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Investigating the Serially Mediating Mechanisms of Organizational Ambidexterity and the Circular Economy in the Relationship between Ambidextrous Leadership and Sustainability Performance

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Abstract: In this study, based on a resource-based view, we investigate the influence of ambidextrous leadership (reflected in transformational and transactional leadership styles) on sustainability performance (reflected in economic, environmental, and social performance) through the serially mediating mechanisms of organizational ambidexterity (reflected in explorer and exploiter attributes) and the circular economy (reflected in fields of action). By applying structural equation modelling analyses to survey data collected from private and public Greek organizations, which operate in manufacturing, services, and trade sectors, under an externally dynamic environmental context, we found that (a) organizational ambidexterity and the circular economy fields of action positively mediate the relationship between ambidextrous leadership and sustainability performance and (b) the mechanism originating from transformational leadership has a higher impact on sustainability performance compared to the mechanism that originates from transactional leadership. Accordingly, this study addresses the aspect of the special issue that refers to modern approaches to management and leadership for sustainable business performance research and makes several theoretical and practical implications.

Keywords: ambidextrous leadership; organizational ambidexterity; the circular economy; sustainability performance; environmental dynamism

1. Introduction

Over the last decade, there has been an intensive investigation in theory and research on the adoption of circular economy practices by organizations in relation to their sustainability performance [1]. Although there are many definitions of the *circular economy* (CE) that have been proposed [2,3], the most prominent definition, according to Geissdoerfer et al. [4], has been provided by the Ellen MacArthur Foundation [5] (p. 7) and reads as follows: "Circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models" [6] (p. 226). It is argued [7–11] that the circular economy, by involving the so-called 10 Rs for *smarter product use and manufacturing* (by Refusing, Rethinking, and Reducing), *extending the lifespan of products and their parts* (by Reusing, Repairing, Refurbishing, Remanufacturing, and Repurposing), and the *useful application of materials* (by Recycling and Recovering), will eventually alter the linear business model of taking, consuming, and disposing.

Although there is no clear and agreed definition of organizational sustainability performance in the literature, in this study, we state that an organization's *sustainability performance*

is reflected in the economic, environmental, and social aspects of performance [1,12,13]. Additionally, we argue that the circular economy constitutes a driving force for improving organizational sustainability performance [1,14,15].

However, the circular economy, which in turn influences sustainability performance, may depend on internal and external organization factors. We argue that ambidextrous leadership and organizational ambidexterity are the two dominant internal factors that serially affect the circular economy. In particular, *organizational ambidexterity* refers to two processes at the same time: the ability of the organization to efficiently manage its current demands, called *exploitation*, and the ability of the organization to be adaptive to its future needs, called *exploration* [16]. *Ambidextrous leadership* usually refers to the balance of transactional and transformational leadership styles [17–19]. Specifically, the *transactional leadership* style refers to leaders who lead their followers in the direction of specific goals, clarifying the roles and requirements of the job, and measure their performance according to the organization's system of rewards and penalties [20]. The *transformational leadership* style refers to leaders who inspire their followers to overcome their own self-interest and motivate them to develop and innovate for the organization's future success [20].

With respect to the factors external to the organization, environmental dynamism and environmental competitiveness are two factors that may influence leadership styles. Environmental dynamism refers to the rate of change in environmental factors over time, whilst environmental competitiveness refers to the type of competition among the market players [21,22]. However, there are few studies that have investigated the influence of external environmental factors on leadership styles [23–25].

In summary, assuming that environmental features constitute the initiating factor of the phenomenon under study, the previous presentation indicates that the *purpose* of this study is to investigate the serially mediating relationship between ambidextrous leadership, organizational ambidexterity, the circular economy, and sustainability performance at the organizational level [26]. Accordingly, the following research questions are attached to this purpose of the study.

Research Question 1 (RQ1). *How does ambidextrous leadership lead to higher sustainability performance?*

Research Question 2 (RQ2). *What is the serially mediating role of organizational ambidexterity and the circular economy actions in the relationship between ambidextrous leadership and sustainability performance?*

Research Question 3 (RQ3). *Is it possible to successfully extend the relationship between the circular economy and sustainability performance at the organizational level?*

Additionally, taking into consideration the need for examining this relationship in different contexts [1,24], the data were obtained by an employee survey in the Greek public and private sectors. Greece provides in effect an important context worthy to be studied in this research, as it has been heavily affected by the COVID-19 pandemic, including facing the 2008 economic and financial crisis.

Accordingly, our study extends the design of business models [27] and contributes to the circular economy literature [2] by distinguishing the differential effects of transformational and transactional leadership styles on explorer and exploiter processes, which in turn influence the circular economy fields of action, which ultimately have an impact on an organization's sustainability performance.

2. Theory and Hypotheses

2.1. Environmental Features and Leadership Styles

Environmental dynamism and competitiveness constitute two external factors that influence the leadership styles to be adopted by organizations. Some researchers state that transformational leadership is superior to transactional leadership in all environmental circumstances [20]. Other researchers state that the type of leadership style depends on the

different environmental features that prevail at the time of choice [28]. In particular, it is argued that transformational leadership has been associated more strongly with dynamic external environments compared to transactional leadership, which has been connected more strongly to stable external environments [29]. However, following the calls [17,28] for more research on how environmental features influence leadership styles, in this study, we try to contribute by investigating whether the environmental dynamism and competitiveness drive the balance between transformational and transactional leadership styles.

Specifically, Jansen et al. [22,29], argue that transformational leadership styles are associated with unstable environments and that transactional leadership styles are associated with stable environments. However, we argue that these associations between environmental factors and leadership styles are not mutually exclusive but, on the contrary, they may occur concurrently. This is because riskiness and stability may simultaneously exist in an external environment and feed each other [17]. Accordingly, we hypothesize the following:

Hypothesis 1 (H1). *Environmental features are positively related to transformational leadership.*

Hypothesis 2 (H2). *Environmental features are positively related to transactional leadership.*

2.2. Ambidextrous Leadership and Organizational Ambidexterity

It is usually argued that the transformational leadership style is needed for exploration. The term exploration refers to the philosophy of the organization to focus on flexibility and innovation by taking risks [24,30,31]. On the contrary, transactional leadership style is needed for exploitation. The term exploitation refers to the philosophy of the organization to focus on efficiency and effectiveness by sticking to production rules and procedures [24,30,31]. However, the long-term survival and success of the organization are achieved in cases where the organization exploits effectively and efficiently its current resources and at the same time explores future opportunities [32].

In other words, ambidextrous leaders may succeed in achieving organizational goals, both in the short-run and in the long-run, by appropriately balancing explorative and exploitative activities [16]. However, it is argued that in developing this balancing, or in developing organizational ambidexterity, the organization takes into consideration the frontiers of its ambidextrous leadership by imposing an emphasis on the parallel relationships between the transformational leadership style and exploration and the transactional leadership style and exploitation [33]. Accordingly, we hypothesize the following:

Hypothesis 3 (H3). *The transformational leadership style is positively related to explorer attributes.*

Hypothesis 4 (H4). *The transactional leadership style is positively related to exploiter attributes.*

2.3. Organizational Ambidexterity and the Circular Economy

The concept of the circular economy, which has emerged as a new business paradigm, comprises "four emerging components to achieve sustainability: (1) recirculation of resources and energy; (2) the minimization of demand for resources, and the recovery of value from waste (namely reuse, reduce, and recycle); (3) the need for a multi-level (micro, meso and macro) approach; and (4) its importance as a path to achieve sustainable development ([34])" [1] (p. 2).

Review studies [2] revealed that in investigating the circular economy aspects, many antecedents have been used, covering both internal and external contexts. However, we argue that in following this new business paradigm, an appropriate concrete business strategy should be applied. This business strategy could depend on organizational ambidexterity, under the guidance of ambidextrous leadership, since these concepts incorporate both internal and external information. In particular, organizational ambidexterity focuses on innovation (i.e., exploration) and efficiency (i.e., exploitation), which could be used for

successfully attaining the so-called the circular economy fields of action comprising design, procurement, production, distribution, usage/consumption, and recovery [35].

We argue that in cases where the organization is facing current problems, it will devote itself to the use of exploitation activities that are more compatible with the circular economy fields of action, such as production and recovery. On the contrary, in cases where the organization is facing future problems, it will devote itself to the use of exploration activities that are more compatible with the circular economy fields of action, such as design and distribution [36]. Accordingly, we hypothesize the following:

Hypothesis 5 (H5). *Explorer attributes are positively related to the circular economy fields of actions.*

Hypothesis 6 (H6). *Exploiter attributes are positively related to the circular economy fields of actions.*

2.4. Circular Economy and Sustainable Performance

A resource-based view (RBV) of a firm [37] is the usual theory for explaining the circular economy business paradigm. According to this theory, the sustained competitive advantage of a firm is based on its valuable, rare, inimitable, and non-substitutable resources. Attached to RBV is the so-called natural-resource-based-view (NRBV) of the firm [38] and the knowledge-based view (KBV), which considers knowledge to be the most important strategic resource of the firm [39]. These theories are considered to be the most influential theories in sustainability literature, describing the connection between strategic management and sustainability performance [40,41].

Based on these theories, previous studies [42,43] in various countries (e.g., China, European Union) on the relationship between the circular economy fields of action and sustainability performance found that there is a positive association between these two concepts. In particular, Prieto-Sandoval et al. [44] argue that the firms that provide to their customers greener products, by using circular economy processes, will eventually achieve higher sustainability performance due to a better reputation. Similarly, other scholars [45–49] argue that firms, by developing and practicing circular economy processes, will eventually improve all dimensions of their sustainability performance. Accordingly, we hypothesize the following:

Hypothesis 7 (H7). *Circular economy fields of actions are positively related to sustainability performance.*

2.5. The Conceptual Model

By summarizing the previous presentation, Figure 1 reflects the conceptual model of the study. In particular, this model refers to two components: The first is the serially mediating mechanisms between environmental features, ambidextrous leadership, organizational ambidexterity, the circular economy fields of action, and sustainability performance. The second is the operationalization of the concept of ambidexterity. Bearing in mind that there may be no clear-cut between transformational and transactional leadership style constructs and between explorer and exploiter attribute constructs, we allowed them to correlate [50]. Thus, we did not follow the interaction approach for expressing ambidexterity, but we followed the correlation approach for expressing combined ambidexterity (for more, see [21,36,51–53]). Additionally, in our conceptual model, we included both organizational and individual controls since these controls may influence most of the constructs in our model [54].
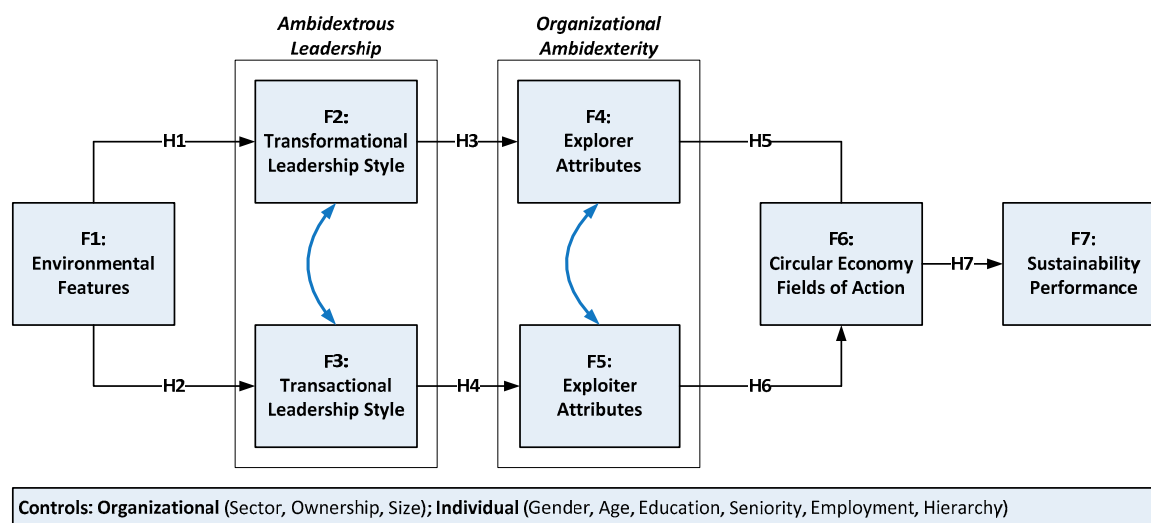
Figure 1. The conceptual model.

3. Data and Methods

3.1. Participants and Procedures

Data for this research were collected in November–December 2022 with the help of students from a business school. The 80 students that took part in the study followed a lecture about the meaning of the study and the specific questionnaire that they should administer, as well as a lecture about sampling with a focus on convenience sampling and how to implement it. Each student was advised to reach two public or private organizations among the manufacturing, services or trade sectors. Further, following [55] they were also advised to focus, if possible, on at least two senior managers (e.g., heads of departments), two middle managers (e.g., line managers), and four employees (e.g., not supervising other employees) from each research organization for increasing the reliability of the measures. Overall, although 160 organizations and 1280 individuals should have been approached, complete questionnaires were gathered from 875 employees working in 112 organizations. This means that the response rate with respect to organizations was 70.0 percent and with respect to employees, 68.4 percent. The demographics of the sample organizations and the respondents are presented in Table 1.

Table 1. Sample Demographics.

Characteristics of the Sample Organizations (N = 112)	Frequency	Percentage
Sector		
Manufacturing	22	16.6
Services	61	54.5
Trade	69	25.9
Ownership		
Public	13	11.6
Private	99	88.4
Size (in employees)		
−50	56	50.0
51–200	24	21.4
201–500	22	19.6
501+	10	8.9

Table 1. *Cont.*

Characteristics of the Sample Organizations (N = 112)	Frequency	Percentage
Characteristics of the sample respondents (N = 875)		
Gender		
Male	440	50.3
Female	435	49.7
Age		
−25	158	18.1
26–35	189	21.6
36–45	201	23.0
46–55	243	27.8
56+	84	9.6
Education		
Basic	13	1.5
High school/Lyceum	259	29.8
College/University	603	68.9
Type of Employment		
Full time	758	86.6
Part time	117	13.4
Seniority (experience in years of work)		
−10	431	49.3
11–20	288	32.9
21–30	117	13.4
31+	29	4.5
Hierarchical Position		
Senior manager	226	25.8
Middle manager/Line manager	227	25.9
Other employee	442	48.2

3.2. Measures

All items used in the survey were developed using a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. The complete questionnaire used in the survey is presented at the Appendix A.

3.2.1. External Environment

This construct comprised two sub-scales based on [22]—*environmental dynamism* and *competition dynamics*. Example items included "Environmental changes in our local market are intense" and "Our organizational unit has relatively strong competitors", respectively.

3.2.2. Transformational Leadership

This construct comprised five sub-scales based on [56]—*idealized influential behavior*, *attributed idealized behavior*, *inspirational motivation*, *intellectual stimulation*, and *individual consideration*. Example items included "Our managers consider the moral and ethical consequences of decisions", "Our managers are proud about their employees", "Our managers talk enthusiastically about the future", "Our managers reexamine critical assumptions to question whether they are appropriate", and "Our managers help employees to develop their abilities".

3.2.3. Transactional Leadership

This construct comprised two sub-scales also based on [56]—*contingent reward* and *active management by exception*. Example items included "Our managers make clear what they except to receive from employees" and "Our managers keep track of all employee mistakes", respectively.

3.2.4. Explorer Attributes

This construct comprised two sub-scales based on [57]—*knowledge practices* and *innovative practices.* Example items included "Our organization generates new ideas" and "Our organization focuses on completely new products or process", respectively.

3.2.5. Exploiter Attributes

This construct comprised four sub-scales also based on [57]—*competition*, *strategic orientation*, *efficiency*, and *partnership.* Example items included "Our organization faces the appearance of new competitors (new arrivals)", "Our organization has a strategic view focused on the present", "Our organization creates detailed routines", and "Our organization has local relationships with outside partners, respectively.

Table 2 presents the consistency, reliability and aggregation properties of all the first-order constructs included in the study.

Table 2. Properties of first-order constructs.

Construct	Sub-Construct (Dimensions)	Items	Consistency and Reliability Properties			Aggregation Properties	
			Loading	TVE%	Cronbach's Alpha (α)	ICC	r_{wg} (j)
F1: External Environment	F1.1: Dynamism	5	0.853	53.3	0.777	0.410	0.923
	F1.2: Competitiveness	4	0.853	70.5	0.858	0.601	0.864
F2: Transformational Leadership	F2.1: Idealized influential behavior	4	0.841	68.1	0.843	0.573	0.883
	F2.2: Attributed idealized behavior	4	0.896	76.4	0.897	0.684	0.851
	F2.3: Inspirational motivation	4	0.858	73.7	0.881	0.649	0.863
	F2.4: Intellectual stimulation	4	0.881	75.1	0.889	0.667	0.854
	F2.5: Individual consideration	4	0.896	79.7	0.914	0.728	0.822
F3: Transactional Leadership	F3.1: Contingent reward	4	0.831	78.2	0.743	0.279	0.909
	F3.2: Active management by exception	4	0.831	63.5	0.679	0.509	0.816
F4: Explorer Attributes	F4.1: Knowledge practices	10	0.901	59.9	0.886	0.438	0.967
	F4.2: Innovative practices	10	0.901	65.9	0.942	0.619	0.940
F5: Exploiter Attributes	F5.1: Competition	8	0.782	56.4	0.886	0.494	0.947
	F5.2: Strategic orientation	2	0.622	76.2	0.688	0.527	0.729
	F5.3: Efficiency	7	0.846	48.8	0.818	0.391	0.959
	F5.4: Partnership	8	0.688	55.1	0.881	0.480	0.941
F6: Circular Economy Fields of Action	F6.1: Design	4	0.818	60.1	0.776	0.464	0.851
	F6.2: Procurement	3	0.783	68.3	0.765	0.521	0.805
	F6.3: Production	4	0.806	51.2	0.745	0.422	0.873
	F6.4: Distribution	2	0.543	75.7	0.679	0.514	0.544
	F6.5: Usage/Consumption	3	0.749	60.5	0.666	0.358	0.736
	F6.6: Recover	2	0.693	78.3	0.723	0.566	0.361
F7: Sustainable Performance	F7.1: Economic performance	3	0.862	73.9	0.819	0.601	0.855
	F7.2: Environmental performance	3	0.833	81.1	0.879	0.708	0.737
	F7.3: Social performance	3	0.845	83.9	0.904	0.758	0.795

Table 3 presents the descriptive statistics, the normality tests, and the properties of all constructs used in the estimation. In particular, the Cronbach's alpha values for each construct were greater than 0.70 [58], except those of the "external environment" (0.662) and "transactional leadership" (0.640). However, in utilizing their information, we kept these constructs in the estimation because their Cronbach's alpha values were not very different from 0.70. The Total Variance Extracted (TVE) of all constructs were not lower than 0.50, supporting acceptable survey instrument construct validity. The values of the Composite Reliability (CR) were higher than 0.80, indicating acceptable construct composite reliability [59].

Table 3. Descriptive statistics, normality tests, and properties of all constructs used in the estimation.

Construct	Means (Standard Deviations)	Skewness (Kurtosis)	p of KS	TVE%	CR	Cronbach's Alpha (α)
F1: External Environment	3.829 (0.703)	−0.666 (0.592)	0.022	72.8	0.842	0.662
F2: Transformational Leadership	3.818 (0.785)	−0.687 (0.430)	0.001	76.5	0.942	0.923
F3: Transactional Leadership	3.235 (0.722)	0.167 (−0.148)	0.005	69.1	0.818	0.640
F4: Explorer Attributes	3.572 (0.719)	−0.300 (−0.036)	0.155	81.1	0.896	0.756
F5: Exploiter Attributes	3.550 (0.587)	−0.365 (1.398)	0.188	54.8	0.826	0.703
F6: Circular Economy Fields of Action	3.269 (0.736)	−0.176 (−0.030)	0.546	54.5	0.876	0.817
F7: Sustainable Performance	3.863 (0.782)	−0.586 (0.360)	0.000	71.7	0.884	0.797

Considering that the skewness statistics of all constructs were between −1 and +1 and their kurtosis statistics were between −3 and +3, we accepted that non-normality was not a problem [59,60]. However, to be on the safe side, we also applied the very sensitive Kolmogorov–Smirnov (KS) test for normality, which indicated that the constructs of explorer attributes, exploiter attributes, and the circular economy fields of action followed a normal distribution.

3.3. Common Method Bias

For reducing possible common method bias in the survey, we followed [61] by recruiting multiple respondents from different actors in the organization such as senior managers, middle managers, and other employees. Additionally, we applied Harman's single-factor test [62] to examine the likelihood of a common method bias threat. This test revealed four factors instead of one, with the first factor covering 39.284 percent of the total variance explained. Accordingly, we accepted that that the common method bias in the data was rather limited.

Further, using the information presented in Table 4, we examined the discriminant validity of the constructs used in the estimation. Considering that the correlation coefficients between pairs of constructs were significantly much lower than one and they were also smaller than the square root of each construct's Average Variance Explained (AVE), the constructs used in the estimation were considered separate [63].

Table 4. Correlation coefficients of all constructs used in the estimation.

Constructs	F1	F2	F3	F4	F5	F6	F7
F1: External Environment	[0.853] [a]						
F2: Transformational Leadership	0.348 [b]	[0.875]					
F3: Transactional Leadership	0.271	0.326	[0.835]				
F4: Explorer Attributes	0.436	0.698	0.409	[0.949]			
F5: Exploiter Attributes	0.467	0.458	0.437	0.631	[0.740]		
F6: Circular Economy Fields of Action	0.314	0.373	0.286	0.553	0.502	[0.738]	
F7: Sustainable Performance	0.363	0.617	0.281	0.653	0.487	0.623	[0.847]

[a] Square root of the average variance explained. [b] All correlation coefficients were significant at the 0.01 level (2-tailed).

4. Results

For estimating the model presented in Figure 1, we applied Structural Equation Modelling (SEM) [59,64] at a significance level equal to 0.05. This is because all constructs of the conceptual model are measured with multiple dimensions and they are formed under serially mediated mechanisms [65]. Taking into consideration that some of the constructs did not follow the normality assumption, we used the MLR estimation technique, via Mplus, because this technique makes all necessary adjustments to the calculated fit indices [66].

4.1. The Measurement Model

The conceptual model of the study presented in Figure 1 consisted of seven constructs. By applying Confirmatory Factor Analysis (CFA) to this hypothesized model, the following fit indices were derived: Chi-square = 1499.918, df = 231, p = 0.000, Normed Chi-square = 6.49, RMSEA = 0.079, CFI = 0.870, TLI = 0.845, SRMR = 0.062. These indices supported an acceptable fit according to [67], who recommends that a model be sufficient in one fit index but insufficient in many others. We note here that the critical values of these indices, which assessed the acceptability of complex models, were as follows: Normed Chi-square < 5.0, RMSEA < 0.080, CFI > 0.80, TLI > 0.80, SRMR < 0.080. By applying CFA using the same constructs but formed as a Harman's single factor model, the derived fit indices were the following: Chi-square = 3488.681, df = 252, p = 0.000, Normed Chi-square = 13.84, RMSEA = 0.121, CFI = 0.669, TLI = 0.637, SRMR = 0.096. The values of these indices are very poor compared to the hypothesized model. This comparison indicates that respondent bias is limited, and the constructs of the hypothesized model are separate [68].

4.2. The Structural Model

In applying SEM to the conceptual model presented in Figure 1, the following fit indices were derived: Chi-square = 1898.647, df = 311, p = 0.000, Normed Chi-square = 6.105, RMSEA = 0.076, CFI = 0.844, TLI = 0.826, SRMR = 0.072. The values of these indices were acceptable, except that of the Normed Chi-square, possibly due to the complexity of the model [69]. However, considering that this is a serially and fully mediating model, we made attempts to estimate various serially but partially mediating models. In these attempts, the extra direct links were not significant. Therefore, we concluded that the fully mediated model was preferable and as such, Figure 2 presents the estimated significant results in standardized units.
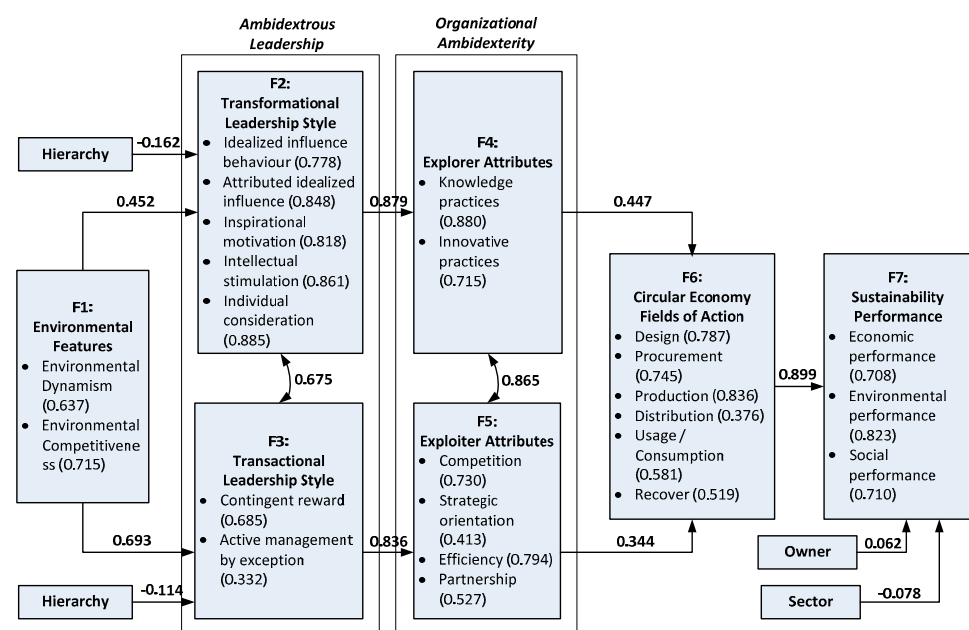

Figure 2. Estimation results of the conceptual model.

4.3. Testing the Hypotheses

From the results in Figure 2, we can see that environmental feature, with *environmental competitiveness* being the dominant factor ($\beta = 0.715$), positively predicted both the transformational leadership style (F1→F2: $\beta = 0.452$) and transactional leadership style (F1→F3: $\beta = 0.693$), supporting hypotheses H1 and H2, respectively. Additionally, the transformational leadership style, with *individual consideration* being the dominant factor ($\beta = 0.885$), positively predicted explorer attributes (F2→F4: $\beta = 0.879$), and the transactional leadership style, with *contingent reward* being the dominant factor ($\beta = 0.685$), positively predicted the exploiter attributes (F3→F5: $\beta = 0.836$), supporting hypotheses H3 and H4, respectively. Further, both explorer attributes, with *knowledge practices* being the dominant factor ($\beta = 0.880$), and exploiter attributes, with *efficiency* being the dominant factor ($\beta = 0.794$), positively predicted the circular economy fields of action, with *production* being the dominant factor ($\beta = 0.836$), supporting hypotheses H5 (F4→F6: $\beta = 0.447$) and H6 (F5→F6: $\beta = 0.344$), respectively. Finally, the circular economy fields of action positively predicted sustainability performance, with *environmental performance* being the dominating factor ($\beta = 0.823$), supporting hypothesis H7 (F6→F7: $\beta = 0.899$).

By investigating the two serially mediating mechanisms from F2 to F7 and from F3 to F7, we found that the transformation leadership style had a higher impact on sustainability performance (0.353, with lower bound = 0.265 and upper bound 0.442) compared to the impact of the transactional leadership style on sustainability performance (0.259, with lower bound = 0.175 and upper bound 0.342).

In terms of the controls, higher level employees followed more transformational leadership styles ($\beta = -0.162$) than transactional leadership styles ($\beta = -0.114$), sustainability performance was higher in private than in public organizations ($\beta = 0.062$), and sustainability performance was lower in organizations operating in the trade sector ($\beta = -0.078$).

4.4. Comparing Results with Those from Other Studies

Dey et al. [1] developed and estimated a structural model referring to the relationship between the circular economy and sustainability performance for Greece, Spain, France, and the UK (p. 7). Considering the Mediterranean countries of Greece and Spain, their estimated standardized results are presented in Table 5. In the same table we also present the corresponding results of the current study of Greece, produced by multiplying the structural coefficient (0.899) of the link between the circular economy construct and the sustainability performance construct with the coefficients of the three dimensions of the sustainability performance, 0.708, 0.823, and 0.710, as shown in Figure 2. By comparing these results, we see that in the study of Dey et al. [1], for both Greece and Spain, the standardized coefficients in descending order followed the series of environmental performance, economic performance, and social performance. The same exact series followed the results of the current study, verifying their robustness.

Table 5. Comparison of the estimation results between different countries.

| Constructs | Link | Sustainability Performance Sub-Constructs | Dey et al. [1] | | Current Study |
			Greece	Spain	Greece
Circular economy	→	Economic performance	0.450	0.446	0.636
Circular economy	→	Environmental performance	0.805	0.622	0.740
Circular economy	→	Social performance	0.334	0.255	0.466

Table 6 presents the results referring to the organizational ambidexterity of Greece between the study of Katou et al. [24] and the current study. Comparing these results, we see that for both studies, the standardized coefficients in descending order for explorer attributes was the same (i.e., Knowledge practices, Innovative practices), and for exploiter attributes, was also the same (i.e., Efficiency, Competition, Partnership, Strategic orientation). We argue that this finding verifies the robustness of the results in both studies.

Table 6. Comparison of the estimation results between different studies in Greece.

Constructs (Dimensions)	Katou et al. [24]	Current Study
Explorer attributes		
• Knowledge practices	0.773	0.880
• Innovative practices	0.656	0.715
Exploiter attributes		
• Competition	0.670	0.730
• Strategic orientation	0.502	0.413
• Efficiency	0.682	0.794
• Partnership	0.589	0.527

5. Discussion

The scope of this study was to investigate the impact of ambidextrous leadership on sustainability performance through the serially mediating mechanisms of organizational ambidexterity and the circular economy fields of action. The results suggest that the impact of the transformational leadership style on sustainability performance was higher compared to the impact of the transactional leadership style. In general, it is stated that combining individual consideration with contingent rewards (i.e., ambidextrous leadership) and knowledge practices with efficiency (i.e., organizational ambidexterity) will improve environmental performance through the circular economy fields of action. Further, the level of employees, the ownership of organizations, and the sector where organizations are activated have an impact on sustainability performance. Accordingly, we state that all research questions of the study have been adequately investigated at the organizational level [26].

5.1. Theoretical Implications

Over the last few decades, the relationship between the circular economy and sustainability performance has become an important topic in management literature. However, there are few theoretical and empirical studies that investigate the antecedent's structure of the circular economy–sustainability performance relationship [2,70]. Accordingly, in our study, the proposed conceptual framework that is now empirically supported has a number of theoretical and research contributions.

First, considering that the drivers of the circular economy business models are still unclear [71], it advances both theoretically and empirically that organizational ambidexterity constitutes an antecedent structure of the circular economy–sustainability performance relationship. Accordingly, it is indicated that mainly balancing knowledge practices with efficiency facilitates the circular economy production processes, which in turn improve sustainability performance.

Second, based on ambidextrous leadership styles [33], it advances both theoretically and empirically that ambidextrous leadership constitutes an antecedent structure of organizational ambidexterity. Accordingly, it is indicated that mainly balancing individual employee consideration with contingent rewards develops organizational ambidexterity that in turn facilitates the circular economy, which ultimately improves sustainability performance.

Third, based on environmental features [29,72], it advances both theoretically and empirically that external dynamic environments constitute the initiating factors that are responsible for developing ambidextrous leadership styles in the organization. Indeed, we argue that this ambidextrous leadership strategy it is applied under the resource-based view (RBV) of the firm [37].

Finally, the robustness of the findings that were verified by comparing results of studies dealing individually with ambidexterity and the circular economy brings new paths in developing theoretical and empirical frameworks in the sustainability literature.

5.2. Practical Implications

In terms of being able to apply the circular economy fields of action, leaders should be able to manage the following:

Become ambidextrous leaders: This could be achieved by learning how to inspire and motivate people and at the same time how to educate people in the direction of specific goals. To successfully apply these two processes, leaders must start by self-evaluating their knowledge and then examine whether this knowledge can be facilitated within their behavioral leadership style [53].

Balance exploration and exploitation: Organizations must develop ambidextrous leaders since our study verified that transformational leaders have a high and positive influence on exploration, and similarly, transactional leaders have also a high and positive influence on exploitation. This process should be applied especially to public organizations [73], as our study found that sustainability performance of public organizations is lower compared to the sustainability performance of private organizations. Additionally, exploitation leaders could transfer duties to their deputies in order to have more time to put emphasis on exploration [33].

Promoting exploration and exploitation: Exploitation could be promoted through training and performance management for improving effectiveness and efficiency. Exploration could be promoted through knowledge and innovation management for capturing the best future processes through experimentation [33].

Applying the circular economy processes: This could be achieved by synchronizing organizational ambidexterity processes with the circular economy fields of action in order to assess their impact on sustainability performance [1]. Further, an ambidextrous organizational culture that involves organizational diversity and shared vision should be developed [74].

5.3. Limitations and Future Research

First, the data were collected in November–December 2022 using a static questionnaire. As a result, the data do not allow for dynamic causal inferences. For that reason, future research using longitudinal responses may further add to the understanding of the phenomenon under study.

Second, single respondent bias is probable because both dependent and independent variables were self-reported. However, despite that the ex-post test was used to assess the level of common bias, future research using responses from different sources may relax the possible level of biased results.

Third, given the cross-sectional character of our study, the explanation of results with respect to the hypotheses indicates associations rather than influences or impacts.

Fourth, although the respondent sample size (n = 875) was large, and the organizational sample size (N = 112) was rather small for estimating such a complex model, and future research should try to collect data from more organizations.

Fifth, the phenomenon under study refers to Greece, which is a member of the European Union. Future research should include more countries for improving the acceptability of the results. However, in spite of these limitations, we believe that we still make the above-claimed useful contributions.

Appendix A

QUESTIONNAIRE ITEMS

Environmental Features (based on [22])

Environmental Dynamism

Environmental changes in our local market are intense

Our clients regularly ask for new products and services

In our local market, changes are taking place continuously

In a year, many things changed in our market

In our market, the volumes of products and services to be delivered change fast and often

Environmental Competitiveness

Competition in our local market is intense

Our organizational unit has relatively strong competitors

Competition in our local market is extremely high

Price competition is a hallmark of our local market

Leadership Styles (based on [56])

Transformational Leadership Style

Idealized influence behaviour

Our managers consider the moral and ethical consequences of decisions

Our managers make clear the importance of having a strong sense of duty

Our managers emphasize how important it is to respect colleagues and work together as a team

Our managers enlighten employees about the importance of having moral values

Attributed idealized influence

Our managers are proud about their employees

Our managers go beyond self-interest for the good of their employees

Our managers act in a way that earns employee respect

Our managers demonstrate a great sense of confidence

Inspirational motivation

Our managers talk enthusiastically about the future

Our managers speak passionately about the goals to be achieved

Our managers present a vision of the future that motivates employees

Our managers transfer confidence to employees that the organizational goals and objectives will be achieved

Intellectual stimulation

Our managers re-examine critical assumptions to question whether they are appropriate

Our managers suggest new ways to employees for completing their tasks

Our managers look problems from different perspectives

Our managers present different angles for solving a problem

Individualized consideration

Our managers help employees to develop their abilities

Our managers encourage employees to improve their work-related skills

Our managers dedicate their time to individual attention to employees

Our managers coach employees for helping them to improve their on-the-job performance

Transactional Leadership Style

Contingent reward

Our managers make clear what they except to receive from employees

Our managers support employees when they do their tasks and activities well

Our managers continually remind employees that our reward will depend on us meeting the objectives

Our managers Highlight only the employees who perform the tasks correctly

Active management by exception

Our managers keep track of all employee mistakes
Our managers remind employees of all their failures
Our managers focus their attention on employee non-compliance with the rules
Our managers focus on employee failures in performing tasks

Organizational Ambidexterity (based on [57])

Explorer Attributes

Knowledge practices

Our organization generates new ideas
Our organization uses new sources of knowledge drawn from partners
Our organization uses existing knowledge in databases
Our organization uses of knowledge already in place in the company
Our organization shares in-house knowledge
Our organization follows individual learning processes
Our organization follows collective learning processes
Our organization builds up team capacities
Our organization develops personnel intensively
Our organization appreciates individual knowledge

Innovative Practices

Our organization focuses on completely new products or process
Our organization engages in prototype development
Our organization increases product innovation rate
Our organization applies marketing innovation techniques
Our organization opens new distribution channels
Our organization focuses on radical product innovations
Our organization focuses on radical technology innovation
Our organization enforces ceaseless quest for new markets
Our organization develops new products and services
Our organization follows aggressive participation in technology-based alliances

Exploiter attributes

Competition

Our organization faces the appearance of new competitors (new arrivals)
Our organization faces the existence of substitute products or processes
Our organization faces competition on the local (Greek) market
Our organization faces price-base competition on the local (Greek) market
Our organization faces a fierce competition in company industry
Our organization faces the existence of promotion war in company industry
Our organization competition covers company offers easily
Our organization price-based competition is the high point of the company industry

Strategic Orientation

Our organization has a strategic view focused on the present
Our organization follows policies focused on the short term

Efficiency

Our organization creates detailed routines
Our organization considers the importance of efficiency
Our organization focuses on performing activities
Our organization has concerns with gains of scale
Our organization applies organizational control mechanisms
Our organization focuses on costs
Our organization has a tendency to focus towards production

Partnership

Our organization has local relationships with outside partners
Our organization depends on outside partners
Our organization uses contracts in relationships with outside partners
Our organization is transparent in joint efforts with partners

Our organization keeps duration of outside partnerships
Our organization shares knowledge with partners
Our organization shows concern with establishing outside partnerships
Our organization establishes a high number of outside partners for the company
Cyclical Economy Fields of Action (based on [1])
Design
Our organization designs aiming at extending product life
Our organization selects materials carefully
Our organization designs products for reuse, recycle and remanufacture
Our organization designs products following ecological standards
Procurement
Our organization applies environmental and social criteria in the selection of suppliers
Our organization prefers local sourcing to mitigate risks
Our organization supports supply chain collaboration
Production
Our organization follows lean practices
Our organization focus on energy efficiency
Our organization use of renewable energy
Our organization supports wellbeing and equality
Distribution
Our organization prefers outbound storage
Our organization prefers outbound transportation
Usage/Consumption
Our organization provides sourcing information
Our organization provides repair information
Our organization buys back used products from customers
Recover
Our organization remanufactures and refurbishes
Our organization reuses and recycles
Sustainable Performance (based on [1])
Economic performance
Our organization increases revenue
Our organization improves business growth
Our organization contributes to local economy
Environmental performance
Our organization increases energy efficiency
Our organization improves resource efficiency
Our organization contributes to waste reduction
Social performance
Our organization increases employee wellbeing
Our organization improves health and safety
Our organization contributes to social wellbeing

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