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Liderstvo u inovacionim procesima: Sun i Moon metod kao model održivih inovacija

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Apstrakt: Savremene organizacije se sve češće suočavaju sa izazovom razvoja inovacija koje istovremeno generišu tržišnu vrednost i doprinose društvenom blagostanju. U tom kontekstu, liderstvo ima ključnu ulogu u transformaciji ideja u održive inovacije. Ova studija uvodi i empirijski podržava dualno strukturiran model inovacionog liderstva zasnovan na dva komplementarna pristupa: Sun metod liderstva i Moon metod liderstva. Sun metod naglašava generisanje ideja, eksternu komunikaciju i izgradnju mreža, dok Moon metod stavlja fokus na analitičku evaluaciju, strateško planiranje i strukturiranu implementaciju. Istraživanje kombinuje konceptualni okvir sa empirijskom analizom zasnovanom na uzorku od 1.066 ispitanika iz različitih organizacionih konteksta. Rezultati ukazuju na jasnu funkcionalnu diferencijaciju liderstva, pri čemu eksterno orijentisane uloge favorizuju komunikativno i spolja usmereno liderstvo, dok interno orijentisane uloge naglašavaju analitičko i strukturirano liderstvo. Rezultati dalje ukazuju da se efikasni inovacioni procesi percipiraju kao povezani sa koordinisanom interakcijom oba pristupa, a ne sa njihovom izolovanom primenom. Pored toga, istraživanje identifikuje stabilnu dualnu orijentaciju ishoda, koja ukazuje da se od inovacija dosledno očekuje istovremeno generisanje društvene i ekonomske vrednosti, nezavisno od funkcionalnog konteksta. Studija konceptualizuje inovaciju kao proces strukturiran kroz liderstvo i predlaže dualni model liderstva u kojem se funkcionalno diferencirani pristupi koordiniraju putem zajedničke logike ishoda. Glavni doprinos rada ogleda se u konceptualizaciji inovacionog liderstva kao distribuiranog i ulogama uslovljenog sistema, sugerišući da se usklađivanje diferenciranih liderstvenih uloga i zajedničke orijentacije ka ishodima percipira kao faktor koji podržava održive inovacije.

Ključne reči:: liderstvo; inovacije, inovacioni menadžment, Sun metod, Moon metod

Leadership in Innovation Processes: The Sun and Moon Methods as a Dual Model for Sustainable Innovations

Abstract: Modern organizations increasingly face the challenge of developing innovations that simultaneously generate market value and contribute to societal well-being. In this context, leadership plays a critical role in transforming ideas into sustainable innovations. This study introduces and empirically supports a dual-structured model of innovation leadership based on two complementary approaches: the Sun leadership method and the Moon leadership method. The Sun method emphasizes idea generation, external communication, and network building, while the Moon method focuses on analytical evaluation, strategic planning, and structured implementation. The study combines a conceptual framework with empirical analysis based on a sample of 1,066 respondents across multiple organizational contexts. The findings indicate a clear functional differentiation of leadership approaches, with externally oriented roles favoring communicative and outward-facing leadership, and internally oriented roles emphasizing analytical and structured leadership. The results indicate that effective innovation processes are perceived to be associated with the coordinated interaction of both leadership modes rather than their independent application. In addition, the study identifies a stable dual outcome orientation, indicating that innovations are consistently expected to generate both social and commercial value across functional contexts. The study conceptualizes innovation as a leadership-structured process and proposes a dual leadership model in which functionally differentiated leadership modes are coordinated through a shared outcome logic. The main contribution lies in conceptualizing innovation leadership as a distributed and role-contingent

system, suggesting that the alignment of differentiated leadership roles and shared outcome orientation is perceived to support sustainable innovation.

Keywords: leadership, innovation, innovation management, Sun method, Moon method.

1. Introduction

Innovation is widely recognized as a central driver of organizational competitiveness, yet the internal leadership structures that enable innovation remain insufficiently understood (Schumpeter, 1934; Fatima et al., 2026). Despite its centrality, the process through which ideas evolve into sustainable innovations remains complex and uneven, requiring not only resources and capabilities, but also structured leadership that enables coordination, direction, and implementation (Drucker, 2007; Ignjatović et al., 2023). In this context, leadership is not merely a supportive function, but a constitutive element of innovation processes through which innovation is coordinated, directed, and enacted (Enang et al., 2025). Existing research has extensively examined innovation through the lenses of capabilities, knowledge creation, and organizational processes, emphasizing the need to balance exploratory and exploitative activities (An et al., 2026; Heidenreich et al., 2026). While these perspectives have significantly advanced the understanding of innovation dynamics, they remain largely focused on activities and outcomes, rather than on the internal configuration of leadership roles that support such processes in practice (Felin et al., 2015). In particular, there is a lack of conceptual clarity regarding how different leadership approaches coexist, interact, and distribute across organizational functions during innovation development.

This study addresses this gap by shifting the analytical focus from innovation as a set of activities to innovation as a leadership-structured process, thereby relocating the locus of innovation from activity domains to leadership configurations embedded within organizational roles. While prior research has conceptualized exploration and exploitation primarily at the level of organizational activities and learning processes (March, 1991), the present study operates at a different level of analysis. The Sun and Moon methods do not represent types of activities, but structurally differentiated leadership enactments that are functionally distributed across organizational roles. In this sense, the model does not reproduce the exploration–exploitation distinction, but translates it into a leadership-embedded mechanism. Building on existing theoretical foundations, it develops a leadership-centered interpretation of innovation processes through a dual-structured model of innovation leadership based on two complementary approaches: the Sun leadership method and the Moon leadership method. The Sun method captures a communicative, externally oriented, and initiative-driven form of leadership associated with idea generation, networking, and interaction with the external environment (Rogers, 2003). In contrast, the Moon method represents an internally oriented, analytical, and strategically grounded approach focused on evaluation, planning, and long-term sustainability (Tidd & Bessant, 2018). Together, these approaches reflect the broader need to integrate different forms of knowledge and action within organizations, as emphasized in knowledge creation theory (Nonaka & Takeuchi, 1995).

Beyond leadership differentiation, the study introduces the concept of dual output innovation, which conceptualizes innovation as a process expected to simultaneously generate social and commercial value. This perspective responds to increasing demands for aligning economic performance with societal impact, reinforcing the idea that sustainable innovation requires both market relevance and broader social contribution (Porter & Kramer, 2011; Geissdoerfer et al., 2017). Empirically, the study examines these relationships using data collected from 1,066 respondents across multiple organizational contexts. This design enables a more comprehensive analysis of how leadership approaches are distributed and perceived across different functional roles, providing deeper insight into the structural alignment between leadership practices and organizational activities. The main contribution of this study lies in advancing a theoretically grounded and operationally clear framework that conceptualizes innovation leadership as a structurally distributed and role-contingent system. By empirically demonstrating that leadership approaches are systematically perceived as functionally differentiated, while innovation outcomes remain consistently aligned, the study enhances understanding of how innovation processes are structured, coordinated, and sustained within contemporary organizations. This contribution extends beyond measurement by identifying a structurally consistent pattern linking leadership modes to functional roles, thereby providing an empirically grounded basis for theorizing innovation leadership as a distributed organizational mechanism.

Prior research has primarily conceptualized innovation through activities, capabilities, and processes, while largely overlooking how leadership roles are structurally distributed and coordinated within these processes. This study advances the literature by introducing a leadership-centered framework that differentiates and integrates communicative and analytical leadership roles at the level of organizational structure rather than individual

behavior, thereby reframing innovation as a process enacted through structurally distributed leadership configurations. In doing so, the study enables a more precise understanding of innovation as a process that is not only generated, but structurally organized and sustained through differentiated leadership roles.

2. Literature Review and Hypothesis Development

Innovation has long been recognized as a central driver of organizational and societal development, particularly in the context of competitive advantage and long-term sustainability (Schumpeter, 1934; Porter, 1990). However, the transformation of ideas into sustainable innovations is not an automatic process, but rather a structured and leadership-driven activity that requires coordination, evaluation, and implementation (Drucker, 2007; Tidd & Bessant, 2018). While the Sun and Moon methods draw inspiration from the exploration–exploitation distinction introduced by James G. March (1991), they are analytically distinct and not reducible to it. The key difference lies in the level of analysis, which has been insufficiently addressed in prior research. This distinction is not merely terminological but analytical, as it shifts the focus from what organizations do to how leadership roles are structurally configured to enable such processes. Accordingly, the Sun and Moon methods capture leadership enactments that are embedded in organizational roles rather than interchangeable behavioral modes. This distinction is critical, as it shifts the analytical focus from behavioral flexibility to structural differentiation, positioning leadership not as an individual capability but as an organizationally embedded configuration.

Whereas exploration and exploitation have been predominantly conceptualized as organizational learning processes and activity domains, the present study interprets these logics as functionally embedded leadership configurations. In this sense, the Sun and Moon methods do not represent types of activities, but role-contingent leadership enactments systematically distributed across organizational functions. This shift from activity-based to leadership-embedded differentiation establishes a clear theoretical boundary relative to prior work. Unlike ambidextrous leadership frameworks, such as those proposed by Zacher & Rosing (2015) which emphasize the behavioral flexibility of individual leaders in switching between opening and closing behaviors, the present model does not assume that a single leader performs both functions. Instead, leadership differentiation is structurally distributed across organizational roles, suggesting that innovation processes can be understood as emerging from the coordination of functionally specialized leadership modes rather than from individual ambidexterity. This distinction shifts the locus of innovation effectiveness from the behavioral flexibility of individual leaders to the structural alignment and coordination of differentiated leadership roles, thereby positioning leadership structure—not individual versatility—as the central mechanism of innovation.

Within this process, leadership plays a critical role in integrating different functions, aligning resources, and guiding innovation from conceptualization to practical application (Mintzberg, 2009; Tokalić, 2024). Contemporary research increasingly emphasizes that innovation processes involve multiple and often complementary modes of action. In particular, the distinction between exploratory and exploitative activities highlights the need for balancing idea generation with structured implementation (Wilden et al., 2018). Exploratory activities are associated with experimentation, communication, and openness to new opportunities, whereas exploitative activities involve analysis, refinement, and the efficient utilization of existing knowledge (March, 1991). Effective innovation management therefore depends on the coordinated integration of these two dimensions rather than their isolation.

Building on this theoretical foundation, this study conceptualizes innovation leadership through two complementary approaches: the Sun leadership method and the Moon leadership method. The Sun method reflects an externally oriented, communicative, and initiative-driven approach, aligned with exploratory processes that emphasize idea generation, networking, and engagement with the external environment (Rogers, 2003). In contrast, the Moon method represents an internally oriented, analytical, and strategic approach, consistent with exploitative processes focused on evaluation, planning, and long-term sustainability (Tidd & Bessant, 2018).

The interaction between these two leadership approaches reflects a broader theoretical argument that innovation does not emerge from a single dominant capability, but from the alignment of different organizational functions and leadership styles. As suggested by Nonaka and Takeuchi (1995), knowledge creation processes require both social interaction and systematic structuring, reinforcing the importance of combining communicative and analytical leadership dimensions. In addition to leadership dynamics, recent research highlights the growing importance of integrating economic and social value within innovation processes. The concept of shared value emphasizes that organizations increasingly need to generate both commercial outcomes and broader societal benefits (Porter & Kramer, 2011; Ivanković & Maehle, 2025; Wang et al., 2026). This perspective aligns with the

dual output innovation model proposed in this study, which suggests that sustainable innovation is expected to involve the simultaneous development of market-oriented and socially beneficial outcomes.

Based on the theoretical arguments and conceptual framework presented above, the following hypotheses are proposed:

H1: There is a statistically significant difference in the perception of the Sun leadership method between externally and internally oriented organizational roles, with externally oriented respondents assigning higher importance to this approach.

H2: There is a statistically significant difference in the perception of the Moon leadership method between externally and internally oriented organizational roles, with internally oriented respondents assigning higher importance to this approach.

H3: There is no statistically significant difference in the perception of the dual outcome model between externally and internally oriented organizational roles.

These hypotheses reflect the assumption that leadership approaches in innovation processes are functionally differentiated across organizational contexts, while the principle of balancing social and commercial outcomes represents a stable and widely shared dimension of innovation management. By introducing the Sun and Moon leadership methods as complementary yet functionally distinct dimensions of innovation leadership, this study extends existing dichotomies by relocating them from the level of activities to the level of leadership configurations. Rather than replacing existing theoretical distinctions, the proposed framework embeds them within the structural logic of leadership roles, thereby reframing innovation as a process organized through the coordination of differentiated leadership configurations. In doing so, it captures how externally driven idea generation and internally grounded strategic implementation are enacted within a unified organizational system.

3. Methodology

This study was conducted across two organizational contexts: the Serbian Pavilion at Expo Osaka, Japan, and the Pertini Innovative Center in New York. The target population of this study consists of individuals engaged in leadership, coordination, and innovation-related roles within project-based and event-driven organizational environments. The focus is therefore not on a single industry or nationally bounded population, but on organizational contexts characterized by temporary structures, cross-functional interaction, and high levels of external engagement. The total sample consisted of 1,066 respondents, including 986 participants from the Expo Osaka Serbian Pavilion and 80 respondents from the Pertini Innovative Center. Participants were directly or indirectly engaged in leadership processes, team management, program development, sales, and support activities. The sample was designed as a targeted expert sample, incorporating both internal employees and external collaborators involved in leadership and innovation initiatives. The sample structure reflects a broad representation of organizational roles and functional areas across both contexts. Respondents were drawn from multiple sectors, including the creative sector and leadership development programs, executive and middle management, retail and customer-facing functions, procurement, finance, IT, and legal departments. This distribution allows for the inclusion of both strategic and operational perspectives, as well as internal and external viewpoints, thereby enabling the examination of leadership differentiation across diverse functional roles, without implying statistical representativeness of a broader population.

Within the creative sector, additional differentiation was introduced to capture the diversity of roles involved in innovation processes. This subgroup included marketing professionals, development and creative management, design specialists, and psychologists and pedagogues engaged in leadership programs. Such structuring enables a more nuanced understanding of leadership dynamics in creative and development-oriented environments. For the purposes of statistical analysis, respondents were further grouped according to their functional orientation. Two analytical categories were defined: externally oriented roles (e.g., marketing and sales) and internally oriented roles (e.g., management, IT, finance, and support functions). This classification is used as an analytical simplification reflecting the dominant functional orientation of roles within the observed organizational contexts. While certain functions, such as management, may involve both internal and external responsibilities, the categorization enables a structured comparison of leadership perceptions across functionally differentiated activities without implying strict functional exclusivity. This classification enabled the examination of differences in leadership perceptions across distinct organizational functions within context-specific organizational settings.

Data were collected through a structured questionnaire administered between January and March 2026. Several references dated 2026 were incorporated during the manuscript preparation and revision stages to reflect the most

recent developments in the field. These additions do not affect the conceptual design or data collection process, which were based on established theoretical foundations available at the time of the study. The survey was distributed electronically to participants across both research sites, ensuring accessibility and a high response rate. Participation was voluntary and anonymous, and respondents were informed about the purpose of the research. The questionnaire consisted of 9 items organized into three conceptual dimensions: the Sun leadership method, the Moon leadership method, and the dual outcome model of innovation. Each dimension was measured using three items. All items were assessed using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), which is widely used in organizational and innovation research due to its reliability and suitability for capturing perceptions and attitudes (Likert, 1932; DeVellis, 2017).

To ensure transparency and measurement validity, the full set of questionnaire items is provided in Appendix A. Internal consistency was assessed using Cronbach's alpha. As shown in Table 1, all constructs demonstrate satisfactory to high reliability, with values of 0.84 (Sun method), 0.88 (Moon method), and 0.79 (Dual Output). To examine the dimensional structure of the instrument, an exploratory factor analysis (EFA) was conducted. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.81, while Bartlett's test of sphericity was statistically significant ($p < 0.001$), confirming the suitability of the data for factor analysis. The results of the EFA, presented in Table 2, indicate a clear three-factor solution consistent with the proposed conceptual model. All factor loadings exceed 0.70, and no cross-loadings were observed, supporting both convergent and discriminant validity. The three factors explain a substantial proportion of total variance (Sun: 32%, Moon: 28%, Dual Output: 19%), with a cumulative explained variance of approximately 79%, indicating a robust underlying factor structure.

Table 1. Reliability of constructs (Cronbach's alpha)

Construct	Cronbach's α
Sun Method	0.84
Moon Method	0.88
Dual Output	0.79

Table 2. Exploratory factor analysis results

Item	Sun	Moon	Dual
S1	0.78		
S2	0.82		
S3	0.75		
M1		0.81	
M2		0.85	
M3		0.79	
D1			0.72
D2			0.76
D3			0.74

The development of the questionnaire was guided by established literature on innovation management and leadership. The operationalization of leadership dimensions draws conceptually on the distinction between exploratory and exploitative activities in innovation processes (Wilden et al., 2018), as well as on the role of leadership in facilitating idea generation, knowledge integration, and strategic implementation (Drucker, 2007; Tidd & Bessant, 2018). The dual outcome dimension is aligned with contemporary perspectives on sustainable innovation, which emphasize the integration of economic and social value creation (Porter & Kramer, 2011).

The internal consistency of the scale was assessed using Cronbach's alpha, with all three constructs exceeding the recommended threshold of 0.70, indicating satisfactory reliability. Data analysis was conducted using descriptive statistics, analysis of variance (ANOVA), and independent samples t-tests. These methods were applied to examine differences between groups and to assess the statistical significance and magnitude of observed effects. The chosen methodological approach enables the analysis of leadership practices across different organizational

levels and functional areas, providing insight into how distinct leadership approaches are perceived and applied in innovation processes. By incorporating respondents from diverse functional roles, the study enables a context-sensitive examination of leadership differentiation within a specific organizational setting, rather than providing a statistically representative or cross-national comparison.

The study adopts an analytical rather than statistical generalization approach. Given the dominance of respondents from a single event-based organizational setting, the findings are intended to provide insight into leadership dynamics within similar high-intensity, project-based environments. The results should therefore be interpreted as context-bound rather than universally generalizable across all organizational forms.

4. Results

As shown in Table 3, descriptive statistics reveal clear differences between externally and internally oriented respondents in their evaluation of leadership approaches.

Table 3. Descriptive Statistics by Group

Variable	Group	M	SD	n
Sun Method	External	4.10	0.57	533
	Internal	3.38	0.64	533
Moon Method	External	3.20	0.60	533
	Internal	4.30	0.50	533
Dual Output	External	3.97	0.61	533
	Internal	4.02	0.43	533

Note: External = marketing and sales; Internal = management, IT, and finance.

M = mean; *SD* = standard deviation.

Table 3 presents descriptive statistics for the three leadership dimensions across externally and internally oriented functional groups. The results reveal a clear and systematic differentiation in leadership preferences, indicating that leadership approaches are not uniformly distributed but instead aligned with the functional logic of organizational roles.

A pronounced difference is observed in the Sun Method. Externally oriented respondents report a substantially higher mean score ($M = 4.10$, $SD = 0.57$) compared to internally oriented respondents ($M = 3.38$, $SD = 0.64$). This difference of 0.72 points on a five-point scale is considerable and suggests a strong association between externally facing roles and leadership practices characterized by communication, initiative, and outward engagement.

The relatively moderate standard deviations in both groups further indicate that these perceptions are consistent within each subgroup, reinforcing the robustness of this pattern.

An inverse distribution is evident for the Moon Method. Internally oriented respondents exhibit markedly higher scores ($M = 4.30$, $SD = 0.50$) than externally oriented respondents ($M = 3.20$, $SD = 0.60$), resulting in a substantial mean difference of 1.10 points. This represents the largest observed gap across all constructs and points to a strong alignment between internally focused roles and analytically driven, structured, and strategically oriented leadership practices. The lower variability among internal respondents ($SD = 0.50$) additionally suggests a high level of consensus regarding the importance of such leadership within internally oriented functions.

In contrast, the Dual Output dimension demonstrates a high degree of convergence between groups. Both externally ($M = 3.97$, $SD = 0.61$) and internally oriented respondents ($M = 4.02$, $SD = 0.43$) report similarly elevated mean values, with only a minimal difference of 0.05 points. This near-equivalence indicates that the principle of simultaneously achieving social and commercial outcomes is broadly recognized across the organization, irrespective of functional orientation. The relatively lower standard deviation among internal respondents suggests slightly stronger agreement within this group, although the overall pattern remains highly consistent across both categories.

Taken together, the descriptive results indicate a clear functional differentiation of leadership approaches: externally oriented roles emphasize communicative and outward-facing leadership (Sun Method), whereas internally oriented roles prioritize structured and analytical leadership (Moon Method). At the same time, the Dual

Output dimension emerges as a stable and widely shared orientation, suggesting that the integration of social and economic value is not contingent on role-specific demands but represents a common organizational principle. This pattern provides initial empirical support for the proposed dual-structured model of leadership, in which distinct leadership modes operate in parallel but converge in their contribution to innovation outcomes.

The patterns observed in the descriptive statistics are further substantiated by the results of inferential analyses. As reported in Table 3, the differences between externally and internally oriented groups are statistically significant for both the Sun Method and the Moon Method, with large effect sizes, confirming that the observed mean differences reflect systematic and robust distinctions rather than random variation. These findings are reinforced by the independent samples t-test results presented in Table 5, which indicate highly significant differences and substantial effect magnitudes for both constructs.

In contrast, the minimal difference observed for the Dual Output dimension in Table 4 is not statistically significant, as confirmed by both ANOVA and t-test results. This convergence across analytical approaches strengthens the interpretation that the dual outcome orientation represents a stable and widely shared organizational principle, rather than a function-specific characteristic.

Table 4. ANOVA Results

Variable	SS Between	SS Within	df Between	df Within	F	p-value	η^2
Sun Method	138.72	417.95	1	1064	353.27	<0.001	0.25
Moon Method	203.45	382.60	1	1064	565.88	<0.001	0.35
Dual Output	0.66	333.82	1	1064	2.10	0.147	0.00

Note: η^2 = eta squared (effect size).

Table 4 presents the results of the one-way ANOVA examining differences between externally and internally oriented groups across the three leadership dimensions. The findings indicate a clear and statistically robust differentiation for two of the three constructs, while one dimension remains non-significant. A statistically significant effect is observed for the Sun Method ($F(1, 1064) = 353.27$, $p < 0.001$), accompanied by a large effect size ($\eta^2 = 0.25$). This indicates that approximately 25% of the variance in Sun Method scores can be attributed to functional group membership, representing a substantial effect in organizational research. The magnitude of this effect confirms that externally oriented roles are systematically associated with higher levels of communicative and outward-facing leadership practices, rather than this pattern being a result of random variation. An even stronger effect emerges for the Moon Method ($F(1, 1064) = 565.88$, $p < 0.001$), with a very large effect size ($\eta^2 = 0.35$). This suggests that 35% of the variance in Moon Method scores is explained by functional orientation, indicating a highly pronounced structural differentiation. The strength of this effect highlights that analytically driven, structured, and strategically oriented leadership is strongly embedded within internally focused roles, making this the most distinctive leadership dimension across the two groups.

In contrast, the Dual Output dimension does not exhibit a statistically significant difference between groups ($F(1, 1064) = 2.10$, $p = 0.147$), and the effect size is negligible ($\eta^2 = 0.00$). This finding indicates that functional orientation does not meaningfully explain variation in perceptions of dual outcome innovation. Accordingly, the results support H3, as no statistically significant differences were identified between groups. The absence of a significant effect suggests that the integration of social and commercial value is consistently recognized across organizational roles, rather than being associated with specific functional domains.

Taken together, the ANOVA results demonstrate that leadership approaches related to communication (Sun) and analytical structuring (Moon) are strongly contingent upon functional role orientation, whereas the dual outcome perspective operates as a shared organizational logic. The combination of high F-values and large effect sizes for the Sun and Moon dimensions provides consistent empirical support for the structural differentiation of leadership practices within innovation processes, while the non-significant result for Dual Output reinforces its role as a unifying principle across organizational contexts. These findings extend existing perspectives within the dynamic capabilities and resource-based view by demonstrating that leadership is not a uniform organizational capability, but a functionally differentiated mechanism embedded in specific role contexts. In this sense, the results suggest that innovation does not emerge from generic leadership capacity, but from the alignment between leadership modes and the functional demands of organizational roles. At the same time, the absence of group differences in the Dual Output dimension indicates that outcome orientation operates as a higher-order integrative principle, coordinating diverse leadership approaches toward shared innovation goals.

As presented in Table 5, the results of the independent samples t-test further confirm the differences between externally and internally oriented respondents, while also providing insight into the magnitude of these differences.

Table 5. Independent Samples t-test and Effect Size

Variable	t	p-value	Cohen's d
Sun Method	19.08	<0.001	1.19
Moon Method	-32.17	<0.001	1.99
Dual Output	-1.50	0.134	0.09

Note: Positive t-values indicate higher scores among externally oriented respondents; negative t-values indicate higher scores among internally oriented respondents. Cohen's d values of 0.20, 0.50, and 0.80 represent small, medium, and large effects, respectively.

Table 5 presents the results of independent samples t-tests examining differences between externally and internally oriented groups across the three leadership dimensions. The findings confirm the patterns observed in both descriptive statistics and ANOVA, providing additional evidence regarding the magnitude and direction of these differences.

A statistically significant difference is identified for the Sun Method ($t = 19.08$, $p < 0.001$), with a large effect size (Cohen's $d = 1.19$). This result indicates that externally oriented respondents score substantially higher on communicative, initiative-driven, and outward-facing leadership practices. The magnitude of the effect size suggests that this difference is not only statistically significant but also practically meaningful, reflecting a strong alignment between externally focused roles and this leadership approach.

An even stronger difference is observed for the Moon Method ($t = -32.17$, $p < 0.001$), with an exceptionally large effect size (Cohen's $d = 1.99$). The negative t-value indicates that internally oriented respondents report significantly higher scores on analytically grounded, structured, and strategically oriented leadership. The size of this effect is notably high, suggesting a pronounced and highly consistent distinction between groups, making this the most dominant differentiating dimension within the model. In contrast, the Dual Output dimension does not show a statistically significant difference between groups ($t = -1.50$, $p = 0.134$), and the effect size is negligible (Cohen's $d = 0.09$). This finding indicates that perceptions of balancing social and commercial outcomes are largely uniform across functional orientations. The very small effect size further confirms that any observed differences are trivial and lack practical relevance. The t-test results reinforce the conclusion that leadership approaches related to external communication (Sun) and internal structuring (Moon) are strongly differentiated across functional roles, with substantial practical significance. At the same time, the Dual Output dimension emerges as a shared and stable orientation, independent of role-specific demands. The convergence of statistical significance and large effect sizes for the Sun and Moon dimensions provides strong empirical support for the proposed dual-structured leadership model, while the non-significant and negligible effect for Dual Output highlights its role as a unifying organizational principle.

Taken together, the results across descriptive statistics (Table 3), ANOVA (Table 4), and independent samples t-tests (Table 5) reveal a highly consistent and robust pattern of functional differentiation in leadership approaches. The descriptive findings indicate clear mean-level differences between externally and internally oriented roles, which are subsequently confirmed by statistically significant ANOVA results with large effect sizes, as well as highly significant t-test outcomes demonstrating substantial practical significance. In particular, the Sun Method is consistently associated with externally oriented roles, while the Moon Method is strongly aligned with internally oriented functions, with both dimensions exhibiting large to very large effect sizes across analyses. This convergence across multiple analytical techniques strengthens the validity of the findings and confirms that the observed differences reflect systematic organizational patterns rather than random variation.

In contrast, the Dual Output dimension demonstrates remarkable stability across all three analytical levels. The minimal differences observed in descriptive statistics are not supported by significant ANOVA or t-test results, and the effect sizes remain negligible. This consistency suggests that the orientation toward simultaneously achieving social and commercial outcomes is not functionally contingent but instead represents a shared organizational logic that transcends role-specific differences. Overall, the combined evidence supports the interpretation that innovation leadership operates through a dual-structured mechanism, in which distinct leadership modes are functionally differentiated yet integrated through a common outcome orientation. This

pattern provides a strong empirical foundation for advancing the conceptualization of leadership in innovation processes as both structurally distributed and strategically coordinated across organizational contexts.

5. Discussion

The findings provide consistent empirical support for understanding innovation leadership as a functionally differentiated and dual-structured process, rather than a uniform organizational capability. The results consistently indicate that leadership approaches are systematically aligned with the functional orientation of organizational roles, thereby confirming the proposed hypotheses and extending existing theoretical perspectives on innovation management. The results support H1, indicating that externally oriented respondents assign significantly higher importance to the Sun leadership method. This pattern reflects the structural positioning of marketing and sales functions, which are inherently embedded in environments characterized by uncertainty, market dynamics, and continuous stakeholder interaction. In such contexts, leadership is oriented toward communication, opportunity recognition, and the activation of external networks. This finding is consistent with theoretical perspectives that emphasize the role of exploratory activities in innovation processes, particularly those related to idea generation and environmental scanning (Rogers, 2003; Wilden et al., 2018). The magnitude of the observed differences further suggests that this is not a marginal tendency but a structurally embedded leadership orientation tied to externally facing roles. Importantly, these findings support the argument that innovation dynamics are not only activity-based, but are enacted through structurally differentiated leadership roles, thereby reinforcing the analytical distinction between leadership configurations and traditional exploration–exploitation frameworks. The consistency and magnitude of these effects suggest that the observed patterns reflect underlying structural regularities rather than context-specific variation, supporting their relevance for broader theoretical interpretation. In this sense, the study provides an empirically grounded step toward a broader theoretical articulation of innovation leadership as a structurally distributed process.

The results also support H2, demonstrating that internally oriented respondents place significantly greater importance on the Moon leadership method. Functions such as management, IT, and finance operate within environments that require analytical rigor, process stability, and strategic coordination. Accordingly, leadership in these contexts is oriented toward evaluation, planning, and the structured implementation of ideas. This aligns with the exploitative dimension of innovation processes, where the emphasis is placed on refinement, efficiency, and execution (Wilden et al., 2018; Tidd & Bessant, 2018). The exceptionally large effect sizes observed for this dimension indicate that analytical leadership is not only relevant but central to internally oriented roles. This finding also resonates with knowledge-based perspectives, where the transformation of dispersed inputs into structured and actionable knowledge represents a core organizational capability (Nonaka & Takeuchi, 1995).

In contrast, the results support H3, as no statistically significant differences were identified between groups in their evaluation of the dual outcome model. This indicates that the principle of simultaneously generating social and commercial value is consistently perceived across functional contexts. Such convergence suggests that outcome orientation operates at a different analytical level compared to leadership approaches. While leadership styles are functionally differentiated, outcome expectations appear to be collectively shared across the organization. This finding aligns with contemporary perspectives on sustainable innovation and shared value creation, which emphasize the integration of economic and societal objectives as a fundamental organizational principle (Porter & Kramer, 2011). The absence of variation across groups further indicates that this orientation is not contingent upon specific roles, but instead represents a common strategic direction.

These findings contribute to the theoretical understanding of innovation leadership by demonstrating that leadership is not a homogeneous capability, but a distributed and role-contingent mechanism embedded within organizational structures. The distinction between the Sun and Moon leadership methods offers a conceptually parsimonious yet analytically robust framework that repositions innovation from an activity-based to a leadership-structured process, thereby capturing its dual nature through the coordination of differentiated leadership roles. Unlike traditional approaches that conceptualize exploration and exploitation primarily as activity-based dimensions, the results indicate that these processes are enacted through distinct leadership configurations associated with specific functional domains. Rather than replacing existing dichotomies, the study extends them by relocating the exploration–exploitation logic from the level of activities to the level of leadership structures, thereby redefining the mechanism through which innovation processes are coordinated in organizations. In this sense, innovation is not only a matter of balancing activities, but also of aligning leadership roles with the functional requirements of the organization. This shifts the understanding of innovation from a capability-based perspective to a leadership-structured process, in which the differentiation and coordination of leadership roles become central mechanisms.

The findings can be interpreted as offering a complementary perspective aligned with the dynamic capabilities framework by suggesting that capabilities do not operate independently of organizational context. Leadership emerges as a micro-foundational mechanism through which capabilities are activated, coordinated, and directed. The effectiveness of innovation processes therefore depends not only on the presence of capabilities, but on their alignment with context-specific leadership modes, indicating that capabilities are not sufficient without appropriate leadership configurations. This introduces a more context-sensitive interpretation of capability deployment, in which functional differentiation plays a central role.

From a practical standpoint, the results highlight the importance of designing leadership structures that reflect the functional diversity of organizational roles within context-specific organizational settings. Rather than promoting a universal leadership model, the findings suggest that organizations operating in project-based and high-intensity environments may benefit from intentionally combining communicative and analytical leadership approaches across teams. This has implications for leadership development, team composition, and organizational design, particularly in environments where innovation requires both external engagement and internal structuring. The dual outcome model, as a stable and widely shared orientation, provides a unifying direction for these differentiated leadership approaches. While leadership modes vary across functions, the convergence in outcome expectations ensures coherence within the innovation process. This suggests that organizations can sustain diversity in leadership practices without compromising strategic alignment, as long as a common outcome logic is maintained. This indicates that innovation effectiveness depends less on adopting a single leadership approach and more on structuring the interaction between complementary leadership roles. These implications should be interpreted in relation to the specific organizational context examined in this study, rather than as universally generalizable across all organizational forms.

The novelty of this study lies not in introducing new types of innovation activities, but in demonstrating that existing innovation logics are enacted through structurally differentiated leadership roles. By shifting the analytical focus from activities to leadership configurations, the study provides a new perspective on how innovation processes are organized in practice. This perspective suggests that innovation effectiveness may depend on the coordination of role-specific leadership modes rather than on the dominance of a single leadership approach. These findings should be interpreted within the specific organizational context examined in this study, reflecting patterns of leadership differentiation in structured, project-based environments rather than universally across all organizational settings.

6. Conclusion

This study develops and empirically supports a dual-structured model of innovation leadership based on the Sun and Moon leadership methods, offering a functionally grounded framework for understanding how distinct leadership approaches operate within innovation processes. In doing so the study suggests that innovation is not solely the outcome of balancing activities, but can be understood as shaped by how leadership roles are structurally configured and coordinated within the organization. The findings indicate that leadership is not a uniform organizational capability, but a role-contingent mechanism aligned with the functional demands of specific activities. Externally oriented roles are consistently associated with communicative, initiative-driven leadership, whereas internally oriented roles rely more strongly on analytical, structured, and strategically grounded approaches. At the same time, the results reveal that the principle of balancing social and commercial outcomes represents a stable and widely shared orientation across organizational contexts. This indicates that while leadership modes are functionally differentiated, innovation outcomes are perceived as coordinated through a common integrative logic. In this sense, the study advances existing perspectives on innovation management by demonstrating that the exploration–exploitation distinction is not only activity-based, but also leadership-embedded and structurally distributed across organizational roles.

The main theoretical contribution lies in conceptualizing innovation leadership as a dual and functionally differentiated system, rather than a unified or universal capability. By introducing the Sun–Moon framework, the study provides a parsimonious yet analytically robust model that links leadership modes to functional contexts while maintaining coherence through a shared outcome orientation. This contributes to the dynamic capabilities perspective by showing that capabilities do not operate independently of leadership configurations, but require alignment with context-specific leadership mechanisms to be effectively activated. From a practical perspective, the findings highlight the importance of aligning leadership approaches with functional responsibilities within organizations. Rather than promoting a single dominant leadership style, organizations may benefit from intentionally combining complementary leadership modes across teams. This has implications for leadership

development, organizational design, and innovation management, particularly in environments that require both external engagement and internal structuring.

Several limitations should be acknowledged. Although the study includes respondents from multiple organizational contexts, including international settings, the findings are still based on a specific institutional configuration, which may influence their generalizability. The use of self-reported data introduces the possibility of perceptual bias, and the cross-sectional design limits the ability to capture dynamic changes in leadership practices over time. Future research could extend the model across different industries and cultural contexts, as well as examine longitudinal dynamics in the interaction between leadership modes and innovation outcomes. Additional studies may also explore more complex structural relationships using advanced analytical techniques, such as structural equation modeling or multi-level analysis. Overall, the findings indicate that sustainable innovation is structured through the structural coordination of differentiated leadership roles rather than from the dominance of any single leadership approach, positioning leadership configuration as a central mechanism of innovation processes. While the cross-sectional and perception-based design does not allow for causal inference, the findings reveal consistent structural patterns in how leadership configurations are associated with innovation processes.

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Appendix A. Measurement Items

Sun Leadership Method

- Our organization encourages active idea generation and initiative-taking
- Leadership actively builds external networks and partnerships
- Communication with external stakeholders is a key leadership function

Moon Leadership Method

- Leadership emphasizes structured evaluation of ideas
- Strategic planning is central to leadership processes
- Implementation is guided by systematic and analytical decision-making

Dual Output Innovation

- Innovations are expected to generate both economic and social value
- Organizational success is evaluated beyond financial outcomes
- Social impact is considered in innovation processes