABI 12	0,746	0,077	19,535			
	Verbal skills	HABI 13	0,871	0,086	22,006			
	Work history	HABI 14	0,828	0,067	17,848			
	Writing skills	HABI 15	0,735	0,077	24,469			
	Ethics	HABI 16	0,751	0,079	14,444			
Business Competitiveness (Severo et al., 2020)	Success rate in new products/services higher than competitors	COMPE 1	0,897	0,23	40,52	0,903	0,948	0,783
	Revenue from new products/services higher than competitors	COMPE 1	0,902	0,223	47,619			
	Profitability of new products/services higher than competitors	COMPE 2	0,884	0,218	38,011			
	Overall performance superior to competitors in the last year	COMPE 3	0,898	0,234	45,263			
	Total operating costs lower than competitors	COMPE 4	0,843	0,224	26,452			
Success and Innovation Indicators – Productivity (Demirdöğen & Işık, 2016)	Higher perceived value	PROD 1	0,795	0,132	15,313	0,954	0,961	0,731
	Project completion within budget	PROD 2	0,825	0,124	20,876			
	Project completion on time	PROD 3	0,836	0,127	21,813			
	Competitive advantage over rivals	PROD 4	0,87	0,133	35,212			
	Company reputation/image	PROD 5	0,851	0,127	22,997			
	Productivity	PROD 6	0,889	0,139	35,473			
	Financial indicators	PROD 7	0,869	0,128	30,547			
	Learning and development	PROD 8	0,859	0,133	25,633			
	Customer/consumer satisfaction	PROD 9	0,899	0,128	35,56			

Note: CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; $p < 0.01$ for all loadings. Values were calculated using PLS-SEM with SmartPLS 4 software (Ringle, C. M.; Wende, S.; Becker, 2024).

Regarding Business Competitiveness (COMPE), the indicators show high loadings, confirming that competitiveness is accurately reflected through metrics such as profitability, innovation success, and efficiency. The results reveal that firms outperforming competitors in revenue, profitability, and product innovation are those that have strategically embedded project management practices into their operational models. The high reliability coefficients (CA = 0.903; CR = 0.948) validate this construct as a strong representation of organizational competitiveness.

Similarly, the Productivity and Innovation Indicators (PROD) dimension displays high reliability and convergent validity. Items such as productivity, project completion on time and within budget, customer satisfaction, and reputation exhibit strong loadings, confirming that these indicators collectively capture the essence of organizational efficiency and innovation. The construct's robustness (CA = 0.954; CR = 0.961; AVE = 0.731) suggests that firms implementing effective project management not only achieve operational efficiency but also foster innovation, continuous learning, and stakeholder satisfaction.

Overall, the measurement model demonstrates high reliability, validity, and theoretical coherence across all dimensions. The consistency of the indicators confirms that the constructs are conceptually distinct yet empirically interrelated, providing a solid foundation for interpreting the structural relationships analyzed in the subsequent sections. These findings substantiate that both methodological rigor and human competencies jointly underpin competitive and productive organizational outcomes.

Table 6
Discriminant Validity

Code	COMPE	HABI	PMP	PROD
COMPE	0,885			
HABI	0,581	0,807		
PMP	0,587	0,589	0,850	
PROD	0,780	0,700	0,605	0,855

Note. The diagonal values represent the square root of the AVE (Average Variance Extracted) for each construct, while the off-diagonal values correspond to the correlations between the latent constructs. According to the Fornell-Larcker criterion, discriminant validity is established when the square root of a construct's AVE is greater than its correlations with the other constructs.

The Fornell–Larcker criterion results confirm that all constructs in the measurement model exhibit satisfactory discriminant validity. In each case, the square root of the Average Variance Extracted (AVE), represented along the diagonal of the matrix, is greater than the correlations between the constructs located off the diagonal. This pattern indicates that every latent construct shares more variance with its own indicators than with those of other constructs, validating that each dimension measures a distinct conceptual domain.

The COMPE construct shows the highest square root of AVE (0.885), exceeding its correlations with HABI, PMP, and PROD, confirming that business competitiveness is empirically distinct from other dimensions while still maintaining moderate theoretical relationships with them. This demonstrates that competitiveness is not a redundant outcome but rather a unique reflection of firms' strategic positioning and performance advantages.

HABI and PMP display moderate correlations (0.589), consistent with theoretical expectations that personal competencies and institutionalized project management practices are interrelated yet distinct. This relationship reinforces the notion that while individual skills, attitudes, and values drive project effectiveness, their organizational impact becomes more evident when embedded within structured methodological frameworks.

The correlation between COMPE and PROD (0.780) is the strongest observed in the matrix, suggesting a close but conceptually appropriate linkage between competitiveness and productivity. This alignment reflects how increased productivity, efficiency, and innovation directly contribute to firms' competitive positioning—a relationship that is central to the model's theoretical rationale.

Overall, the discriminant validity evidenced by the Fornell–Larcker criterion confirms that the constructs used in this research are conceptually sound, empirically distinct, and theoretically coherent. The results strengthen the reliability of the measurement model, ensuring that subsequent structural analyses accurately capture the causal relationships among project management practices, professional competencies, and organizational outcomes.

Table 7
Hypothesis Testing

Hypothesis	Standardized Beta	t-value (bootstrap)
H_1: Project Management Practices → Business Competitiveness	0,375	5,488
H_2: Project Management Practices → Success and Innovation Indicators – Productivity	0,295	5,194
H_3: Skills, Attitudes, and Values in Project Management → Business Competitiveness	0,36	3,973
H_4: Skills, Attitudes, and Values in Project Management → Success and Innovation Indicators – Productivity	0,526	5,727

Note. Standardized coefficients of the structural relationships are presented along with the t-values obtained through bootstrapping. All values are statistically significant ($p < 0.01$), supporting the validity of the hypotheses proposed in the structural model. The values were calculated using PLS-SEM with SmartPLS 4 software (Ringle et al., 2024). The model explains a substantial proportion of variance in the endogenous constructs, with adjusted R-square values of 0.424 and 0.542, respectively.

The hypothesis testing results derived from the structural model confirm that all proposed relationships are statistically significant and align with the theoretical expectations of the study. Each standardized path coefficient demonstrates a positive and meaningful association between the analyzed constructs, providing empirical support for the conceptual framework linking project management practices and professional competencies with organizational performance.

The first hypothesis **(H_1)** establishes that Project Management Practices (PMP) positively influence Business Competitiveness (COMPE). The standardized coefficient ($\beta = 0.375$; $t = 5.488$; $p < 0.01$) validates this assumption, indicating

that organizations implementing formalized project management methodologies, supported by managerial commitment and methodological rigor, tend to achieve superior competitive positioning. These practices enhance strategic alignment, operational control, and resource optimization—key factors for sustaining long-term competitiveness.

The second hypothesis **(H_2)** examines the effect of PMP on Productivity and Innovation Indicators (PROD), showing a significant relationship ($\beta = 0.295$; $t = 5.194$; $p < 0.01$). This result underscores that standardized project management systems contribute not only to efficiency but also to innovation and continuous improvement. Organizations that systematize project processes are more capable of delivering results on time, within budget, and with higher quality standards, ultimately translating into enhanced productivity.

The third hypothesis **(H_3)** tests the impact of Skills, Attitudes, and Values (HABI) on Business Competitiveness (COMPE). The positive coefficient ($\beta = 0.36$; $t = 3.973$; $p < 0.01$) highlights that behavioral competencies—such as leadership, communication, adaptability, and ethical commitment—are decisive in shaping competitive advantage. These competencies enable project managers to navigate complex environments, coordinate multidisciplinary teams, and foster trust and collaboration, all of which strengthen organizational competitiveness.

Finally, the fourth hypothesis **(H_4)** evaluates the effect of HABI on Productivity and Innovation (PROD), revealing the strongest relationship in the model ($\beta = 0.526$; $t = 5.727$; $p < 0.01$). This finding demonstrates that professional and behavioral competencies are the most influential factors in driving productivity and innovation outcomes. The capacity of project managers to make informed decisions, communicate effectively, and lead adaptively has a direct and substantial impact on organizational performance.

Collectively, these results confirm that both structural (PMP) and human (HABI) dimensions of PM act as complementary drivers of competitiveness and productivity. The synergy between institutionalized management practices and well-developed personal competencies creates a sustainable foundation for organizational success, particularly in regional and emerging economies where professionalization of project management is still evolving.

5. Discussion

The empirical findings of this study confirm that project management practices (PMP) and professional competencies (HABI) are significant determinants of organizational competitiveness (COMPE) and productivity (PROD) in the regional context of Nariño, Colombia. These results can be better understood when anchored in the theoretical foundations of the Resource-Based View (RBV)**,** Human Capital Theory, and Dynamic Capabilities Theory, which together explain how organizations leverage internal resources to achieve sustained competitive advantage.

According to the RBV (Barney, 1991), PM practices and competencies act as intangible assets that meet the VRIN criteria—valuable, rare, inimitable, and non-substitutable. The high reliability and validity scores across the constructs demonstrate that these competencies are both distinctive and systematically embedded in organizations. In Nariño's socioeconomic landscape, characterized by a predominance of micro and small enterprises with limited access to capital and technology, such intangible resources become critical sources of competitive differentiation. The strong path coefficients from PMP ($\beta = 0.375 \rightarrow$ COMPE; $\beta = 0.295 \rightarrow$ PROD) reflect how structured managerial practices and methodological discipline can offset resource scarcity, enabling organizations to compete through efficiency, planning, and quality assurance.

From the perspective of Human Capital Theory (Becker, 1964), the findings highlight that postgraduate education in project management enhances behavioral and technical competencies, which in turn translate into measurable organizational outcomes. The construct HABI, showing the strongest effects in the model ($\beta = 0.526 \rightarrow$ PROD; $\beta = 0.36 \rightarrow$ COMPE), represents the accumulation of knowledge, skills, and values that empower professionals to lead teams, adapt to uncertainty, and innovate within resource-constrained environments. In the context of Nariño, where economic activity is largely service-oriented and highly dependent on human labor, such competencies emerge as pivotal enablers of productivity and innovation. This result aligns with the notion that investment in education—particularly at the postgraduate level—generates social returns in the form of enhanced organizational performance and regional competitiveness.

The Dynamic Capabilities Theory (Teece et al., 2009) provides additional explanatory power for interpreting these results. Organizations in emerging economies must constantly reconfigure resources to adapt to volatile environments. The significant effects of both PMP and HABI on productivity and competitiveness indicate that firms in Nariño are developing adaptive mechanisms—through formalized project structures and skilled human capital—that allow them to innovate and respond effectively to market fluctuations. These capabilities underpin a learning-oriented culture that enhances organizational resilience and sustainability, even in the absence of large-scale industrial infrastructures.

Regarding the R^2 values**,** the model explains 42.4% of the variance in Business Competitiveness (COMPE) and 54.2% of the variance in Productivity and Innovation (PROD). These values represent a substantial explanatory capacity, confirming that the variables analyzed capture a significant portion of the factors influencing organizational performance. However, they also imply that other elements—approximately 45–58%—remain unexplained, suggesting potential contributions from external and contextual factors. These may include:

- Institutional and regulatory conditions, such as local government support, access to financing, and policy incentives for innovation.
- Technological infrastructure, which affects firms' ability to digitize processes and compete in broader markets.
- Cultural and social capital, particularly collaboration networks and trust-based relationships that influence project success in regional ecosystems.
- Market and environmental dynamics, including competition intensity, sectoral diversification, and exposure to national and international markets.

Integrating these dimensions within future models would provide a more holistic understanding of how competitiveness and productivity evolve in developing territories like Nariño.

The findings also reaffirm the strategic role of universities as knowledge brokers and catalysts of development. CESMAG University's postgraduate program in project management contributes directly to strengthening regional human capital by fostering competencies that align with both global standards (PMI® framework) and local needs. This dual orientation explains why the behavioral dimension (HABI) emerges as a more decisive predictor than technical or structural factors: in contexts where formalized industrial processes are still emerging, human capabilities fill structural gaps, enabling innovation through leadership, collaboration, and adaptability.

In summary, the study demonstrates that the interaction between organizational practices (PMP) and human competencies (HABI) forms the backbone of competitive and productive performance in the regional economy of Nariño. These intangible assets represent the foundation upon which organizations can build sustainable advantage, especially when supported by continuous learning and institutional collaboration. The relatively high explanatory power of the model, coupled with the regional evidence, confirms that strengthening project management education and professionalization is a viable pathway for promoting innovation, productivity, and long-term competitiveness in emerging economies.

6. Conclusion

This study provides robust empirical evidence on the strategic impact of both organizational PMP and individual professional competencies, skills, attitudes, and values (HABI), on business competitiveness and productivity within the context of southwestern Colombia, particularly the department of Nariño. The results demonstrate that the alignment of managerial practices with the PMI® framework significantly enhances organizational competitiveness and innovation performance, while behavioral competencies exert an even stronger and more consistent influence on productivity outcomes.

Anchored in the Resource-Based View (RBV)(Barney, 1991), the findings confirm that project management practices and competencies operate as intangible strategic resources that provide sustainable competitive advantage when they fulfill the VRIN criteria, being valuable, rare, inimitable, and non-substitutable. Within the socioeconomic context of Nariño, where most organizations are micro and small enterprises with limited access to capital, these intangible assets become decisive levers for achieving differentiation and resilience. The significant relationships identified between PMP and both competitiveness and productivity ($\beta = 0.375$ and $\beta = 0.295$, respectively) reflect how the institutionalization of standardized project methodologies can offset resource constraints and promote operational excellence.

From the perspective of Human Capital Theory (Becker, 1964), the study highlights that postgraduate education in PM enhances human capital through the development of both technical and behavioral competencies. The HABI construct, which demonstrated the strongest statistical impact ($\beta = 0.526$ on productivity; $\beta = 0.36$ on competitiveness), illustrates how education-driven investments in knowledge, skills, and values translate into superior organizational performance. In an emerging regional economy such as Nariño's, characterized by service-based enterprises and limited technological infrastructure, these competencies are particularly crucial, as they enable innovation, adaptability, and leadership in resource-constrained environments.

Complementarily, the Dynamic Capabilities Theory (Teece et al., 2009) explains how organizations in volatile contexts build resilience by integrating and reconfiguring competencies to innovate and respond to change. The positive influence of PMP and HABI on both competitiveness and productivity indicates that firms in Nariño are developing the adaptive capabilities necessary to manage uncertainty, optimize resource use, and foster learning-oriented cultures that sustain innovation.

The study's explanatory power—reflected in R^2 values of 0.424 for competitiveness and 0.542 for productivity—demonstrates that these internal factors account for a substantial portion of performance variance. Nonetheless, nearly half of the variance remains unexplained, suggesting that other contextual dimensions, such as institutional support, digital infrastructure, market dynamics, and social capital, also influence organizational outcomes. This underscores the importance of a systemic approach that integrates project management with territorial development strategies and public policy initiatives.

From a methodological standpoint, the use of Partial Least Squares Structural Equation Modeling (PLS-SEM) proved effective for testing complex relationships in a medium-sized sample, ensuring high levels of reliability, convergent validity, and discriminant validity. The model confirmed that both organizational and individual dimensions of project management are empirically distinct yet interdependent, collectively driving sustainable performance.

Practically, these findings provide actionable insights for universities, policymakers, and organizations. Universities, particularly those offering postgraduate education in project management, such as CESMAG, play a crucial role in strengthening regional human capital and aligning academic training with market needs. Organizations, in turn, are encouraged to integrate standardized project management practices while simultaneously investing in behavioral competency development. Policymakers should view project management education as a strategic instrument for regional competitiveness and innovation.

Ultimately, the study reinforces that project managers must be understood as knowledge workers, capable of integrating both technical expertise and behavioral competencies to navigate complex project environments. This supports the PMI® Talent Triangle, emphasizing that leadership, communication, and ethical commitment are often more decisive than certification alone in determining project success—particularly in developing economies.

7. Limitations and Future Research

This research is limited to graduates from a single university in southwestern Colombia, which may constrain the generalizability of results. These results demonstrate that the educational process has successfully integrated not only technical knowledge but also attitudinal and ethical dimensions, aligning with the HABA model (Skills, Attitudes, Values, and Knowledge). This integration, consistent with the principles of the PMI®, strengthens the graduate's profile as an agent of change across various productive and social sectors.

Finally, in terms of contributions, this study provides solid empirical evidence on the influence of project management (PM) competencies, both at the individual level (Skills, Attitudes, and Values – HABI) and the organizational level (Management Practices – PMP), in enhancing business competitiveness and productivity within regional contexts such as the department of Nariño. The findings not only support the relevance of advanced PM education as a strategy for strengthening human capital but also align with key public policy guidelines and the Sustainable Development Goals (SDGs).

As future lines of research, it is proposed to extend the analysis to other departments with similar characteristics, incorporate contextual variables such as company size, economic sector, or level of organizational maturity, and include mixed methods to contrast quantitative results with qualitative analyses. Likewise, it would be valuable to explore the mediating and moderating effects of factors such as organizational culture or managerial leadership on the relationship between PM competencies and organizational performance.

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