

RESEARCH ARTICLE

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Impact of Leadership Styles and Organisational Citizenship Behaviours on Organisational Green Innovation Performance: The Moderating Role of Organisational Legitimacy

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ABSTRACT

Firms' green innovation performance is influenced by several factors, including external legitimacy pressures and internal leader–member exchange relationships. Existing studies make little distinction between types of sustainable innovation and neglect leader, employee and organisational factors in the same strategic management framework. Based on institutional and social exchange theories, data from 537 Chinese enterprises are analysed through a hierarchical regression to explore how different leadership styles, organisational citizenship behaviours and legitimacy outside organisations affect green innovation performance. Research findings suggest that both transactional and transformational leadership contribute to organisational citizenship behaviours and green innovation performance. Organisational citizenship behaviours partially mediate between leadership styles and green innovation. Organisational legitimacy only positively moderates between leadership styles and organisational citizenship for green product innovation. This implies that organisations should pay attention to fostering high-quality leader–member exchange relationships, formulating sustainable innovation management strategies and seeking a balance between obtaining organisational legitimacy and promoting organisational citizenship.

1 | Introduction

A predominant issue confronted by Chinese enterprises in achieving sustainable development is how to improve environmental benefits while promoting economic growth, and green innovation is a key strategy for reaching corporate sustainable

development goals (X. M. Xie and Zhu 2021). Green innovation is able to satisfy the dual needs of economic development and environmental safeguard. Organisational green innovation performance is manifested in minimising negative environmental impacts, with key metrics including green process and product innovation. Enhancing organisational citizenship and different

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leadership styles affects organisational green innovation performance. This pressing issue is aligned with the evolution of innovation theory and the practical demands of sustainable development and innovation management strategies in firms (Y. Ren et al. 2014). Organisational green innovation performance promotes organisations' industrial restructuring and pollution management strategies (K. J. Li, Dong, and Han 2020) and can be measured through green process and product innovation (El-Kassar and Singh 2019), as sources of competitive advantage (Y. S. Chen, Lai, and Wen 2006), environmental, social and governance (ESG) performance and organisational transformation (Y. S. Chen, Lai, and Wen 2006; Margherita, Espindola, and de Sa Freire 2024).

Based on environmental economics and the ecosystem theory of green innovation (L. Wang, Chen, and Niu 2021), environmental regulation and social responsibility affect organisations' green innovation performance (Du and Zhang 2012; Audretsch and Tamvada 2023; Siegel and Guerrero 2021; Guerrero, Urbano, and Fayolle 2016; Siegel 2014; Carayannis 2011; Waldman, Siegel, and Javidan 2006; Waldman and Siegel 2005). Legitimacy is an attribute of an organisation to achieve a certain determinate state in its environment, which is both immediate and processual (Liang and Wang 2023). Therefore, under the new institutionalism theory, for organisations to survive in a certain institutional environment, they need to seek and achieve legitimacy in continuous interaction with the environment (Bozeman 2022; Heikka and Carayannis 2018; Guerrero and Urbano 2017; Alcalde and Guerrero 2016; Guerrero, Urbano, and Fayolle 2016).

Regarding the antecedent factors affecting an organisations' green innovation performance, from the internal strategic management perspective, scholars have investigated whether organisational leadership styles—including transformational and transactional leadership styles—are conducive to the implementation of green innovation (Pan and Tian 2017). Some scholars have explored the mechanisms linking organisation membership and environmental performance to organisational green development (X. M. Xie and Zhu 2021; Siegel 2009; Siegel and Vitaliano 2007; McWilliams and Siegel 2000, 2001). Thus, it can be seen that current research focuses on individually discussing the antecedents of organisational green innovation performance. Few studies integrate internal and external factors to explore the antecedents of green innovation (Pacheco, Alves, and Liboni 2018; M. Tang et al. 2018; Pandithasekara 2022). Therefore, grounded in social exchange theory, this paper examines both internal and external factors of the organisation. It explores the interactive effect of leadership style and citizenship - among internal members of an organisation - on green innovation performance, as well as the moderating role of external legitimacy of the organisation.

The interaction between the organisational and individual levels is an important variable influencing the innovative performance of organisations and their overall sustainability (Y. F. Wang and Zhu 2012; Scuotto et al. 2021; Tian, Su, and Yang 2022; R. Guo, Ning, and Chen 2022; Caputo et al. 2023).

Leadership style refers to the behavioural style adopted to achieve organisational goals and to make internal members and

the organisation work in harmony (H. Liu and Li 2010). Some scholars found that hierarchical relationships and values affect the role of leadership style (Yang and Wang 2020). Leadership style influences the performance and innovation of the whole organisation (Scuotto, Del Giudice, and Carayannis 2017). An appropriate leadership style helps achieve effective management of organisational employees (C. Liu et al. 2014), helps organisation members to actively contribute (Qiu and Long 2014; M. M. Jia, Zhang, and Wang 2020) and affects organisational citizenship behaviours (H. Y. Xie et al. 2022). Different leadership styles will also have different effects on the ability of organisation members to innovate and affect organisational green innovation performance (Zhang et al. 2011).

Organisational citizenship behaviour is a voluntary personal behaviour, and feedback provided by organisational members to leaders and the organisation can improve organisational effectiveness (Organ 1997; see also Lou, Li, and Liu 2021). When a particular leadership style increases the self-efficacy of employees, they engage in feedback behaviours beneficial to both leader and organisation, promoting organisational citizenship behaviour (Lou, Li and Liu 2021) and innovation performance (Y. Tang 2005). Employees can change the one-way nature of supervision in the organisation, and through their feedback and initiative, make every member of the enterprise both a manager and a managed one (Jin, Li, and Tang 2004).

Drawing on social exchange theory and institutional theory, extant research on organisational green innovation performance tends to focus on the passive convergence process of organisations under isomorphic pressure from market-driven and social capital perspectives (L. M. Chen, Liu, and Zhang 2016). Most studies are on the direct effect of single factors and lack any consideration of the internal and external environment. It also lacks simultaneous consideration of maintaining organisational legitimacy and the passivity of institutional pressure. External legitimacy pressure affects the internal social exchange of organisations (Ren 2017). Bringing external legitimacy and organisational social exchange into the same framework has profound significance for holistic analysis. Based on social exchange theory and institutional theory, this paper selects Chinese enterprises as samples to investigate the role of leadership style and organisational citizenship behaviour on organisational green innovation. It also examines the moderating effect of organisational legitimacy, as external market competition and environmental uncertainty can affect leadership style and organisational behaviour (M. Y. Wang, Li, and Wang 2022; H. Guo et al. 2018).

The contribution of this paper is threefold. Firstly, based on its dual internal and external perspectives, it analyses the interaction mechanism between leadership styles, organisational citizenship behaviours and organisational legitimacy on green innovation performance, filling the gap in existing research that often adopts a single perspective and providing references for the selection of leadership styles under different conditions of legitimacy. Secondly, it incorporates the moderating effect of organisational legitimacy which further expands the literature on the boundary conditions of influencing green innovation performance through organisational citizenship behaviour. Finally, it contributes to the understanding of the

intermediary mechanism of leadership style and organisational citizenship behaviour. The results provide theoretical and managerial support for organisations' strategic planning, human resource management and legitimacy building by linking management strategy, innovation efforts and sustainability issues.

2 | Theoretical Background

2.1 | Social Exchange Theory

Social exchange theory is an authoritative paradigm for the study of human behaviour in the workplace from a microerspective. It involves several disciplinary perspectives including anthropology, economics and sociology (X. P. Liu 2011). The concept of social exchange was first introduced by Homans (1958), who emphasised that the objects of social exchange should also include symbolic values such as honour and gratitude. Blau (1964) further classified the types of exchange into economic and social. Social exchange theory then became a tool to study organisational behaviour, leaders and employees (M. Z. Xu and Zhang 2016; S. Liu and Wang 2001) and to explain the antecedents of employees' green behaviours (Cropanzano and Mitchell 2005). Some scholars have explored that organisational support can enhance employee job satisfaction, which in turn benefits the formation of their green behaviour (Hou, Peng, and Yang 2019). Organisation members generate exchanges with their leaders and organisations through the leader–member exchange (LMX) relationship (Ling et al. 2019). This social exchange is based on rules or norms established by the subject, primarily the expected reciprocity (W. Z. Chen and Ren 2015). The quality of interaction is influenced by the degree of expectation fulfilment (H. Xu et al. 2008). Where leaders adopt leadership styles that satisfy employees' expectations, employees engage in organisational behaviours that conform to leaders' expectations (Y. F. Wang et al. 2021). Similarly, leaders project higher expectations of green innovation performance, motivating employees to assume green innovation responsibility (Dulebohn et al. 2012). Employees' green innovation behaviours also help in implementing green strategic management (J. Peng et al. 2020) and increasing green innovation performance (Podsakoff et al. 2000).

2.2 | Institutional Theory

An institution is a structure based on specific rules, laws, norms and perceptions (R. H. Lin et al. 2016) that provides boundary conditions for organisations and members (X. E. Zhang, Wang, and Li 2022). Institutional theory includes institutional pressure and institutionalisation perspectives (R. H. Lin et al. 2016). It states that an organisation's innovative activities result from the interplay of external institutional environment and internal behaviours (M. W. Peng 2003) and emphasises the interactions of organisations and their environment (S. Huang et al. 2015). Institutions produce legitimacy requirements and organisations adjust their behaviours and structures accordingly, including those related to sustainable innovation practices (Meyer and Rowan 1977). Organisational green innovation has

externalities, therefore, based on institutional theory, regulatory pressure and normative pressure are emphasised as the main driving forces for organisational green innovation (Chen, Wu, and Zhang 2023).

Scott (2001) categorised the sources of organisational legitimacy into three groups: legal regulation and standards set by industry associations; value systems and codes of conduct shared by the society and industry as a whole; and inherent belief systems and taken-for-granted assumptions that exist in the mind (Yu and Mei 2016). Accordingly, organisational legitimacy is divided into three dimensions, proposed by institutional theory (I. Guo, Yin, and Zhou 2009): regulatory legitimacy, normative legitimacy and cognitive legitimacy (Peng, Gu, and Fu 2013). The structure–action duality of institutional theory is a good perspective for strategic management research and has led to innovative concepts (I. Guo, Yin, and Zhou 2009). Institutional theory suggests that businesses need to meet policy standards and social expectations. Strategic green innovation behaviour arises from this (Zeng, Xiao, and Yu 2024). Few scholars have been able to explore the mechanism of organisational green innovation simultaneously. This study provides a multidimensional assessment of organisational legitimacy, focusing on the regulatory legitimacy perspective to measure the degree of and explore how organisational legitimacy moderates the leader–employee relationship and ultimately influences organisational green innovation performance.

3 | Research Hypothesis

3.1 | Leadership Style and Green Innovation Performance

The green innovation performance of enterprises can come from green product and process innovation (Yi and Xue 2016). Green product innovation relates to the development or betterment of products aimed at reducing resource consumption and environmental impact in the input, process and output of production (W. Li and Li 2023). Green process innovation pertains to the creation or enhancement of production and management processes geared to reduce resource consumption and environmental impact (Yi and Xue 2016).

Burns (1978) classified leadership styles into two broad categories: transformational and transactional. The former focuses on the spiritual level of influence, enhancing the motivation of organisation members from ideology and morality to lead to higher level goals (Ensley, Pearce, and Hmieleski 2006). Transactional leadership represents the exchange of values and interests in common goals among leaders and members, similar to a social contract (Wu, Cao, and Zhou 2009). Bass (1985) argued that transactional and transformational leadership styles are not two extremes but rather are complementary and leaders can achieve a more efficient strategic management practice through rational integration and flexible transformation (Lewis, Welsh, and Dehler 2002). Apart from the transactional–transformational leadership model, an orientation-based distinction is made in the strategist versus integrator leader roles (Waldman, Siegel, and Stahl 2020;

Waldman and Siegel 2008). Comparative studies show that transformational leadership increases employees' identification and sense of belonging more than transactional leadership (Y. Liu et al. 2007). In Eastern cultures, transformational leadership is more important than transactional leadership for employee innovation performance (Huo and Lou 2011).

Transactional leaders establish organisational ties for value exchange, performance attainment and emotional support (Burns 1978). Organisational citizenship behaviour relates to the personal behaviour of employees that is beneficial to the overall interests of the organisation, and the motivation behind it may be social exchange and positive psychological cognition. Leadership theory suggests that transactional leaders exercise their functions by manipulating the power, obligations and pay levels of organisation members (X. Li and Wei 2007). Organisational green innovation is an important initiative to achieve sustainable innovation and development strategy, as organisations are constantly reforming the traditional development model towards sustainability (Z. W. Chen and Chen 2019) and their performance measurement includes green process or product innovation (J. W. Huang and Li 2017). As transactional leadership clarifies the content and attribution of responsibilities and power boundaries, it enhances the participation, creativity and innovation capacity of members, improving the level of organisational citizenship behaviour (Raveeswaran 2022). This innovative capacity is often quantitative rather than qualitative and linked to the outputs of green innovation results. Thus, transactional leadership motivates organisation members to actively engage in green product innovations (H. J. Yang and Yang 2015). Bass (1985) argued that transactional leaders tend to be risk averse, value time constraints and control the process rather than the content itself. Hence, in predictable environmental conditions, transactional leadership can lead to a sufficiently high level of effectiveness (F. Wei, Yuan, and Di 2009), improving organisational efficiency and green process innovation.

Transformational leadership is the factor most directly associated with organisational change (He et al. 2023). Transformational leadership has two prominent characteristics: an emphasis on innovation and a focus on management (Duan and Zhang 2015). Transformational leadership focuses on the utility and value of innovation and the importance of making changes. Consequently, organisations experience substantial challenges to inertia and breakthroughs in cognitive styles and organisation members are encouraged to experiment with innovative behaviours (Barrick et al. 2014; J. G. Zhou, Jing, and Meng 2012; Pieterse et al. 2010). Secondly, transformational leadership pursues the improvement of leadership effectiveness and strategic management (H. Wang et al. 2005), assigning the duty of innovation and stimulating employees to innovate (J. G. Zhou, Jing, and Meng 2012; Liang, Li, and Luo 2018). Leaders spread green innovation influence and set an inspiring example for organisation members (Peng et al. 2020), enhancing their ability and capability to engage in green innovation (He et al. 2023; Oreg and Berson 2019).

Drawing from the preceding discussion, this research hypothesises the following:

Hypothesis 1a. *Transactional leadership styles positively influence organisational green process innovation.*

Hypothesis 1b. *Transactional leadership styles positively influence organisational green product innovation.*

Hypothesis 1c. *Transformational leadership positively influences organisational green process innovation.*

Hypothesis 1d. *Transformational leadership positively influences organisational green product innovation.*

3.2 | Mediating Role of Organisational Citizenship Behaviour

The academic research in the fields of organisational behaviour and human resource management focuses on organisational citizenship behaviour as an important measure of the work output of organisation members (Podsakoff et al. 2000; Balven et al. 2018) and an important factor affecting the competitiveness of organisations (H. Ren et al. 2013). It refers to the work that employees need to complete within their roles within an organisation and innovative and autonomous behaviours that go beyond their role requirements (L. Wang, Chu, and Ni 2009).

According to the self-determination theory of organisational competitiveness, self-motivation occurs when the autonomy, competence and emotional needs of organisation members are satisfied (X. Wei and Zhang 2018). Intrinsic autonomously formed motivation is an important driver of innovative activities (Anderson, Potocnik, and Jing 2014).

According to social exchange theory, the approach and attitude of leaders towards organisation members affect employees' sense of organisational support which in turn motivates them to carry out organisational citizenship behaviours (S. S. Lin and Yang 2014). Leadership behaviour or style can have an impact on employees' green behaviour and is an important stimulus that can stimulate individual green behaviour and maintain its sustainability. Organisational citizenship behaviour is influenced by employee cognitive mechanisms which include green self-efficacy and green work engagement and ultimately influence voluntary green behaviour. This is also the key to sustainable development and green innovation (Cai, Muhammad, and Ma 2023).

Transactional leadership refers to the exchange between superiors and subordinates and the fulfilment of the organisational contract geared to achieving organisational goals (C. L. Feng and Zhang 2014). It has two dimensions: contingent reward leadership and management by exception (Bass 1985). The former focuses on the positive aspects and rewards organisation members receive according to their performance, while avoiding punitive measures to enhance intrinsic motivation and efficiency (H. J. Yang and Yang 2015). Exception management includes positive and negative exception management. It focuses on the negative behaviours of employees—work errors, inefficiency and failure to achieve tasks. Positive

exception management consists of leaders' proactive supervision or monitoring to avoid errors, while negative exception management is about corrective and punitive measures (Qi and Zhang 2001). The transactional leadership style strengthens team collaboration in achieving goals by setting rules and regulations, implementing reward and punishment measures and encouraging team members to focus on improving the green performance of the enterprise (X. W. Ren, Sun, and Xing 2021). The transactional leadership style encourages organisation members to continuously engage in internal learning, redeploy innovative resources and enhance their ability for green innovation (Jiao, Yang, and Ying 2021).

Transformational leadership aims to establish a vision for organisational development, based on which organisation members are viewed as an interconnected whole, given appropriate responsibilities and developed to their potential (Chen, Xin, and Wang 2004). Transformational leaders influence organisational commitment and citizenship behaviours by enhancing members' self-concept, including affirming self-esteem and increasing identification and belonging (Y. X. Chen et al. 2006). Leaders encourage and stimulate more innovative ideas and behaviours (Bass 1999), which can stimulate members' self-growth and potential development (Y. W. Wang et al. 2012) and positively influence organisational citizenship behaviours (Judge and Piccolo 2004). Among leadership dimensions, personal charisma implies that leaders influence employees' organisational behaviours by, for example, creating green influence and innovation dynamics (Peng et al. 2020; Singh et al. 2022) and a shift towards the digitalisation of innovation processes (Scuotto et al. 2017), thus promoting green process and product innovation. Intellectual stimulation aims to cultivate innovative thinking skills and inspire new ideas, perspectives and approaches (Sui et al. 2012), thus promoting the development of sustainable ideas and a conducive atmosphere for green process and product innovation. Therefore, we hypothesise the following:

Hypothesis 2a. *Organisational citizenship behaviour mediates between transactional leadership styles and organisational green process innovation.*

Hypothesis 2b. *Organisational citizenship behaviours mediate between transactional leadership styles and organisational green product innovation.*

Hypothesis 2c. *Organisational citizenship behaviour mediates between transformational leadership and organisational green process innovation.*

Hypothesis 2d. *Organisational citizenship behaviour mediates between transformational leadership and organisational green product innovation.*

3.3 | Moderating Role of Organisational Legitimacy

Organisational legitimacy is an important safeguard for the growth and development of organisations and a topic of wide academic interest (Berbacher 2014). It indicates that a social

entity's actions are appropriate, reasonable and justified under a structured set of norms, values, beliefs and definitions, also affecting sustainability aspects (Suchman 1995). Legitimacy is an indispensable element for organisations and has both pressure and resource attributes (Díez-Martín, Prado-Román, and Blanco-González 2013). While the social environment is diversified and this pressure pushes organisations to improve their conditions and regulate their behaviours (Deng 2019), organisational legitimacy is an important resource. Organisations can acquire other resources such as institutional support, technology and stability, to enhance their competitiveness (Meyer and Rowan 1977). Zimmerman and Zeitz (2002) proposed a classic theoretical framework: organisational legitimacy–resource–growth. This framework argues that legitimacy facilitates organisations to achieve more efficient management (H. Guo et al. 2018). Research has widely confirmed the importance of organisational legitimacy for resource acquisition and that organisations can use their legitimacy to acquire key resources (Calic and Mosakowski 2016).

Legitimacy can bring credibility and internal consistency to an organisation, influencing members' perceptions (Li, Zhang, and Wu 2011). Organisations with high legitimacy tend to be perceived as more valuable and trustworthy (Suchman 1995). Internal members form their own judgements by referring to the external legitimacy of the organisation and the corresponding societal expectations and performance, which affect their loyalty to the organisation and the investment of their resources (Link, Ruhm, and Siegel 2014). Transactional leadership emphasises the fulfilment of organisational contracts between superiors and subordinates and the entire implementation process is like a transaction about costs and benefits. Therefore, the enhancement of external legitimacy can provide guarantees for this transaction process, making the exchange between leaders and members smoother. Transformational leadership influences organisational commitment and citizenship behaviour by enhancing the self-concept of members. Thus, when an organisation has a higher degree of legitimacy, members have a higher degree of understanding and agreement with the leader and the organisation's decision-making and deployment; the organisation's internal cohesion is stronger; the leadership style works better and a higher degree of social exchange between leader and members is realised, enhancing the effectiveness of the relationship 'Leadership style–organisational citizenship behaviour' (M. Ren 2017). Drawing from the above discussion, we hypothesise the following:

Hypothesis 3a. *Organisational legitimacy positively moderates the pathway between transactional leadership and organisational citizenship behaviours; when organisational legitimacy increases, transactional leadership impacts stronger on organisational citizenship behaviours.*

Hypothesis 3b. *Organisational legitimacy positively moderates the relationship between transformational leadership and organisational citizenship behaviours; when organisational legitimacy increases, transformational leadership impacts stronger on organisational citizenship behaviours.*

The theoretical model is reported in Figure 1.

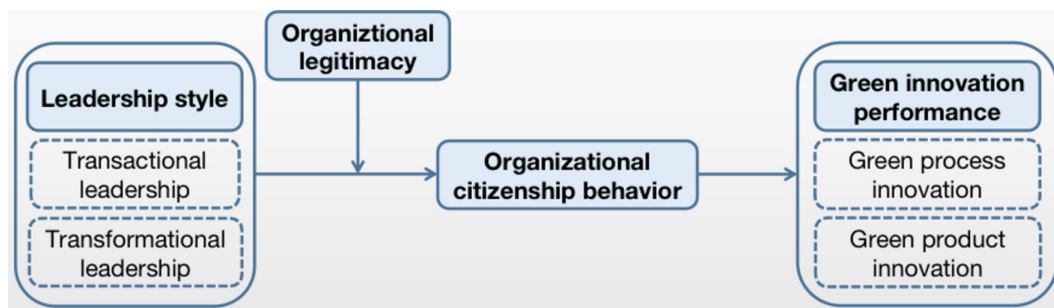


FIGURE 1 | The theoretical model.

TABLE 1 | Descriptives of the sample.

Firm-level information	Status	Frequency	Proportion (%)
Enterprise size	< 100	113	25.7
	100–499	242	50.9
	500–999	94	8.9
	> 999	64	14.5
Form of ownership	State-owned enterprises	111	21.6
	Private enterprise	356	69.4
	Joint-stock enterprise	43	8.4
	Other form	3	0.6

4 | Methodology

4.1 | Data Collection

This paper adopted the questionnaire survey method, with the nationwide enterprise in-service employees as the research object. The design of the questionnaire was based on relevant literature and a mature questionnaire scale. Following the method of Yang and Wang (2020), the classification of enterprise size covers companies counting less than 100, 100–499, 500–999 and 1000 employees and above. Classified by ownership, the sample of enterprises we collected covers state-owned enterprises as well as private, joint-stock and other forms of enterprises, covering almost all types of ownership. The 5-point Likert scale ensures the completeness of information and the validity of data where ‘1’ indicates complete disagreement and ‘5’ complete agreement. The questionnaire was distributed through the Questionnaire Star platform from April to June 2023. Some 537 questionnaires were returned, and excluding 24 invalid questionnaires (incompletely filled out and answered with obvious regularity), there were 513 valid questionnaires, a validity rate of 95.5%. Table 1 categorises the information of the samples and provides its descriptives. Because most people in the enterprise play both leadership and subordinate roles, we do not strictly distinguish between leadership and organisational citizenship identities and all responses are from the same sample. This can avoid setting limits on the participants, allowing them to answer questions as closely as

possible to their actual work situation and think from their own perspective about how they treat their leaders and subordinates.

4.2 | Measures

4.2.1 | Independent Variable: Leadership Style

The Multifactor Leadership Questionnaire (MLQ) by Avolio and Bass (1995) was adopted to measure transformational and transactional leadership styles. Both leadership styles were measured by four items each (e.g., ‘I am completely trusted by others’ and ‘I am satisfied when everyone conforms to a uniform standard’, respectively), as reported in Table 2. A standard translation-back-translation procedure was utilised between the Chinese and English versions.

4.2.2 | Mediating Variable: Citizenship Behaviour

Organisational citizenship behaviours were measured using the modified Organisational Citizenship Behaviour Scale (Liu et al. 2014), selecting four items (e.g., I will give sincere concern to my colleagues and treat them with courtesy), as reported in Table 3.

4.2.3 | Moderating Variable: Organisational Legitimacy

The measurement of organisational legitimacy draws on the measurement method of Du and Zhang (2012), combined with the dimensions of organisational legitimacy divided by our research institute and the needs of actual testing (Table 4). Given that this study mainly emphasises regulatory legitimacy, we removed two questions regarding the perspectives of competitors and investors and focused on measuring from the perspectives of government and employees. We set five items from the perspectives of stakeholders such as organisation members, external officials, suppliers, customers and government departments (e.g., employees would be proud to tell others that they are members of my organisation).

4.2.4 | Dependent Variable: Green Innovation Performance

Using the measurement scale developed by Xie and Zhu (2021), green innovation performance was split into two elements:

TABLE 2 | Measurement scale of leadership style.

Transformational leadership (TRL)	TRL 1. I am fully trusted by others	Avolio and Bass (1995)
	TRL 2. I can draw an attractive perspective on what we can do	
	TRL 3. I can help others find meaning in their work	
	TRL 4. I let others know that I pay attention to their thoughts on doing things	
Transactional leadership (TSL)	TSL 1. I feel satisfied when everyone meets the unified standards	
	TSL 2. I will inform employees of the standards for performing their work	
	TSL 3. I will tell others what to do if they want to receive rewards through work	
	TSL 4. When others achieve their goals, I will give recognition or rewards	

green process and product innovation (Table 5). The measurement of green process innovation consists of four questions (e.g., our production process is low in energy consumption and reduces the use of energy such as water, electricity, coal and petroleum). The measurement of green product innovation also consists of four questions (e.g., we choose environmentally friendly product materials in our product improvement and design process).

TABLE 3 | Measurement scale of citizenship behaviour.

Citizenship behaviour (CITI)	CITI 1. I will show sincere concern to my companions and treat them with courtesy	C. Liu et al. (2014)
	CITI 2. I feel proud when recommending companies to the outside world	
	CITI 3. I am loyal to the company	
	CITI 4. I am very concerned about the corporate image	

4.2.5 | Controlled Variable

Some basic information about the firms can also impact green innovation. Therefore, variables like firm's size and ownership structure are chosen as control ones in order to limit the influence of the firm's setting on the results.

5 | Measurement Model Analysis

5.1 | Common Method Bias

Because the same data source or measurement may lead to common method bias (CMB), this study adopted the Harman single-factor method to minimise this risk and to test exploratory factor analysis on the questions of leadership style, organisational citizenship behaviour, organisational legitimacy and green innovation (S. Wang et al. 2018; Chan 2009; Doty and Glick 1998). The number of unrotated extraction factors was used to determine the severity of the same source deviation problem. The results show that the maximum explanatory amount of the variance of the first factor was 29.67% (significantly less than 50%). Therefore, CMB did not affect the results. However, additional methodological approaches towards potential CMB have been adopted, according to field literature (Crampton and Wagner 1994; Paulhus and Vazire 2009; Sandvik, Diener, and Seidlitz 1993). First, a marker variable—that is, a theoretically unrelated variable—was used to investigate CMB (Simmering et al. 2015; King and Malhotra 2015; Lindell and Whitney 2001). The analysis revealed no signs of significant CMB. Second, the statistical procedures like Harman's test were integrated with procedural approaches to reduce CMB, based on Podsakoff et al. (2003), like separating survey constructs depending on psychological criteria and on temporal and spatial ones (Podsakoff, MacKenzie, and Podsakoff 2012).

5.2 | Reliability Test

We use the standardised Cronbach's α to reflect the stability level of the measurement of each dimension for leadership,

TABLE 4 | Measurement scale of organisational legitimacy extent.

Organisational legitimacy extent (OLE)	OLE 1. Employees will proudly tell others that they are members of my organisation	Du and Zhang (2012)
	OLE 2. Officials closely related to me highly evaluate this company	
	OLE 3. The supplier hopes to do business with me	
	OLE 4. Customers highly evaluate our products	
	OLE 5. The government highly evaluates our business behaviour	

TABLE 5 | Measurement scale of green innovation performance.

Green process innovation (GPI)	GPI 1. Our production process has low energy consumption and reduces the use of energy such as water, electricity, coal and petroleum	X. M. Xie and Zhu (2021)
	GPI 2. We use clean production technology to save energy and reduce pollutants	
	GPI 3. Our manufacturing process effectively reduces harmful substances and waste emissions	
	GPI 4. Our manufacturing process effectively reduces the use of raw materials	
Green tailorism innovation (GTI)	GTI 1. We choose environmentally friendly product materials in the process of product improvement and design	
	GTI 2. We use biodegradable packaging for existing or new products	
	GTI 3. We will evaluate whether the product is easy to recycle, reuse and decompose during product improvement and design processes	
	GTI 4. We use fewer resources in product improvement and design processes and adopt green product labels	

TABLE 6 | Reliability test.

Variable	Number of items	Cronbach's α
TSL	4	0.58
TRL	4	0.67
OLE	5	0.70
CITI	4	0.70
GPI	4	0.65
GTI	4	0.60

organisational legitimacy, organisational citizenship behaviour and green innovation performance. The results are reported in Table 6: the measurement reliability is evaluated using the combination of reliability (composite) and factor loading (factor loading). Cronbach's α reached 0.7, but it remained relatively low for transactional leadership. However, this result is coherent with past research (Judge and Piccolo 2004) and derives from a consolidated, stable and

reliable scale (X. J. Li and Wei 2006; H. J. Yang and Yang 2016; F. Wei, Yuan, and Di 2009).

5.3 | Validity Test

Convergent validity was checked by means of the average variance extracted (AVE), while discriminant validity was checked by adopting the criterion that the square root of the latent variable AVE is greater than the correlation value between the latent variables (D. X. Peng and Lai 2012). AVEs higher than 0.5 are required in most cases, but if the AVE is lower than 0.5 and the composite reliability exceeds 0.6, the convergent validity remains sufficient (Fornell and Larcker 1981). As shown in Tables 7 and 8, the measurement model shows good convergent and discriminant validity.

5.4 | Research Hypothesis Testing

This paper adopts the hierarchical regression method for testing the research hypotheses. Results are shown in Tables 9 and

TABLE 7 | Convergent validity.

Variable	Item	Factor loading	AVE	CR
TRL	TRL 1	0.7	0.51	0.8
	TRL 2	0.7		
	TRL 3	0.72		
	TRL 4	0.73		
TSL	TSL 1	0.6	0.44	0.76
	TSL 2	0.7		
	TSL 3	0.63		
	TSL 4	0.73		
OLE	OLE 1	0.68	0.46	0.81
	OLE 2	0.63		
	OLE 3	0.63		
	OLE 4	0.72		
	OLE 5	0.71		
CITI	CITI 1	0.76	0.52	0.81
	CITI 2	0.74		
	CITI 3	0.79		
	CITI 4	0.7		
GPI	GPI 1	0.67	0.49	0.79
	GPI 2	0.72		
	GPI 3	0.73		
	GPI 4	0.68		
GTI	GTI 1	0.64	0.46	0.77
	GTI 2	0.67		
	GTI 3	0.68		
	GTI 4	0.72		

Abbreviations: AVE = average variance extracted, CR = composite reliability.

TABLE 8 | Discriminant validity.

	CITI	GPI	GTI	OLE	TRL	TSL
CITI	0.723					
GPI	0.507	0.700				
GTI	0.589	0.640	0.676			
OLE	0.631	0.581	0.620	0.675		
TRL	0.460	0.495	0.498	0.580	0.710	
TSL	0.516	0.453	0.578	0.532	0.486	0.661

Note: The value of the diagonal is the square root of AVE, and the correlation coefficient is below the diagonal.

10. The value of VIF is much less than 3 in each model, thereby showing no issue of multicollinearity. Models 1–5 are tested by regression, whereas the dependent variable is organisational

citizenship behaviour, and Model 1 is a regression model that only takes the number of years of enterprise establishment, enterprise size and form of enterprise ownership as the control variables to be studied; Models 6–11 are tested by regression, whereas the dependent variables are green product innovation and green process innovation.

5.4.1 | Main Effect Test

Green process innovation is the dependent variable in Model 8, in Table 10. After incorporating all other variables and the cross-multiplier term of transactional leadership and organisational legitimacy, transactional leadership shows a significant positive impact on green process innovation. Findings show that transactional leadership presents a significant positive effect on green process innovation ($\beta = 0.12$, $p < 0.01$) and Hypothesis 1a is verified.

In Model 11, green product innovation plays the role of the dependent variable. It contains the same variables as Model 8: Transactional leadership shows a significant positive effect on green product innovation ($\beta = 0.15$, $p < 0.001$). Thus, Hypothesis 1b is verified.

In Model 7, green process innovation is the dependent variable. After incorporating all other variables and the cross-multiplication terms of transformational leadership and organisational legitimacy, transformational leadership showed a significant positive impact on green process innovation ($\beta = 0.16$, $p < 0.001$). Therefore, Hypothesis 1c is validated.

In Model 10, green product innovation acts as the dependent variable. After incorporating all other variables and the cross-multiplication term between transformational leadership and organisational legitimacy, transformational leadership is shown to exhibit a significant positive impact on green product innovation ($\beta = 0.07$, $p < 0.01$). Thus, Hypothesis 1d was verified.

5.4.2 | Mediating Effect Test

Baron and Kenny's (1999) three-step method is adopted in order to test the mediating effect (Tables 9 and 10). Firstly, this work investigated the impact of the independent variable (leadership style) on the mediating variable (organisational citizenship behaviour). Subsequently, it continued to evaluate the impact of the mediating variable (organisational citizenship behaviour) on the dependent variable (green innovation performance). Finally, it examined the relationships among the independent variables and the dependent variables, including mediating variables.

Models 1–5 in Table 9 were analysed with organisational citizenship behaviour as the dependent variable. Model 1 only examines the number of years of establishment, size of the firm and form of ownership of the firm as control variables, and Model 2 adds transformational leadership and transactional leadership as independent variables to examine their effects on organisational citizenship behaviour. Transformational leadership significantly and positively affects organisational citizenship

TABLE 9 | Hypothesis testing results.

	Model 1	Model 2	Model 3	Model 4	Model 5
CITI					
Size	−0.003	−0.029	−0.043	−0.047	−0.05
Ownership	−0.013	−0.019	−0.01	−0.014	−0.02
TRL		0.21***	0.07**	0.06*	0.075**
TSL		0.37***	0.26***	0.23***	0.26***
OLE			0.42***	0.44***	0.42***
CITI					
TRL*OLE				−0.17**	−0.04
TSL*OLE					−0.29**
R ²	0	0.26	0.37	0.38	0.39
Adj R ²	−0.04	0.25	0.36	0.37	0.38
F change	0.051**	81.7**	83.45***	88.56***	88.8***
VIF maximum	1.043	1.28	1.57	1.59	1.6

Abbreviations: F = F statistic, R^2 = coefficient of determination, VIF = variance inflation factor.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

TABLE 10 | Hypothesis testing results.

	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
	GPI	GPI	GPI	GTI	GTI	GTI
Size	0.007	0.01	0.01	−0.007	−0.005	−0.006
Ownership	0.038	0.04	0.04	0.012	0.015	0.015
TRL	0.14***	0.16***		0.067**	0.07**	
TSL	0.075		0.12**	0.14***		0.15***
OLE	0.33***	0.33***	0.4***	0.26***	0.24***	0.25***
CITI	0.19***	0.22***	0.22***	0.27***	0.28***	0.25***
TRL*OLE		0.089			0.09**	
TSL*OLE			0.11			0.091*
R ²	0.384	0.38	0.37	0.47	0.46	0.47
Adj R ²	0.376	0.37	0.36	0.465	0.45	0.465
F change	48.7***	48.73***	45.34***	69.69***	66.17***	69.76***
Max VIF	1.83	1.85	1.63	1.83	1.85	1.63

Abbreviations: F = F statistic, R^2 = coefficient of determination, VIF = variance inflation factor.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

behaviour ($\beta = 0.21$, $p < 0.001$); transactional leadership also significantly and positively influences organisational citizenship behaviour ($\beta = 0.37$, $p < 0.001$).

In Model 8, in Table 10, green process innovation acts as the dependent variable. According to Model 8, organisational citizenship behaviour shows a significant positive impact on green process

innovation ($\beta = 0.22$, $p < 0.001$). Transactional leadership also significantly positively affects green process innovation ($\beta = 0.12$, $p < 0.01$). Organisational citizenship behaviour partially mediates the pathway between transactional leadership styles and organisational green process innovation, and transactional leadership can further promote organisational green process innovation by facilitating citizenship behaviour as validated by Hypothesis 2a.

Model 11 incorporates both transactional leadership and organisational citizenship behaviours to analyse green product innovation: Both transactional leadership and organisational citizenship behaviours present a significant positive impact on green product innovation ($\beta_1 = 0.15, p_1 < 0.001$; $\beta_2 = 0.25, p_2 < 0.001$). This finding suggests that organisational citizenship behaviours partially mediate among transactional leadership style and organisational green product innovation and transactional leadership can further promote organisational green process innovation by promoting citizenship behaviours. Thus, Hypothesis 2b is verified.

Both Models 7 and 10 incorporated both transformational leadership and organisational citizenship behaviour. The dependent variable of Model 7 is green process innovation: Both transformational leadership and organisational citizenship behaviour show a significant positive impact on green process innovation ($\beta_1 = 0.16, p_1 < 0.001$; $\beta_2 = 0.22, p_2 < 0.001$). This proves that organisational citizenship behaviour partially mediates the relationship between transformational leadership and organisational green process innovation and transformational leadership can further promote organisational green process innovation by promoting citizenship behaviour as validated by Hypothesis 2c. The dependent variable of Model 10 is green product innovation: Both transformational leadership and organisational citizenship behaviour have a significant positive impact on green product innovation ($\beta_1 = 0.07, p_1 < 0.01$; $\beta_2 = 0.28, p_2 < 0.001$). This finding suggests that organisational citizenship behaviour partially mediates the relationship between transformational leadership style and organisational green product innovation and that transformational leadership can further promote organisational green product innovation by facilitating citizenship behaviours. Thus, Hypothesis 2d was verified.

5.4.3 | Moderating Effect Test

According to Wen (2006), testing for moderated mediation effects requires testing the mediation effect; the dependent variable must be included in the whole model for consideration. Models 3–5 in Table 9 are regression models with organisational citizenship behaviour as the dependent variable to test the moderating role of organisational legitimacy among leadership styles and organisational citizenship behaviour. Models 7, 8, 10 and 11 in Table 10 are regression models with organisational green innovation performance as the dependent variable to check whether the moderating role is still significant when adding leadership styles, organisational legitimacy and their interaction term and whether the mediation effect still holds when organisational legitimacy is included as a moderator variable.

Firstly, Model 3 introduces the moderating variable of organisational legitimacy into the analysis based on Model 2, to test the impact of organisational legitimacy on organisational citizenship behaviour; Models 4 and 5 incorporate the cross-multiplication terms of the independent variables of transformational and transactional leadership with organisational legitimacy based on Model 3 to test the moderating impact of organisational legitimacy among the two independent variables and organisational citizenship behaviour.

From Model 3, organisational legitimacy can be seen to have a significant positive contribution to organisational citizenship

behaviour ($\beta = 0.42, p < 0.001$). Transformational leadership and transactional leadership also continued to have a significant positive impact on organisational citizenship behaviour.

Model 4 incorporates the cross-multiplier of transformational leadership and organisational legitimacy. The coefficient of the interaction term of transformational leadership and organisational legitimacy can be seen to be significantly negative, which preliminarily confirms that the pathway among transformational leadership and organisational citizenship behaviours is negatively moderated by organisational legitimacy ($\beta = -0.17, p < 0.01$).

Model 5 added the interaction term between transactional leadership and organisational legitimacy and the results showed that the coefficient of the interaction term was significantly negative at the 0.01 level, thus preliminarily confirming that organisational legitimacy negatively moderates the pathway among transactional leadership and organisational citizenship behaviour ($\beta = -0.29, p < 0.01$).

Models 8 and 11 both incorporate transactional leadership, organisational legitimacy and the cross-multiplier terms, whereas the dependent variable is green process innovation, in Model 8, and green product innovation, in Model 11. Findings showed that the coefficients of the cross-multiplier terms of transactional leadership and organisational legitimacy in Model 8 were insignificant and the coefficients of the cross-multiplier terms of transactional leadership and organisational legitimacy in Model 11 were positively significant ($\beta = 0.091, p < 0.1$).

Models 7 and 10 incorporated transformational leadership, organisational legitimacy and the cross-multiplier terms, whereas the dependent variable is green process innovation, in Model 7, and green product innovation, in Model 10. The coefficients of the cross-multiplier terms in Model 7 were insignificant, while they were positively significant in Model 10 ($\beta = 0.09, p < 0.01$). Organisational citizenship behaviour showed a significant positive impact on the dependent variable in all four models ($\beta_1 = 0.22, p_1 < 0.001$; $\beta_2 = 0.22, p_2 < 0.001$; $\beta_3 = 0.28, p_3 < 0.001$; $\beta_4 = 0.25, p_4 < 0.001$).

Figure 2 summarises the results of mediation and moderation. Organisational legitimacy has a significant positive moderating impact among leadership style and the mediating variable organisational citizenship behaviour when the dependent variable is green product innovation; this moderating effect does not hold when the dependent variable is green process innovation. Therefore, Hypotheses 3a and 3b are partially validated.

6 | Conclusions and Implications

6.1 | Discussion and Conclusions

Building on institutional theory and social exchange theory, this paper systematically explores the mechanism of leadership style on organisational green innovation performance and the moderating role of organisational legitimacy between leadership style and organisational citizenship behaviour.



FIGURE 2 | The path coefficients.

Both transactional and transformational leadership make a significant contribution to organisational green innovation performance. Transformational leadership emphasises the management of sustainability and innovation and can guide organisation members to transcend individual interests, create common values and contribute to green innovation performance. This outcome aligns with the prevailing literature. Transactional leadership can also promote green innovation in organisations. However, this finding contradicts some existing studies. For example, some scholars analyse from a psychological perspective and believe that transactional leadership reduces organisational innovation performance because it presents strong controlling characteristics that undermine employees' intrinsic motivation to innovate (X. Q. Lin et al. 2022). One possible explanation is that the samples selected for this study are all domestic enterprises, whereas leaders and employees often continue to follow the traditional superior-subordinate relationship based on clear guidance from the leaders to help employees achieve sustainability and innovation goals and to reward them accordingly. Transactional leadership has the characteristics of clear responsibilities, clear goals and clear rewards and penalties, improving the organisation's green innovation performance. The promoting effect of transactional leadership on green innovation performance is primarily realised through power-variable rewards for subordinates, which motivate employees to achieve the expected green innovation performance goals through a two-way mutually beneficial LMX.

Organisational citizenship behaviours partially mediate among leadership styles and green innovation performance, coherently with extant literature (Qi and Zhang 2001). Transformational leaders promote organisational citizenship behaviours through charisma, inspiration, intellectual stimulation and personalised care (Y. W. Wang et al. 2023). Transformational leaders usually provide positive role models for organisation members, establish collective values and stimulate the awareness of green innovation among organisation members, thus promoting organisational green process and product innovation. Transactional leaders pay more attention to the growth of the enterprise itself rather than fierce competition (H. J. Yang and Yang 2015) and can clearly define tasks content and requirements, clarify responsibility and give guidance, largely stimulating the motivation of organisation members and promoting high-quality organisational citizenship behaviours while ultimately promoting the organisational green innovation performance.

This paper further explores the mediating mechanism between leadership styles and organisational green innovation performance. Findings show that organisational legitimacy has a positive moderating effect among leadership styles and organisational citizenship behaviours when the dependent variable is green product innovation. Thus, as organisational legitimacy increases, the facilitating effect of leadership styles on organisational citizenship behaviours is reinforced and no significant moderating effect occurs when green process innovation is the dependent variable. The results of the former test are consistent with our hypothesis and for the latter, we offer the following possible explanations: Owing to the natural profit-seeking tendency of enterprises, product innovation can bring further explicit profits and market competitiveness and by providing innovative green products, enterprises can establish a good market image and thus win competitive advantages. Under this premise, high organisational legitimacy aims even further at pursuing product innovation and profit, linking them to sustainability. Therefore, when the dependent variable is organisational product innovation, the moderating effect of external legitimacy is significant. However, in terms of organisational process innovation, according to the limited decision theory, in the process of managing an organisation, the leader's attention will affect the allocation of internal and external resources (S. Q. Wang, Han, and Wang 2022), which will have a critical effect on the final output (Shao 2022). The resource-based view posits that a firm's heterogeneous resources are characterised by being valuable and unique (Hoopes, Madsen, and Walker 2003), which is the root cause of the differences in firms' innovation performance. Under the premise of limited resources, the natural profit-seeking tendency of enterprises leads to more resources flowing towards direct product updates rather than long-term process innovation. Accordingly, the focus on green product innovation disperses the heterogeneous resources of green process innovation, resulting in the practice of obtaining legitimacy by enterprises often becoming a product-oriented regulatory tool only. In that case, obtaining external legitimacy for organisations is only a guarantee for innovative products and cannot bring direct changes to process innovation. Therefore, the moderating effect is insignificant when the dependent variable is process innovation.

6.2 | Implications and Suggestions

Top team members must cultivate high-quality LMX relationships. Organisational leaders should choose their own

leadership styles, pay attention to developing the green innovation and sustainability awareness of organisation members and promote high-quality organisational citizenship behaviours to facilitate green innovation performance. This way, employees can receive additional encouragement, empowerment, trust and emotional support (B. H. Xu, Deng, and Wu 2021), which can increase organisation members' motivation and initiative towards green innovation. In specific (strategic) management work, leaders can flexibly choose or combine the two leadership styles according to the organisational scenario and the different personalities of organisation members to maximise both organisational citizenship behaviour, green innovation performance and overall sustainability.

Enterprises should formulate their own sustainable development and innovation management strategies and recognise that green product and process innovation are both important dimensions for measuring green innovation performance. Product innovation, as a kind of explicit return on innovation, is often more valued by enterprises because, with fierce market competition and the complexity and variability of customer demands, personalised features and the rapid development of production technology and product innovation can help enterprises effectively satisfy the unique needs of consumers and occupy market share. Its return is also faster and more intuitive than process innovation. Process innovation is also a key strategy for businesses to attain a competitive advantage, improving production efficiency, reducing costs and providing the foundations for product innovation (e.g., design production, testing and commercialisation). Therefore, enterprises should focus on the combination of green processes and product innovation when formulating green innovation management strategies to gain long-term competitive advantages.

Leaders should seek a balance between gaining organisational legitimacy and promoting organisational citizenship behaviour. If the focus only lies in improving the exchange relationship of leadership members and seeking internal harmony in the organisation but neglects the acquisition of external legitimacy, the further development of the organisation will be hindered and a legitimacy crisis may arise. The pursuit of external legitimacy and the satisfaction of external regulations as the main task may distract from the internal management and attention of the organisation. Therefore, organisations should acquire external legitimacy following their own internal characteristics and development plans to achieve coherence between the internal and external strategies of the organisation.

This work provides practical management strategies and guidance for organisational leaders and also helps firms understand green innovation and develop more comprehensive and effective green innovation management strategies. It provides practical management strategies for organisational leaders that should focus on building good communication and trusting relationships with their team members, which will help them to better adapt to the organisation's needs and contribute to the organisation's development. It also helps organisation members to understand green innovation more comprehensively and develop more comprehensive and effective green innovation management strategies. Finally, this paper highlights the suggestion that organisations should not neglect the construction of internal

management and leader-member communication relationships while pursuing external legitimacy to achieve consistency between the organisation's internal and external strategies, a recommendation that is important for the long-term development and stability of organisations.

6.3 | Limitations

Although this paper elucidates the effect of leadership style on organisational green innovation performance and its role mechanisms, some limitations persist. Firstly, it excludes the influencing factors of government departments. In China, government regulation can have a profound effect on organisational legitimacy. Therefore, considering governmental factors can improve the overall theoretical framework. Secondly, the samples selected originate from domestic enterprises, which somewhat limits the scope of influence and may give a localised flavour to the findings. Subsequent studies may consider expanding the scope by selecting enterprises from different cultural backgrounds to further validate and improve our conclusions.

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Conflicts of Interest

The authors declare no conflicts of interest.

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