International Journal of Project Management 43 (2025) 102782

Contents lists available at ScienceDirect

International Journal of Project Management

journal homepage: www.elsevier.com/locate/ijproman

Empowering future leaders: The interplay between shared leadership in projects and leadership development of project professionals

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ARTICLE INFO

Keywords:
Leadership development
Shared leadership
Project professional
Project careers

ABSTRACT

Individual leadership development has been a central area of research for many years. Project environments provide a unique setting for cultivating leadership competences, as their collaborative leadership approaches frequently enable individuals to step into leadership roles. Understanding the way project professionals grow into leadership roles during project work presents a significant opportunity for project-oriented organizations to employ projects beyond their original objectives and proactively leverage them as leadership learning ecosystems. The paper investigates how shared leadership in a project—moderated by organizational-level factors such as personnel development opportunities and servant leadership—relates to the project professionals' leadership development. Based on a survey of 328 project professionals in German-speaking countries, the study reveals that projects are particularly effective as incubators for leadership growth. Results show a positive relationship between shared leadership in projects and individual leadership development. This association is further strengthened when the organization is characterized by a servant leadership style and provides further personnel development measures. These findings make significant theoretical contributions and open new avenues for future research into leadership development within project contexts.

1. Introduction

Project environments serve as excellent learning and development settings, offering unique opportunities for employees to develop new competencies (Gareis & Huemann, 2000) and to gain hands-on experience in managing change and complexity (Laufer et al., 2017). In such dynamic environments, individuals can often rotate between roles outside their usual expertise (Whyte et al., 2022) and take on leadership roles sooner than they might in more traditional work settings, accelerating their professional growth (Cullen-Lester et al., 2017).

Leading global companies like Sandvik, General Electric, Shell, and IBM have long recognized the potential of action learning in the project context and even established initiatives to support leadership development through professional training programs (Mercer, 2000; Flaherty & Osicky, 2014; Scott, 2017). Although both academic research and practice acknowledge the unique environment projects offer for learning and skill development, there is limited knowledge on how project environments specifically enable individual leadership development. We have identified two research gaps in this context, which this paper aims to address.

Firstly, shared leadership, where team members divide leadership tasks and responsibilities among each other (McCauley & Palus, 2021), is a common feature in many projects (Clarke, 2012). This leadership style enables ample "learning by doing" opportunities, as individuals can step into leadership roles before being officially appointed to the formal role (Müller et al., 2016). Shared leadership, with its inherent knowledge creation (Bligh et al., 2006), could act as a mechanism to enhance and nurture individual leadership capabilities. This is particularly relevant in project contexts, where temporary team structures and dynamic roles create unique opportunities for this rotation (Scott-Young et al., 2019), potentially accelerating individual leadership development. However, the relationship between leadership development of project professionals and shared leadership remains insufficiently proven with large-scale empirical research. Addressing this gap is essential to better understand the development of leadership competencies through real-world project experiences, which will significantly

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https://doi.org/10.1016/j.ijproman.2025.102782
Received 9 February 2025; Received in revised form 5 October 2025; Accepted 9 October 2025
Available online 13 October 2025

contribute to academic research and management practice. Moreover, advancing this understanding is essential for project-oriented organizations to be able to employ projects beyond their original scope and leverage them as strategic hubs for leadership development. For this reason, our first research question is: *How is shared leadership in projects associated with the leadership development of project professionals?*

Secondly, limited research exists on the organizational factors that influence leadership development in project settings, particularly within the unique, supportive context of applied shared leadership in projects. Prior research has demonstrated that organizational support structures such as personnel development opportunities and servant leadership can play a role in enabling, supporting, and encouraging learning and development (Hölzle, 2010). Empirical evidence suggests that the selected organizational factors are particularly significant in shaping both the emergence of shared leadership (Zhu et al., 2016) and the development of skills and capabilities by project professionals (Zada et al., 2023; Bredin & Söderlund, 2013; Turner et al., 2008). Specifically, prior research suggests that servant leadership enables professionals to develop their leadership competencies and take on leadership roles (Langhof & Güldenberg, 2019). However, existing research has not yet identified how servant leadership affects the influence of shared leadership in projects on the leadership development of project professionals, which this research aims to address.

Moreover, although there is previous research on the relevance of development opportunities for project professionals (Turner et al., 2008) and the strategic importance of competence development in project-based organizations (Amituuni, 2021), the integration of targeted training and development programs for leadership development into project-based work environments and their role in enabling and strengthening shared leadership dynamics remain largely understudied. Understanding the interplay of these organizational factors with shared leadership and their role in individual leadership development is critical to understand the dynamics of project professionals' leadership growth during project work. Therefore, our second research question is: *How do servant leadership and personnel development opportunities at the organizational level influence the relationship between shared leadership in projects and project professionals' leadership development?* Specifically, we examine the moderating influence of servant leadership style and personnel development opportunities.

The study draws on data collected through an online survey of 328 participants from German-speaking countries, offering a comprehensive examination of the relationship between shared leadership and individual leadership development in projects. The findings confirm that shared leadership in projects has a positive relationship with individual leadership development, positioning projects as excellent settings for cultivating leadership skills. Notably, servant leadership and personnel development programs strengthen this relationship by enabling supportive organizational cultures and supporting project professionals with development opportunities.

This study contributes to the understanding of leadership development by demonstrating how shared leadership in project environments functions as a "leadership catalyst," enabling project professionals to practice and refine their leadership skills through shared responsibility. It also highlights the critical role of organizational factors—specifically servant leadership and personnel development programs—in strengthening the positive relationship between shared leadership and individual leadership growth. This research bridges gaps in the leadership development literature and provides actionable insights for enhancing leadership capabilities in project settings. The findings not only contribute to academic discourse but also equip managers and organizations with strategies to foster leadership development through supportive structures in project environments.

2. Theoretical framework

2.1. Leadership development of project professionals

Transformational leadership (Burns, 1978) is defined as "leaders and followers raise one another to higher levels of morality and motivation" (p 20). It centers on transforming and inspiring individuals and organizations to achieve long-term goals (Bass & Riggio, 2006), strongly emphasizing follower motivation and development (Wooi et al., 2017). The theory was advanced by Bass (1985), and later also further developed by Bass and Avolio (1994). In the past decades, it has gained prominence as a dominant leadership perspective (Black, 2015). The meta-analysis from Hoch et al. (2018), which also reports results from earlier meta-analyses documents the strong positive influence of transformational leadership on various performance criteria. This analysis also shows that three more recent leadership theories that are based on moral behavior: authentic, ethical and servant leadership, do not add very much explained variance when controlling for transformational leadership. However, servant leadership delivers substantial additionally explained variance for various criteria, and it also has a stronger weight in a meta-regression for these criteria than transformational leadership. Transformational leadership is the most important predictor of job performance, but for organizational citizenship behavior, job satisfaction, organizational commitment and trust in supervisor, servant leadership is the strongest predictor of all four compared leadership styles.

Based on transformational leadership (Bass, 1985), Dulewicz and Higgs (2005) created a new framework for assessing leadership competencies. They established a comprehensive overview of existing leadership research and assessment tools, identifying 15 distinct leadership dimensions. Subsequently, these dimensions have been grouped into three competency categories: intellectual (IQ), emotional (EQ), and managerial (MQ).

The LDQ by Dulewicz and Higgs (2005) is particularly relevant in project settings, since project leadership transcends the mere utilization of tools and techniques. It also doesn't solely entail the application of learned methods to any project, irrespective of the project manager's domain of knowledge, personal traits, behaviors, temperament, and leadership style (Müller & Turner, 2010). The appeal of competency perspectives may, in part, arise from the distinction that traits are often perceived as inherent qualities, whereas competencies are viewed as skills that can be acquired, providing more avenues for development. Competency theory has played a significant role in shaping research on project management and project leadership, establishing itself as one of the dominant leadership theories in this domain (Floris & Cuganesan, 2019).

The LDQ (Dulewicz & Higgs, 2005) not only has its roots in two well-established theories in the context of project leadership, transformational leadership and competency theory, it also has been successfully applied in project management context. Research using the Leadership Development Questionnaire (LDQ) has underscored particular leadership competencies linked to project success, especially within the financial sector (Geoghegan & Dulewicz, 2008) and in agile project settings (Porthouse & Dulewicz, 2007). Müller and Turner (2007) also applied the LDQ to analyze how a project manager's leadership style, combined with project type, relates to project success. Their findings emphasize that competencies within the Emotional Dimension (EQ) are especially significant for achieving successful project outcomes.

2.2. Shared leadership in projects

Over the past decade, leadership research has generally moved away from traditional, top-down hierarchical models towards a more balanced approach incorporating vertical and horizontal leadership styles (Zhu et al., 2016). Early studies on project leadership focused primarily on appointed leaders' roles and the vertical structures that

positioned them as central decision-makers (Aga et al., 2016; Zhang et al., 2018). However, more recent research also highlights the benefits of distributed or horizontal leadership (DeRue & Ashford, 2010, Muethel et al . 2012), where leadership responsibilities are shared across project team members (Scott-Young et al., 2019). This shift recognizes that, in certain situations, project outcomes can improve when appointed leaders create an environment that allows other team members to assume leadership roles as needed (Drescher et al., 2014). This dynamic, interactive influence process among individuals in groups is called shared leadership, an approach grounded in the Shared Leadership Theory by Pearce & Sims (2000). In this leadership approach, team members alternatingly develop a sense of being a leader or follower, and this identity is further confirmed through a mutual role-taking and collectively acknowledged within the work environment (DeRue & Ashford, 2010).

Müller et al. (2017) observed that situational contingencies often dictate the need for this balance, where project leaders facilitate the rise of horizontal leaders who can temporarily assume control or contribute to decision-making processes. Whyte et al. (2022) further emphasize that this collaborative approach increases not only adaptability but also leverages the diverse expertise within the team, resulting in a more resilient and responsive project structure. Shared leadership also establishes an exceptionally motivating environment that may encourage a creative approach toward work challenges (Liang et al., 2020). The meta-analysis from Wang et al (2014) documents a strong positive influence of shared leadership on team effectiveness. “Moreover, the effects of shared leadership are stronger when the work of team members is more complex.“ (ibid,p. 181). This means that shared leadership should be very effective in complex projects. The meta-analysis from Wu et al. (2020) confirms the positive influence on team effectiveness and adds that intragroup trust and task interdependence positively moderate the performance effects of shared leadership,

Altogether, the research field is moving toward a nuanced understanding of project leadership, where the dynamic interplay between horizontal and vertical leadership enables a more inclusive and effective project environment. Projects provide ideal settings for shared leadership due to their evolving phases and temporary nature, which enable rotating roles across different tasks and stages (Müller et al., 2018). This leadership style has gained even more prominence with the rise of virtual teams and remote work since COVID-19, as professionals increasingly depend on mutual accountability, shared responsibility, and collaborative decision-making to maintain effectiveness and cohesion (Han & Hazard, 2022).

Although an increasing body of research has explored shared leadership in projects (Pilkiené et al., 2018) and its effects on project success (Imam & Zaheer, 2021; Ali & Yushi, 2024), team performance (Scott-Young et al., 2019), as well as learning and development (Lechler & Huemann, 2023), little is known about how shared leadership influences the leadership development of project professionals. Given the collaborative and dynamic nature of shared leadership, where individuals frequently take on leadership roles on a rotating basis, its potential to facilitate leadership development seems evident. In light of the extensive existing research about shared leadership in projects and the recognition of projects as excellent learning environments, the lack of studies on the effect of shared leadership on leadership development is surprising, as the influence of shared leadership in projects could play a significant role in cultivating the leadership skills of project professionals. This research examines shared leadership as the central predictor of leadership growth in project settings.

2.3. Key organizational factors

We frame our analysis around three interconnected contexts: the organizational, project, and individual dimensions. Currently, there is a lack of academic research analyzing the key organizational factors that influence the relationship between shared leadership in projects and the leadership development of project professionals. Our study identifies two potential organizational factors that may play a significant role in this dynamic: *servant leadership* and *personnel development opportunities*.

We base this selection of organizational factors on a multilevel study examining similar dynamics in project management environments. Ekrot et al. (2018) emphasized the essential role of organizational support, qualification opportunities, and career systems in supporting retention and fostering job satisfaction among project professionals. While our focus shifts toward shared leadership and individual leadership development, we draw a conceptual connection between these factors. Specifically, we consider servant leadership instead of organizational support, as servant leadership serves as a key antecedent to perceived organizational support. Servant leadership belongs to a family of leadership movement driven by focusing on ethical responsibilities of leaders (Lemoine et al., 2019). In contrast to authentic and ethical leadership, servant leadership fosters more social behaviors like organizational citizenship, and trust in leaders – which might be extended to trust in persons that practice leadership together (Hoch et al. 2018). We did not use transformational leadership because our main interest was not to explain the performance of the project, but the development of leadership competencies for people to learn to lead projects.

Servant leadership empowers followers through principled guidance and fosters holistic growth through ethical, emotional, and spiritual support (Greenleaf, 1977). Servant leadership at the organizational level, with its focus on prioritizing follower growth (Eva et al., 2019), serves as a powerful enabler of leadership development (Sims, 2018). While the three moral forms of leadership (i.e., ethical, authentic, and servant leadership) share a lot of similarities, in particular the theories they are based on and the constructs they are measured with (Lemoine et al., 2019), servant leadership also focuses on serving multiple stakeholders, not only followers (Chen et al., 2015). In addition to that, servant leadership has unique outcomes by predicting service-oriented behaviors like community citizenship and value co-creation (Liden et al., 2014)

The rise of virtual teams, agile organizations, and employee-driven innovation further increased the interest in a leadership approach with leaders acting as enablers rather than authority figures (Wang et al., 2019). In this context, researchers found that servant leadership can act as catalyst for collaboration and innovation (Haider et al., 2025).

On the organizational level, servant leadership results in enhanced team effectiveness, sustainability, thriving, and performance (Lu et al., 2023). A systematic literature review by Langhof and Güldenberg (2019) highlights the antecedents and outcomes of servant leadership, explaining that servant leadership fosters a serving culture and mutual trust, likely creating an environment where leadership responsibilities are naturally distributed within the team. Thus, it is not surprising that there is a growing body of research on the application of servant leadership and its outcomes in the context of project settings (Li, 2024), particularly on its effect on project success (Harwardt, 2020) and its influence on the effectiveness of project management (Zada et al., 2023). The meta-analysis from Zhang et al. (2021) finds “that servant leadership is positively related to followers’ job-related outcomes (e.g., psychological empowerment, organizational commitment, service quality), leader-related outcomes (e.g., leader effectiveness), and group-related outcomes (e.g., group service performance).“ (ibid., p. 371).

Although there is strong scientific evidence that servant leadership is linked to individual performance and development (Chiniara, 2016), there is limited understanding about the specific influence of the *combination* of servant and shared leadership on leadership development. Our study bridges this gap by showing how an organization-wide commitment to servant leadership fosters an environment ripe for growth, enhancing opportunities for developing leadership competencies across project teams.

Finally, while personnel development opportunities provided by the organization are often highlighted to equip individuals with the tools (Turner et al., 2008) as well as confidence, skills, and knowledge

necessary to navigate and succeed in leadership roles (Lacerenza et al., 2017), the current literature does not sufficiently examine their role in enabling shared leadership in projects to support individual leadership development. By addressing this gap, our study shows how personnel development resources, such as training, mentoring, and coaching, enable project professionals to step confidently into leadership through shared leadership frameworks, accelerating and strengthening their leadership development journey.

3. Hypotheses

The conceptual framework of our study combines organizational and project-level factors to predict leadership development of individuals in project environments. This model brings together the domains of leadership development and shared leadership, which have only been studied in isolation in previous academic research. Through the inclusion of organizational moderators, we account for strengthening conditions that may reinforce or constrain the influence of shared leadership on the development of leadership skills of project professionals. The chosen configuration enables us to examine cross-level interplays that are currently understudied in project management research, providing an overarching understanding of the way individual leadership skills evolve within temporary and dynamic structures of project teams.

As potential moderators, we examine organizational factors that extant leadership literature considers essential for project professionals' development and professional growth by giving them chances to increase their competencies (Bredin & Söderlund, 2013; Chiniara, 2016; Ekrot et al., 2018; Turner et al., 2008). With these choices, we aim to explain whether these organizational factors strengthen the effect of shared leadership in projects on the leadership development of project professionals.

Based on the Shared Leadership Theory (Pearce & Sims, 2000) and using the Leadership Development Questionnaire (LDQ) (Dulewicz & Higgs, 2003) as a measurement instrument, we argue that there is a positive relationship between shared leadership in projects and the leadership development of project professionals as shared leadership on the project level fosters learning-by-doing effects through proactive participation in leadership tasks by the individuals in project teams (Müller et al., 2016).Fig. 1

3.1. Shared leadership in projects and the leadership development of project professionals

The Leadership Development Questionnaire by Dulewicz and Higgs (2003) identifies the key leadership dimensions. Our premise is that through shared leadership, project professionals cultivate these leadership dimensions and have the opportunity to develop essential leadership skills through project work.

The dynamic setup of shared leadership provides project professionals with the continuous opportunity to develop diverse skills through on-the-job learning (Poell & Van der Krogt, 2003). Shared leadership enables teams and their leaders to identify and address deficiencies in collective and individual capabilities by promoting skill development through cross-training, peer coaching, and targeted development methods (Morgeson et al., 2010). The role rotation in shared leadership ensures regular assumption of leadership responsibilities, even before being appointed to a formal leadership role (Erez et al., 2002). Mutual feedback between project team members supports self-awareness and adaptive learning because it encourages individuals to reflect on their performance and learn from each other (Day et al., 2014), promoting critical thinking and decision-making abilities (Mueller et al., 2023). Moreover, collaborative decision-making promotes leadership skills, including self-leadership (Bligh et al., 2006). Finally, divided responsibility demands accountability, allowing individuals to develop key leadership skills through hands-on experience (Scott-Young et al., 2019). These mechanisms suggest that shared leadership in a project could relate to the leadership development of project professionals. We therefore propose:

Hypothesis 1. Shared leadership in projects is positively associated with the leadership development of project professionals.

3.2. The moderating influence of servant leadership in the organization

Servant leadership is a comprehensive approach that nurtures

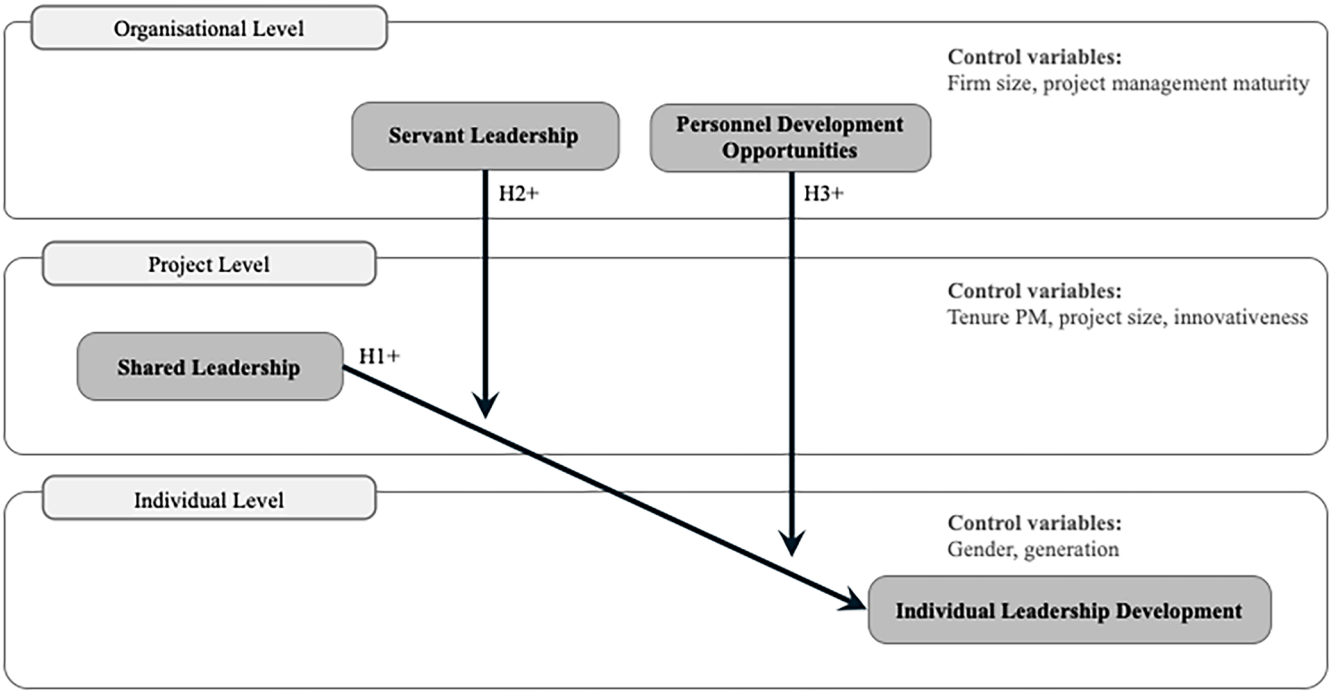

Fig. 1. Conceptual framework.

followers across various aspects, for example, relational, ethical, spiritual, and emotional – empowering them to reach their full potential. This leadership style prioritizes the development of followers, guided by the leader's commitment to altruism and ethical principles (Greenleaf, 1977). Servant leadership nurtures an inclusive culture (Gotsis & Grimani, 2016) where team members feel empowered to take on tasks necessary for their development (Nauman et al., 2022b), fostering a sense of agency and collaborative spirit (Bragger et al., 2021). Servant leadership encourages personal growth and empowerment (Newman et al., 2015). These findings are corroborated by the meta-analysis from Hoch et al. (2018) which documents the unique and strong contribution of servant leadership on social behaviors. Empirical evidence shows that empowering professionals enhances their willingness to take on leadership roles (Sims, 2018), making shared leadership frameworks increasingly efficient in enabling individual leadership development.

Additionally, central elements of servant leadership, such as trust, empowerment, and psychological safety, foster active engagement and openness to learn from criticism (Coetzer et al., 2017). When individuals feel safe to challenge the status quo, speak up, and learn from mistakes without fear of negative consequences (Edmondson, 1999), they are more likely to take on leadership roles. This supportive environment accelerates personal growth and probably allows shared leadership processes to function more effectively. Based on the literature, we assume that through applied servant leadership in organizations, project professionals are more likely to explore innovative solutions, take calculated risks, and develop essential leadership skills through real-world application.

Conversely, the absence of servant leadership could hinder the development of leadership competencies through shared leadership in project environments. Rigid and hierarchical organizations often suppress initiative-taking behaviors and limit chances for leadership experimentation (Valentine, 2018). In such organizations, individuals lack role models and supportive conditions, essential for developing key leadership skills, particularly through shared leadership processes. This contrast confirms the essential role of servant leadership in reinforcing the inherent potential of developing leadership skills in shared leadership dynamics.

Based on these insights, we assume that the presence of servant leadership in the organization will increase the benefits of shared leadership in projects for project professionals' leadership development.

Hypothesis 2. An organization's servant leadership style will strengthen the positive association between shared leadership in projects and leadership development (positive moderation).

3.3. The moderating influence of personnel development opportunities

Personnel development opportunities are seen as a substantial organizational resource that equips project professionals with the necessary knowledge, skills, and confidence to succeed in leadership roles (Lacerenza et al., 2017). These resources, which include mentoring, lecturing, coaching, and training (Turner et al., 2008), are particularly valuable in the dynamic and challenging context of projects, where professionals often encounter rapidly changing conditions and responsibilities (Huemann et al., 2007). The opportunity to participate in personnel development initiatives increases individual skills while also fosters an environment conducive to leadership growth by providing organized and professional pathways for competency development (Day, 2000).

Personnel development opportunities can play a highly supporting role in accelerating learning and development in projects characterized by shared leadership. Shared leadership inherently involves the distributed management of responsibilities and collaborated decision-making (Kocolowski, 2010), all of which require different team members to step into leadership roles at different phases of the project lifecycle (Lorinkova & Bartol, 2020). However, when responsibilities are distributed across team members, competency gaps might hinder the team's performance. Personnel development opportunities help bridge these gaps by offering upskilling and targeted training (Turner et al., 2008), thereby ensuring that project professionals are able to step into leadership roles more effectively and confidently.

Structured personnel development programs also enable psychological safety (Edmondson, 1999), which ensures that team members feel supported in taking on leadership roles.

We propose that personnel development opportunities can enable project professionals to embrace leadership roles successfully and effectively by building confidence and addressing skills that are required in leadership situations.

Hypothesis 3. Personnel development opportunities for project professionals will strengthen the positive association between shared leadership in projects and leadership development (positive moderation).

4. Method

4.1. Data collection and sample

A quantitative, cross-sectional survey design was used to gather data from a sample of project professionals. The survey approach was chosen for its efficiency in collecting data from a wide array of participants across different industries and career stages. This research is part of a broader study, which aims to explain the main drivers of and motivators within project management careers and examines the individual, organizational, and project factors that influence project professionals, with a particular focus on leadership development, certification attainments, and elements contributing to career satisfaction and progression.

The sampling approach involved a two-phase process to ensure a broad and representative sample of project professionals. First, participants were recruited through the researchers' project management networks in German-speaking regions, including IPMA and PMI local chapters. In the second phase, the sample was expanded with the help of a market research panel provider to reach a more diverse pool of project professionals and to achieve balanced generational representation. This combined strategy ensured a mix across industries, generations, project experience, and career stages.

Data was collected using an online survey platform, which allowed convenient participant access while ensuring data anonymity. The questionnaire included questions about participants' experiences with shared leadership in projects, perceived leadership development, current project roles, and organizational background.

To encourage engagement, participants were offered a personalized report comparing their results with those of their peer group, and they were also offered the opportunity to attend an online workshop about the findings at the end of the research. Due to missing data in some questionnaires, the final sample was reduced to 328 project professionals. Participants primarily worked in hybrid projects (64%), followed by agile (24%) and waterfall (12%) approaches. The sample comprises 62% male participants and 38% female participants. Participants were categorized into generational cohorts: Gen X and older (born in 1980 or earlier, 31%), Gen Y (born between 1981 and 1995, 40%), and Gen Z (born in 1996 or later, 29%).Table 1

4.2. Measurement

Building on an extensive review of the literature on shared leadership in project settings and individual leadership development, we identified relevant constructs and corresponding measurement scales. Where necessary, we adapted the wording of scale items to fit the specific context of our study better, ensuring conceptual alignment with project-based environments. To establish content validity and enhance item clarity, we pretested the scales with a panel comprising project

Table 1
Sample Descriptives.

Gender	%	Generation	%	Project size	%	Project roles	%
Male	62	Gen X and older (<1980)	31	1-10 team members	50,6	Leader of a sub-team	6
Female	38	Gen Y (1981-1995)	40	11-100 team members	42,1	Project manager of a multi-team project	66
		Gen Z (>1996)	29	101+ team members	7,3	Project manager of a single-team project	22
						Project team member	6
Type of project			%	Industry cluster			%
IT / Digitalization		30		Primary industries			6
Research or new product development		19		Manufacturing and engineering			22
(Re-) organization		17		Construction & infrastructure			12
Infrastructure & construction		13		Services (professional and consumer)			37
Social		9		Public and social services			8
Ecological		6		Transport & logistics			3
Other		6		Other			12

management students, practitioners, and researchers. All constructs were measured using multi-item scales. Unless otherwise specified, items were rated on a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree").

4.2.1. Independent variable

Shared leadership was assessed using a seven-item scale created by Muethel et al. (2012). The items are designed to measure shared leadership behaviors within a team. The focus lies on the extent to which all team members take active roles in guiding, contributing, and supporting the team's effectiveness. Specifically, the items cover the main aspects of proactivity in improvement, information-seeking and sharing, and constructive collaboration. The overall assessment of the items addresses the distributed and collaborative nature of leadership within the team, where team success responsibility is shared among all members.

4.2.2. Dependent variable

Individual leadership development was measured using the Leadership Development Questionnaire (LDQ) developed by Dulewicz and Higgs (2003). The LDQ links leadership to a set of competencies and personal characteristics. The instrument was refined through two pilot studies and has demonstrated strong psychometric properties. Notably, LDQ scores have been found to be largely independent of demographic and professional variables such as gender, job function, and qualification level. For this study, we used 11 items of the LDQ, detailed in the Appendix.

4.2.3. Moderators

Servant leadership was measured using six items based on Liden et al. (2008) and Nauman et al. (2022a). Personnel development opportunities were assessed using a self-developed 5-item scale that rated the quality of project manager development services in the respondent's organization, such as project management methods trainings or mentoring programs.

4.2.4. Control variables

To isolate the effect of shared leadership on individual leadership development, we included a set of control variables at the organizational, project, and individual levels. At the organizational level, firm size was measured as the logarithm of the number of employees, and project management maturity was assessed using a six-item scale developed by Teller et al. (2012). At the project level, project size was operationalized as the logarithm of the number of team members, while project innovativeness was measured based on its degree of technical novelty, following Bechtel et al. (2022). On the individual level, we also controlled for participants' tenure in project management (in years), gender (dummy-coded as 1 = female), and generational cohort (dummy variables for Generations Y and Z, with Generation X and older as the reference category).

We employed confirmatory factor analysis (CFA) to assess the scales' reliability and validity (DeVellis, 2016). Reliability was evaluated using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). All constructs demonstrated strong internal consistency, with both Cronbach's Alpha and composite reliability values exceeding 0.80. AVE values were above the recommended threshold of 0.50 for all constructs, with the exception of individual leadership development, which yielded an AVE of 0.49. Despite this marginal deviation, the construct was retained based on standardized factor loadings above 0.65 and a composite reliability of 0.91, indicating acceptable convergent validity. Overall, the CFA results indicate a good model fit: $\chi^2(579) = 1159.70$, $p < .001$; root mean square error of approximation (RMSEA) = .055; standardized root mean residual (SRMR) = .044; and comparative fit index (CFI) = .92. We therefore deem the measurement model acceptable. Table 2 shows the descriptive statistics of all variables.

5. Results

We tested our hypotheses using ordinary least squares (OLS) regressions to identify whether shared leadership in projects, along with interaction terms, significantly predicts the leadership development of project professionals.

As shown in Table 3, the explanatory power of the models increases substantially with the sequential inclusion of additional variables. Model 1 includes only the control variables, highlighting their direct effects on individual leadership development. As expected, higher project management maturity is positively associated with leadership development. Interestingly, tenure, project size, and innovativeness show no significant relationship with the dependent variable. Collectively, the control variables account for approximately 31% of the variance in individual leadership development.

Model 2 adds shared leadership as the main independent variable. The results confirm a positive association between shared leadership in projects and the leadership development of project professionals ($b = 0.347$, $p = 0.000$), providing strong support for H1. On average, a one-point increase in shared leadership in projects (on a 7-point scale) corresponds to a 0.347-point increase in leadership development, holding all else constant.

Model 3 adds the main effects of the two proposed moderators: servant leadership and personnel development. Servant leadership is positively associated with leadership development ($b = 0.126$, $p = 0.004$), indicating that project professionals in servant-led environments report higher developmental outcomes. Personnel development shows no significant effect ($b = -0.083$, $p = 0.076$). Models 4 and 5 test the interaction effects. Model 4 includes the interaction between shared leadership and servant leadership. The interaction term is positive ($b = 0.130$, $p = 0.000$), indicating that servant leadership strengthens the positive relationship between shared leadership and leadership development. This supports Hypothesis 2. Model 5 tests the interaction between shared leadership and personnel development, which is also positive ($b = 0.134$, $p < 0.000$), supporting Hypothesis 3.

Model 6 includes both interaction terms simultaneously. Both

Table 2
– Correlations.

Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Leadership development	5.73	0.84	1.00										
(2) Shared leadership	5.37	1.15	0.60	1.00									
(3) Servant leadership	5.33	1.30	0.51	0.65	1.00								
(4) Personnel development	5.33	1.32	0.45	0.70	0.72	1.00							
(5) Firm size	5.33	13.05	0.03	0.01	0.00	0.00	1.00						
(6) PM maturity	5.46	1.24	0.49	0.58	0.60	0.66	0.02	1.00					
(7) Female	0.38	0.48	0.01	0.02	-0.03	-0.02	-0.09	-0.10	1.00				
(8) Generation y	0.39	0.49	0.11	0.12	0.15	0.12	0.06	0.11	0.09	1.00			
(9) Generation z	0.29	0.46	-0.13	-0.03	-0.05	-0.02	-0.11	-0.09	0.10	-0.52	1.00		
(10) Tenure pm	8.15	7.37	0.05	0.04	0.03	0.03	0.05	0.09	-0.16	-0.19	-0.40	1.00	
(11) Project size	2.69	1.19	0.12	0.16	0.21	0.21	-0.05	0.19	-0.10	0.13	0.14	-0.07	1.00
(12) Project innovativeness	4.17	1.67	0.07	0.15	0.21	0.11	-0.06	0.06	-0.02	0.08	0.12	-0.20	0.15

n = 328, SD = standard deviation, all correlations above 0.11 are significant at the 5% level.

Table 3
Regression results.

	Individual leadership development					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm size	0.001	0.001	0.001	0.000	0.000	0.000
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
PM maturity	0.329**	0.145**	0.136**	0.120**	0.107**	0.111**
	[0.034]	[0.037]	[0.041]	[0.039]	[0.039]	[0.039]
Female	0.141	0.073	0.076	0.018	-0.003	-0.001
	[0.087]	[0.079]	[0.078]	[0.073]	[0.074]	[0.073]
Generation Y	-0.057	-0.140	-0.152	-0.138	-0.147	-0.141
	[0.119]	[0.107]	[0.106]	[0.099]	[0.100]	[0.099]
Generation Z	-0.238	-0.315*	-0.309*	-0.246*	-0.266*	-0.247*
	[0.137]	[0.123]	[0.122]	[0.114]	[0.115]	[0.114]
Tenure PM	-0.003	-0.007	-0.008	-0.006	-0.009	-0.007
	[0.007]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
Project size	0.034	0.025	0.022	-0.005	0.010	-0.001
	[0.037]	[0.033]	[0.033]	[0.031]	[0.031]	[0.031]
Project innovativeness	0.025	-0.001	-0.012	-0.011	-0.015	-0.013
	[0.025]	[0.023]	[0.023]	[0.021]	[0.022]	[0.021]
Shared Leadership		0.347**	0.330**	0.357**	0.336**	0.350**
		[0.040]	[0.047]	[0.044]	[0.044]	[0.044]
Servant Leadership			0.126**	0.168**	0.130**	0.155**
			[0.043]	[0.041]	[0.041]	[0.041]
Personnel Development			-0.083	-0.066	0.005	-0.027
			[0.046]	[0.043]	[0.045]	[0.046]
Shared Leadership X Servant Leadership				0.130**		0.082**
				[0.019]		[0.028]
Shared Leadership X Personnel Development					0.134**	0.069*
					[0.020]	[0.030]
Constant	3.791**	5.050**	5.156**	5.170**	5.243**	5.209**
	[0.239]	[0.259]	[0.285]	[0.266]	[0.267]	[0.264]
R^2	0.259	0.405	0.422	0.500	0.495	0.508
Adjusted R^2	0.240	0.388	0.402	0.481	0.475	0.488

OLS regression: n = 328; unstandardized regression coefficients are reported; interaction variables were mean-centered;
*p < 0.05, **p < 0.01; standard errors in brackets.

remain significant, and the model explains over 50% of the variance in individual leadership development—the highest explanatory power among all models. These results underscore the critical role of both project-level behaviors of shared leadership and contextual organizational factors in shaping individual-level leadership development.

To further investigate these interactions, Fig. 2 illustrates the marginal effects of shared leadership across different levels of the moderators. The top panel shows that when servant leadership is low (below 3 on the 7-point scale), the effect of shared leadership on leadership development is not yet statistically significant. However, the effect becomes increasingly positive as servant leadership increases. Similarly, the bottom panel shows that shared leadership only has a positive impact when personnel development opportunities are sufficiently high (above 4). Below this threshold, the effect is negligible.

Overall, the results confirm that both servant leadership and personnel development serve as critical organizational support structures that enhance the developmental value of shared leadership in project contexts. These findings highlight the importance of aligning project environments with supportive leadership cultures and developmental practices to foster leadership growth among project professionals.

6. Discussion

This study quantitatively investigates the relationship between shared leadership in projects and project professionals' leadership development, and it identifies moderating factors of this interplay at the organizational level. First, the study provides compelling evidence that

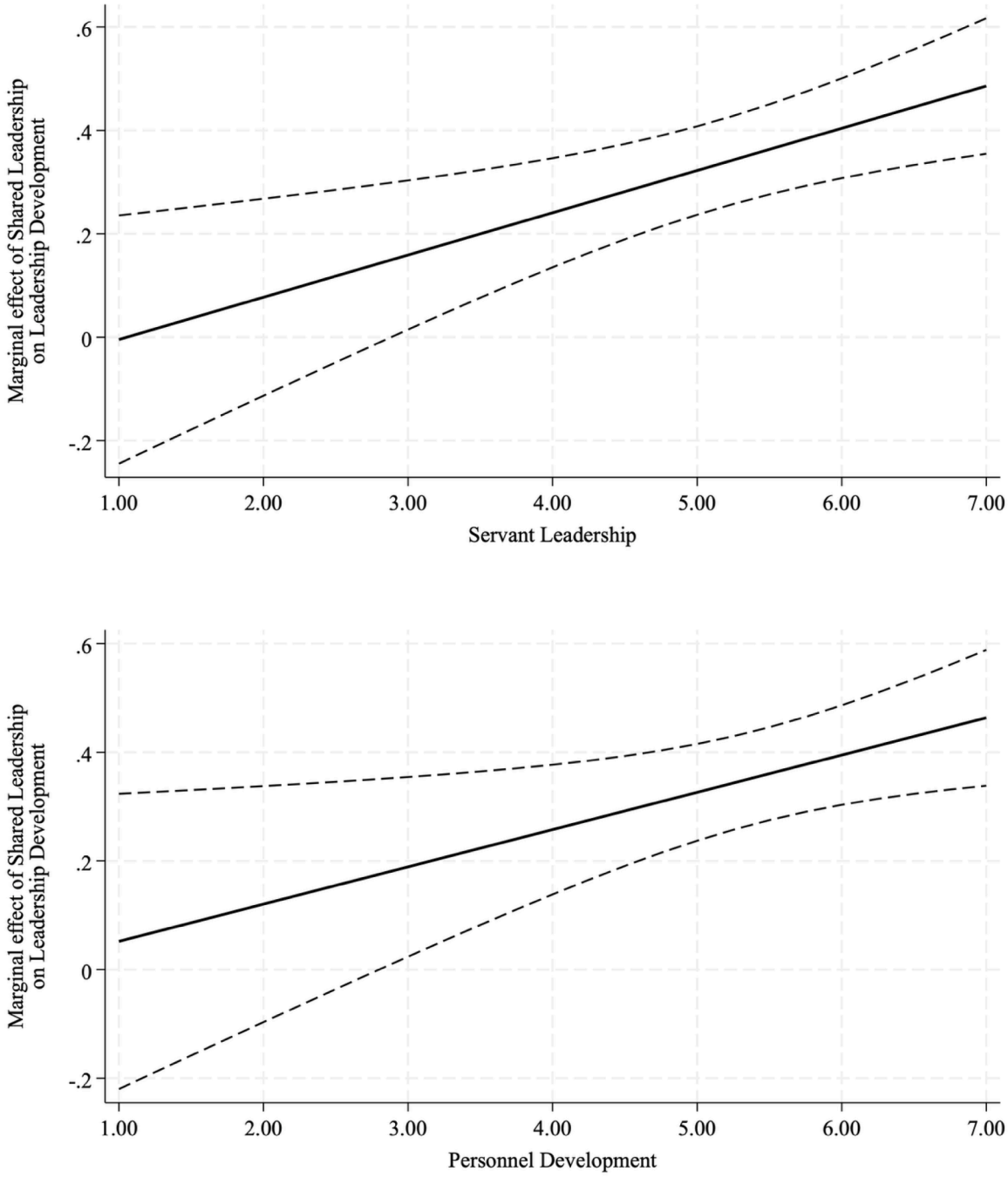

Fig. 2. Marginal Effects of Shared Leadership on Leadership Development depending on Servant Leadership (top) and Personnel Development (bottom).

shared leadership in projects is a key driver of leadership development of project professionals. Second, results show that two organizational factors further strengthen shared leadership's relationship with individual leadership development. Servant leadership within the organization and personnel development opportunities positively moderate the positive relationship between shared leadership in projects and project professionals' leadership development. Servant leadership also exerts a significant positive main effect, that adds to the other significant effects.

6.1. Theoretical contribution

This paper advances project management and leadership development research by theorizing shared leadership in project environments as a developmental mechanism for individual leadership competencies of project professionals and by identifying organizational boundary conditions that shape this mechanism. Building on multilevel views of leadership development that span organizational, project, and individual dimensions (Bechtel et al., 2022), we integrate streams of work on leadership in projects and organizational enablers to offer a cohesive explanation of how project work can function as a leadership catalyst. In doing so, we extend the theoretical foundations of leadership development in projects (Porthouse & Dulewicz, 2007; Müller & Turner, 2007; Geoghegan & Dulewicz, 2008) from a largely descriptive account of developmental opportunities toward an explanatory model that specifies drivers and contingencies.

First, we provide quantitative evidence that shared leadership in projects is positively associated with the leadership development of

project professionals. While prior studies have emphasized the performance benefits of shared leadership in project settings (Pilkiené et al., 2018; Scott-Young et al., 2019; Imam & Zaheer, 2021; Ali & Yushi, 2024), our findings shift the focus from project outcomes to individual-level developmental outcomes. We theorize that responsibility sharing, broadened decision authority, and exposure to diverse leadership episodes constitute essential mechanisms to accelerate competency growth. This moves beyond treating shared leadership as merely an alternative leadership structure; it positions shared leadership as a developmental context that systematically cultivates project leadership capabilities.

Second, the results provide empirical evidence that specific organizational factors enhance this relationship. Therefore, the study contributes to the existing literature on servant leadership in project-oriented organizations (Harwardt, 2020; Zada et al., 2023; Li, 2024) by showing that this leadership style strengthens the positive relationship between shared leadership in projects and leadership development. By fostering an inclusive and supportive culture (Newman et al., 2015; Gotsis & Grimani, 2016), servant leaders empower individuals to take on leadership roles and responsibilities, creating a synergistic environment that amplifies the benefits of shared leadership. Another organizational factor that strengthens the relationship between shared leadership and leadership development is the provision of personnel development opportunities, such as training programs, mentoring, and coaching for project professionals (Turner et al., 2008; Lacerenza et al., 2017). These Human Resources (HR) practices equip project professionals with the necessary knowledge and competencies needed to thrive in shared leadership environments, further enhancing the improvement of their leadership skills. By connecting these HR practices to leadership outcomes in shared leadership contexts, we contribute to the literature on HR systems in project-oriented organizations and clarify how developmental infrastructures translate into individual capability gains (Hueman et al., 2007; Turner et al., 2008; Ambituuni et al., 2021).

Third, by linking organizational enablers to project-level leadership processes and individual growth, the study contributes to multilevel theorizing in project management. We show how governance dynamics in the permanent organization shape the competency-building potential of temporary organizations, thereby bridging two domains that are often examined separately. In doing so, we develop a holistic understanding of how shared leadership fosters leadership growth by connecting project-level dynamics with organizational enablers, such as personnel development opportunities and servant leadership. This extends research on how leadership styles and practices in permanent organizations shape the competency-building potential of projects. While prior work has regarded temporary organizations not only as delivery vehicles for complex product offerings but also as arenas for organizational learning and competency building (Davies & Brady, 2016), our study identifies shared leadership as a micro-mechanism that enables such developmental results. Specifically, we show that projects provide invaluable opportunities for leadership competency development that may exceed those available in permanent functional settings.

Finally, the findings could also pose implications for conceptualizing and measuring project success (Pinto et al., 2022). Beyond the "iron triangle" and stakeholder satisfaction (Prabhakar, 2008), leadership capability development emerges as a meaningful outcome dimension that projects can intentionally produce. Reframing project success to include human capital gains would recognize leadership development as an integral, theorized outcome of project governance choices rather than a serendipitous by-product.

6.2. Practical implications

Our study provides valuable insights for organizations and managers about enabling shared leadership in projects and magnifying its effect on the leadership development of project professionals. These results are especially valuable for project-oriented organizations, where the development of leadership skills is many times incorporated into practice and occurs through informal processes.

Our findings show that prioritizing servant leadership through organizational mechanisms such as a servant culture and structure (Ebener & O'Connell, 2010) can be fundamental for shaping the pathway for the leadership development of project professionals through shared leadership in projects. Additionally, emphasizing personnel development opportunities further supports leadership growth (Baron & Parent, 2015), creating structured pathways for continuous learning and capacity-building within the organization (Day et al., 2014).

At the project level, shared leadership and servant leadership not only increase the success of current projects (Harwardt, 2020; Imam & Zaheer 2021; Nauman et al. 2022a, 2022b). Our results also suggest that shared leadership should be recognized as an essential component for developing individual leadership competencies. Encouraging shared leadership in project teams enables members to take on leadership roles and responsibilities collectively (Wu et al., 2024), enhancing their leadership skills in real-time project settings.

Participating in projects with applied shared leadership creates opportunities that actively support skill development and foster project professionals' leadership competencies. Therefore, these projects allow individuals to grow within their roles and contribute to the overall leadership capacity within their teams and the broader organization.

These layers of influence – spanning the commitment of the organization to the structure of personnel development programs and servant leadership, as well as the encouragement of shared leadership in projects – establish a robust framework where project professionals can exercise, refine, and cultivate their leadership potential.

By aligning individual development with project-specific opportunities, organizations can foster an environment that sustains a culture of continuous learning and builds capable leaders. This far-reaching approach highlights how the leadership growth of project professionals can be effectively supported across multiple levels, which also provides actionable management strategies for leadership development through project work within complex organizational contexts, in addition to the advancement of theoretical insights.

6.3. Limitations and future research

As in every scientific study, the limitations of our research open avenues for future research.

While the results demonstrate a high explanatory power, validity limitations must be addressed. For instance, the generalizability might be limited due to the voluntary participation from professionals in the German-speaking countries. Although the focus on German-speaking countries is a strength of this research as it enables an in-depth investigation of leadership development in projects within a specific cultural context that is usually characterized by formalized education, structured career paths, and established project management standards. These aspects make the research results particularly relevant for professionals and organizations in this region, providing actionable insights derived from their unique work environments. However, expanding the geographical scope of the research to include diverse regions would offer a broader perspective on how cultural, economic, and societal factors shape leadership styles and influence individual leadership development. Such a comparative analysis across countries could reveal important contextual differences that impact leadership growth.

To further advance the study of individual leadership development within project environments, conducting a panel study over the course of 2-3 years could track changes in leadership development and shared leadership dynamics, providing valuable insights into long-term effects and trends. This longitudinal approach would allow for a deeper understanding of how leadership evolves over time and the enduring impact of shared leadership within project settings.

Future research should also examine additional leadership styles beyond shared leadership in the project and servant leadership in the organization to determine their impact on the leadership development of project professionals. Moreover, a comparative study involving participants in line positions, as well as project professionals, would provide meaningful insights into potential differences in leadership development in project-based roles versus traditional organizational roles.

Our study shows that the relationship between shared leadership in projects and project professionals' leadership development holds independent of firm size, project size, project management tenure, project innovativeness, and gender. Incorporating additional variables and control dynamics would enrich the study's results. Adding new factors, such as individual motivators or organizational culture, would contribute to a more holistic view of the relationship between shared leadership in projects and the leadership development of project professionals. To better understand the diversity of experiences, further investigation could explore differences among participants by adding new control variables beyond gender and generation, which may reveal valuable distinctions across role-based or demographic groups.

Despite these limitations, this study is the first to link shared leadership in projects and the leadership development of project professionals and demonstrate that projects can act as leadership labs. It hopefully encourages further academic research on this topic.

The aforementioned contextual and methodological expansions offer a comprehensive roadmap for future research, enabling a broader understanding of the dynamics of shared leadership in projects and the leadership development of project professionals.

CRediT authorship contribution statement

Julia Bauer: Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Martina Huemann:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Alexander Kock:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Hans Georg Gemünden:** Writing – review & editing, Validation, Supervision, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

This paper was managed according to IJPM policies without any engagement of the Editor-in-Chief.

Acknowledgements

This paper is an outcome of the research project PROCEED, which was partly sponsored by the International Project Management Association.

Appendix – Confirmatory Factor Analysis

Construct	Items	Loading
Individual leadership development	While working on this project, I learned to…	
Cronbach's Alpha = 0.91, Composite Reliability = 0.91, AVE = 0.49	… encourage others to take on personally challenging tasks and give them autonomy.	0.72
	… plan ahead, organise and coordinate resources efficiently and effectively.	0.68
	… help others understand by coaching and giving feedback and encourage them to take on more difficult tasks.	0.70
	… engage others and win support through clear communication.	0.69
	… make decisions involving significant risk to gain an advantage	0.74
	… persuade others to change their views while appreciating their perspectives.	0.65
	… consider the needs and perceptions of others when making decisions.	0.73
	… commit to a course of action in the face of challenge and encourage others to support the chosen direction.	0.70
	… analyze situations and examine the facts critically.	0.70
	… develop a clear vision of the future direction to meet project imperatives.	0.68
	… see the wider issues and broader implications by exploring relationships, balancing short- and long-term considerations and identifying opportunities and threats.	0.71
Shared leadership	Think about teamwork in your project and indicate how much you agree with each statement below.	
Cronbach's Alpha = 0.92, Composite Reliability = 0.92, AVE = 0.61	All team members initiate actions to improve procedures for the team.	0.78
	All team members are proactive in suggesting new work methods to improve team performance.	0.80
	All team members are proactive in making constructive suggestions for improving how things operate within the team.	0.79
	All team members initiate actions to make the team more effective.	0.84
	All team members ask other team members for advice.	0.71
	All team members seek information from other team members about external influences that could affect their own work.	0.79
	All team members seek information from other team members about aspects of how to accomplish the work that could affect their own work.	0.77
Servant leadership	Reflect on your collaboration with your supervisor and evaluate the following statements.	
Cronbach's Alpha = 0.91, Composite Reliability = 0.92, AVE = 0.64	My superior helps employees develop themselves further.	0.82
	My superior learns from the different views and opinions of others.	0.82
	My superior is open about their strengths and weaknesses.	0.81
	My superior makes my career development a priority.	0.81
	I would seek help from my superior if I had a personal problem.	0.75
	My superior puts my best interests ahead of their own.	0.80
Personnel development	Rate the quality of project manager development services in your organization. It includes…	
Cronbach's Alpha = 0.91, Composite Reliability = 0.91, AVE = 0.66	… project management methods training.	0.83
	… soft skills training (e.g., teamwork, conflict management, and intercultural skills).	0.85
	… specialized training and hard skills training.	0.79
	… a mentoring program.	0.82
	… on-the-job training (e.g., project participation to learn a specific skill).	0.77
Project management maturity	Consider project management in your organization. Indicate how much you agree with the following statements.	

(*continued on next page*)

(*continued*)

Construct	Items	Loading
Cronbach's Alpha = 0.85, Composite Reliability = 0.85, AVE = 0.58	A standardized process model is followed by all project participants.	0.77
	Each project has a steering committee and defined escalation paths.	0.75
	The project managers are familiar with our project management standards and are very well qualified for their tasks.	0.72
	For all projects, project progress is regularly evaluated and communicated using standardized metrics.	0.81
Project innovativeness	Assess the situation at the beginning of your project.	
Cronbach's Alpha = 0.83, Composite Reliability = 0.84, AVE = 0.64	At the beginning of the project, we did not have the necessary technical knowledge yet.	0.79
	At the beginning of the project, we had little practical experience in the application of the required technology.	0.87
	We could only partially rely on the company's technological competence.	0.74

7-point Likert-type scale; $\chi^2 = 1159.70$ (df = 579; $p < 0.00$); RMSEA = .055; SRMR = .044; CFI = .92; n = 328.

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