

# A multi-case study on the legitimacy construction of female successors in strategic innovation and green transition of petrochemical family enterprises

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**Abstract:** This study investigates how female successors in family-owned petrochemical and high-carbon enterprises construct leadership legitimacy while promoting strategic innovation and green transformation. Drawing on legitimacy theory and institutional work, the research addresses a critical gap at the intersection of gender, family business succession, and environmental strategy. Through a qualitative multiple-case study of three female-led organizations—Hengli Group (China), Solvay (Belgium), and S.W. Jack Drilling Co. (United States)—the analysis reveals differentiated pathways of legitimacy construction across pragmatic, moral, and cognitive dimensions. The findings show that female successors deploy strategic narratives, institutional embedding, and stakeholder alignment to reconcile traditional family expectations with forward-looking environmental agendas. While gender remains a latent factor in leadership perception, legitimacy is often achieved through professional normalization and symbolic continuity rather than direct gender appeals. This study contributes to a deeper understanding of how gendered actors engage in institutional work within male-dominated legacy industries and offers theoretical and practical insights for succession planning, ESG leadership, and sustainable transformation in family enterprises.

**Keywords:** Family business, Female successors, Green transition, Institutional work, Legitimacy construction.

## 1. Introduction

### 1.1 Research Background

In the context of accelerating climate change and increasing global pressure for sustainability, the petrochemical industry faces an urgent need to pursue green transformation. As one of the most carbon-intensive and heavily scrutinized sectors, petrochemical enterprises are being compelled to engage in strategic innovation that aligns with environmental, social, and governance (ESG) principles. This transformation is not only technological but also deeply organizational, requiring shifts in leadership vision, cultural norms, and stakeholder alignment.

Simultaneously, family-owned businesses, many of which dominate the petrochemical sector in emerging economies, are encountering the challenge of generational succession. Unlike widely held corporations, family enterprises intertwine business strategy with family dynamics, values, and long-term legacy concerns. The process of leadership transition thus becomes a critical juncture, especially when successors seek to redefine the company's strategic direction [1].

Within this broader context, the emergence of female successors in traditionally male-dominated family businesses introduces an additional layer of complexity. Entrenched gender norms, patriarchal family structures, and organizational expectations often render women's leadership roles in family enterprises less legitimate in the eyes of internal and external stakeholders. This "legitimacy gap" becomes particularly salient when female successors attempt to lead bold transformations, such as green innovation, that challenge both traditional business models and gendered expectations.

### 1.2. Research Motivation

While growing academic attention has been devoted to gender dynamics in corporate leadership, much of the existing literature focuses on publicly listed firms or state-owned enterprises. The role of women as successors in family-controlled firms, especially in high-carbon industries like petrochemicals, remains relatively underexplored [2]. This research is motivated by three intersecting considerations: The rising visibility of female successors in Asia and other emerging regions, who are not merely caretakers but active reformers seeking to modernize and green their enterprises; The strategic inflection point faced by petrochemical family firms, where maintaining business viability increasingly depends on innovation and environmental adaptation; The theoretical puzzle of legitimacy construction, where gender, family authority, organizational transformation, and external scrutiny intersect in complex and often contradictory ways.

By investigating how female successors navigate this legitimacy terrain, this study aims to contribute to a deeper understanding of gendered leadership dynamics in the green transformation of legacy industries.

### 1.3. Research Questions

This study adopts a multi-case qualitative approach to examine how female successors in petrochemical family enterprises construct legitimacy while leading strategic innovation and green transformation. Specifically, it addresses the following research questions: What legitimacy challenges do female successors encounter when promoting strategic innovation and green transformation in petrochemical family firms? What mechanisms or strategies do they adopt to construct or acquire legitimacy among family members, organizational actors, and external stakeholders? How do family dynamics, organizational structures, and industry environment shape the legitimacy construction process?

By exploring these questions, the study seeks to illuminate the micro-processes through which gendered successors achieve agency, the institutional constraints they face, and the organizational outcomes of their leadership strategies.

## 2. Literature Review

### 2.1. Strategic Innovation and Green Transition in Petrochemical Family Enterprises

The petrochemical industry is widely acknowledged as one of the most resource-intensive and environmentally impactful sectors, often characterized by large-scale capital investments, high emissions, and rigid production chains. In recent years, mounting regulatory pressure, investor scrutiny, and global commitments to carbon neutrality have compelled firms in this sector to pursue green transition strategies [3]. These strategies often include the adoption of cleaner technologies, diversification into low-carbon materials, and participation in ESG (Environmental, Social, Governance) disclosure frameworks.

Family businesses in the petrochemical industry face unique challenges in navigating such transitions. On the one hand, their long-term orientation and stewardship values may provide incentives to invest in sustainability for the sake of legacy [4]. On the other hand, strong path dependence, risk aversion, and centralized decision-making can inhibit experimentation and innovation [5]. When generational succession coincides with green transformation, the enterprise confronts dual complexity: preserving family control while redefining corporate purpose.

Strategic innovation in this context thus entails more than the introduction of new technologies; it involves a reconfiguration of organizational identity, stakeholder expectations, and governance structures.

### 2.2. Female Successors and Gendered Legitimacy Challenges

Although women have made significant inroads into corporate leadership, their presence in family business succession, particularly in male-dominated industries such as petrochemicals, remains limited.

Research has shown that female successors often face skepticism regarding their competence, leadership style, and decision-making authority, especially when their role deviates from conventional patriarchal norms [6].

In many family enterprises, succession is guided by primogeniture (the preference for male heirs) and gendered expectations of family roles, which systematically marginalize women's claims to leadership [7]. As a result, female successors must often engage in "legitimacy work" to be perceived as rightful and capable leaders, not only by shareholders and employees, but also by family elders and siblings.

This legitimacy challenge is exacerbated when female successors advocate for strategic shifts that challenge traditional practices, such as environmental innovation, ESG integration, or stakeholder activism. Their legitimacy, in such cases, must be built across multiple domains: gender, generational authority, and strategic direction.

### *2.3. Theoretical Framework: Legitimacy Construction and Institutional Work*

This study is theoretically grounded in the concept of legitimacy, which has been widely employed to examine how organizational actors secure acceptance and authority within broader institutional environments. Building upon Suchman's influential typology, legitimacy is understood as a generalized perception or assumption that an actor's actions are desirable, proper, or appropriate within a socially constructed system of norms, values, and beliefs [8]. Importantly, legitimacy is not an inherent attribute but rather a socially conferred status that must be actively constructed, maintained, or repaired. For successors in family enterprises, particularly women navigating leadership transitions in male-dominated industries, legitimacy becomes a central and contested resource.

Legitimacy manifests in multiple dimensions. Pragmatic legitimacy derives from the actor's perceived utility to stakeholders and is often built through strategic alignment with external interests, such as improved ESG performance or enhanced investor confidence. Moral legitimacy, by contrast, rests on normative evaluations of whether the actor's goals and methods align with prevailing ethical standards. Cognitive legitimacy emerges when the actor's role or actions become taken for granted, understood as natural or inevitable within a given institutional context. These dimensions are not mutually exclusive but rather interdependent, shaping the ways in which female successors are perceived as legitimate change agents.

To further unpack how legitimacy is constructed, this study draws on the concept of institutional work, which refers to the purposive actions of individuals and organizations aimed at creating, maintaining, or disrupting institutions [9]. Female successors in petrochemical family firms often operate at the intersection of competing institutional logics: the legacy-oriented logic of family continuity, the traditionally masculine norms of industrial leadership, and the emergent imperatives of environmental stewardship. Navigating these logics requires more than passive adaptation; it demands active engagement in meaning-making, identity framing, and symbolic action. By positioning themselves as both heirs to family legacy and pioneers of green transition, these successors undertake institutional work that simultaneously reaffirms and redefines their organizational roles. This dual anchoring, in inherited authority and future-oriented legitimacy, offers a fertile site for exploring how gender, power, and innovation converge in processes of institutional transformation.

## **3. Methodology**

This study employs a qualitative multiple-case study design to examine how female successors in family-owned petrochemical and high-carbon enterprises construct legitimacy while leading strategic innovation and green transformation. Given the exploratory nature of the research questions and the complexity of the phenomenon, which sits at the intersection of gender, family business dynamics, and institutional change, a qualitative approach is especially suited to capturing the embedded, context-dependent processes through which legitimacy is enacted and contested [10].

### 3.1. Case Selection Strategy

The selection of cases followed a purposeful theoretical sampling logic aimed at identifying information-rich instances that could illuminate the micro-processes of legitimacy construction. To qualify for inclusion, each case had to meet the following criteria: (1) the enterprise operates in the petrochemical or adjacent energy-intensive sectors with high environmental impact; (2) the firm is family-owned and has undergone a succession process involving a female family member assuming top leadership responsibilities; and (3) the successor has played a significant role in initiating or guiding green transformation strategies, including ESG disclosure, low-carbon innovation, or sustainability-driven restructuring.

Three cases were selected based on these criteria: Hengli Group (China), Solvay (Belgium), and S.W. Jack Drilling Co. (United States). While Solvay is not a family firm in the traditional ownership sense, its long-standing industrial legacy and transition under female leadership offer an analytically valuable comparative context. The cases represent variation in geographic, institutional, and cultural environments, enabling cross-case comparison of legitimacy construction in different societal and industry settings.

### 3.2. Data Sources and Collection

The data sources included corporate sustainability reports, annual financial disclosures, ESG ratings, media profiles, executive speeches, and public interviews. These materials provided critical historical context, served as a basis for triangulation, and allowed for process tracing of legitimacy construction over time. For each case, multiple documents spanning at least five years of organizational activity were systematically reviewed to map trajectories of strategic change and identity reframing.

## 4. Findings

### 4.1. Case A: Green Brand Reinvention Post-Succession

This case examines the Hengli Group, a privately owned petrochemical conglomerate headquartered in China, where female co-founder and executive leader Fan Hongwei has played a central role in steering the company's strategic evolution. Although not a second-generation successor in the conventional sense, Fan's long-term leadership within a family-controlled enterprise situates her in a unique position to embody the tensions between traditional industrial trajectories and emergent green innovation. Her case is particularly illustrative of how a female leader in a heavily masculinized, high-carbon sector may construct legitimacy when advocating for environmental transformation [11].

The Hengli Group was originally established with a strategic focus on petrochemical processing and textile manufacturing, industries typically driven by capital intensity, economies of scale, and high energy consumption. These sectors have historically prioritized cost efficiency and volume maximization over ecological responsibility. As such, green transformation efforts initiated by leadership must contend not only with technological inertia but also with entrenched organizational cultures and expectations rooted in past success. For Fan, who gradually assumed expanded strategic authority within the group, the challenge lay in promoting sustainability-oriented innovation in an environment conditioned by traditional performance logics and gendered assumptions about leadership roles.

In response to increasing environmental regulation, investor scrutiny, and shifting stakeholder expectations, Fan has actively led efforts to reposition Hengli as a sustainability-conscious industry leader. Under her leadership, the company began publishing annual ESG (Environmental, Social, and Governance) reports, disclosing key environmental indicators such as carbon emissions, energy use, and waste management performance. In parallel, Hengli pursued initiatives in green hydrogen, biodegradable materials, and recycling-based manufacturing chains. These actions were not merely symbolic; they formed a coherent sustainability narrative that aligned with national policy goals and international investor interests.

From a legitimacy perspective, these efforts constitute a form of pragmatic legitimacy construction. By aligning Hengli's green transformation with the expectations of key stakeholders, particularly regulators, institutional investors, and global supply chain partners, Fan enhanced the perceived utility of her leadership. ESG disclosures and third-party ESG ratings served as boundary objects through which the company's commitment to environmental reform could be verified, benchmarked, and publicized. These tangible markers of performance allowed external audiences to recognize the firm's strategic shift as credible and value-enhancing.

At the same time, Fan's leadership cultivated cognitive legitimacy by embedding sustainability into Hengli's corporate identity. Through internal communications, public speeches, and strategic branding efforts, she positioned green transformation not as a temporary compliance measure but as an integral component of the firm's long-term mission. Over time, the narrative of "innovation through environmental responsibility" gained traction within the organization and its extended stakeholder network, reducing cognitive dissonance and reinforcing the plausibility of a new institutional logic.

In sum, this case demonstrates how a female executive operating within a family-owned petrochemical enterprise may leverage ESG mechanisms to bridge the legitimacy gap that emerges when progressive environmental strategies challenge traditional business norms. By pursuing transparency, aligning with external evaluative standards, and reframing corporate purpose, Fan Hongwei enacted institutional work that repositioned both her leadership and the company's identity. This case illustrates the interplay between gender, authority, and green strategic innovation, and highlights how legitimacy can be both a constraint and an asset in navigating organizational transformation.

#### *4.2. Case B: Leading with Sustainability, Moral Legitimacy Through Green Vision at Solvay*

Ilham Kadri, a Moroccan-born chemical engineer and accomplished global executive, assumed the role of CEO at Solvay, a Belgium-based, historically male-dominated chemical conglomerate, in 2019. While not a family successor in the narrow sense, Kadri's tenure presents a compelling case of female leadership in a legacy industrial sector undergoing a complex sustainability transition. Her efforts to reorient Solvay's strategic vision toward environmental responsibility offer a concrete illustration of how moral legitimacy can be constructed by women leaders in traditional, high-carbon enterprises.

Upon joining Solvay, Kadri inherited an organization with deep historical roots in fossil-based production and conventional industrial chemistry. Rather than pursuing incremental operational improvements, she launched a bold sustainability strategy under the banner of "Solvay One Planet", which articulated ambitious goals across multiple ESG dimensions: carbon neutrality, circular product design, biodiversity preservation, and sustainable sourcing. The strategy was framed not merely as a market response but as a moral imperative, a declaration that Solvay bore a collective responsibility to contribute to planetary well-being. Kadri positioned sustainability as a core element of the company's identity, thus tying corporate performance to broader ethical expectations in society.

Her leadership was met with a mix of internal skepticism and external scrutiny, particularly given her status as both a woman and an outsider in a company with a century-long European industrial heritage. In this context, her legitimacy could not be taken for granted. Rather, she constructed moral legitimacy by aligning the company's strategic narrative with globally accepted sustainability norms, engaging openly with stakeholders, and emphasizing ethical accountability in executive communications. Publicly stating that "climate is the challenge of our generation," Kadri's discourse activated a normative consensus that elevated her leadership beyond technical management to values-based stewardship.

Moreover, the legitimacy of her leadership was enhanced through symbolic and institutional actions, embedding sustainability KPIs into executive compensation, establishing internal governance mechanisms to monitor ESG progress, and spearheading partnerships with climate-science organizations. These initiatives signaled both moral commitment and institutional integrity, allowing

Kadri to overcome potential resistance and redefine what it meant to lead a chemical company in the 21st century.

Though Solvay is not a family enterprise, Kadri's experience parallels that of many female successors in family firms: she confronted legacy logics, challenged expectations of gender and authority, and relied on a compelling sustainability vision to construct a new foundation for organizational legitimacy [12]. Her case suggests that moral legitimacy, when anchored in clear values, authentic leadership, and systemic reform, can serve as a potent tool for overcoming institutional inertia and redefining strategic purpose.

#### *4.3. Case C: From Familial Continuity to Cognitive Legitimacy through Generational Anchoring*

This case explores the leadership trajectory of Christine Toretti, the third-generation successor of S.W. Jack Drilling Co., a family-owned oil and gas drilling company based in Indiana, Pennsylvania. Founded by her grandfather in 1918 and later led by her father, the company had long operated within the traditional, male-dominated landscape of the American energy sector. Following the sudden death of her father in 1990, Toretti assumed the role of CEO, becoming one of the few women to lead a high-carbon industrial firm with deep familial and regional roots. Her experience illustrates how cognitive legitimacy can be constructed by a female successor through the strategic mobilization of family legacy, cultural continuity, and professional credibility, thereby enabling a seamless leadership transition in a conventionally gendered organizational environment.

At the time of succession, Toretti faced multiple legitimacy challenges. Internally, employees, clients, and industry peers were accustomed to a patriarchal model of leadership, where authority and technical expertise were closely associated with male executives. Externally, the broader oil and gas sector remained skeptical of female leadership, particularly in operationally intensive roles. Moreover, Toretti's appointment came amid organizational grief and uncertainty, raising concerns about business continuity and stakeholder confidence. Against this backdrop, her leadership legitimacy was neither self-evident nor automatically conferred through lineage alone; rather, it had to be actively constructed across multiple stakeholder groups.

Toretti's initial strategy emphasized continuity and symbolic anchoring. Rather than radically altering the firm's direction, she framed her leadership as an extension of her father's legacy, reinforcing a narrative of familial stewardship and intergenerational trust. By invoking shared memories, longstanding client relationships, and inherited corporate values, she established a cognitive frame in which her succession appeared natural, expected, and culturally appropriate. This form of "generational anchoring" served to reduce uncertainty, restore organizational morale, and situate her leadership within a familiar and accepted institutional logic.

Concurrently, Toretti engaged in substantive organizational reforms that gradually shifted the perception of her leadership from symbolic continuity to strategic competence. Under her guidance, S.W. Jack Drilling expanded its operations, pursued technological modernization, and implemented stricter safety and compliance protocols. These moves generated positive performance outcomes and reinforced the pragmatic utility of her leadership. However, Toretti consistently avoided framing these accomplishments in gendered terms. Instead, she positioned herself as a business leader first, and a female successor second, thereby normalizing her authority and disarming gender-based scrutiny.

From a legitimacy theory perspective, Toretti's case demonstrates the strategic deployment of cognitive mechanisms in legitimizing female succession. Rather than directly confronting gendered expectations, she reconstituted them through narrative framing, performance credibility, and institutional embedding. Her approach exemplifies a distinct form of institutional work in which gender becomes backgrounded, not erased, but normalized, through alignment with inherited legitimacy and demonstrated effectiveness. Unlike cases where legitimacy is constructed through overt ethical signaling or stakeholder appeals, Toretti's pathway underscores the quiet power of symbolic continuity and professional habituation in overcoming gendered resistance within family-owned legacy industries [13].



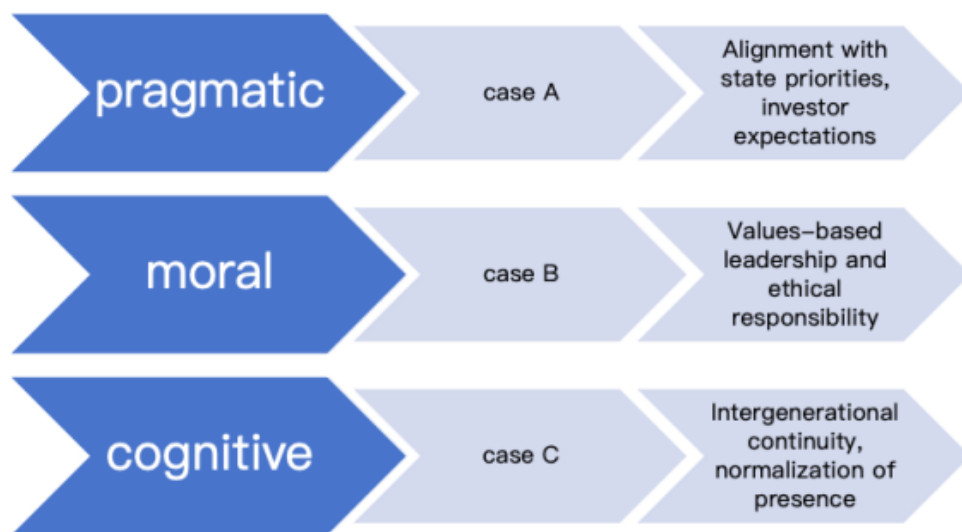
In sum, this case provides a complementary perspective to the earlier examples by highlighting how female successors can achieve legitimacy not through discursive disruption, but through organizational familiarity and gradual symbolic integration. Toretto's experience suggests that cognitive legitimacy, once established, offers a robust foundation for sustained leadership, particularly when gender and generational identity are skillfully fused into a coherent succession narrative.

## 5. Cross-Case Analysis: Comparative Patterns in Legitimacy Construction

The preceding case narratives reveal how female successors in petrochemical and high-carbon family enterprises employ differentiated strategies to construct leadership legitimacy amidst complex institutional terrains. While each case unfolds within distinct socio-cultural and organizational contexts, a cross-case comparison uncovers recurrent patterns and strategic divergences that illuminate the multi-dimensional nature of legitimacy work. This chapter synthesizes the findings along three analytical axes: the dominant legitimacy dimension mobilized, the institutional logics navigated, and the mechanisms of symbolic and material enactment.

### 5.1. Legitimacy Dimensions and Strategic Emphases

Each case illustrates a distinct dominant form of legitimacy constructed by the female successor, although all three forms, pragmatic, moral, and cognitive, intersect dynamically over time.



**Figure 1.**  
Legitimacy Dimensions and Strategic Emphases.

In Case A (Fan Hongwei / Hengli Group), the legitimacy work centers on pragmatic legitimacy, achieved through alignment with state environmental priorities, investor expectations, and ESG disclosure frameworks. Fan leveraged quantifiable sustainability metrics and innovation portfolios to demonstrate her utility to key stakeholders, thereby repositioning her leadership as technically effective and strategically aligned.

In contrast, Case B (Ilham Kadri / Solvay) foregrounds moral legitimacy, emphasizing values-based leadership and ethical responsibility. Kadri's "Solvay One Planet" strategy constructed a normative

vision that elevated sustainability to a moral imperative. Her discursive and institutional actions, embedding ESG KPIs in governance and public moral framing, enabled her to assert legitimacy in a historically male-dominated, industrial context.

Case C (Christine Toretta / S.W. Jack Drilling) exemplifies the construction of cognitive legitimacy, whereby the successor's leadership is framed as natural and inevitable. By aligning herself with intergenerational continuity and gradually normalizing her presence, Toretta dissolved resistance through familiarity, habit, and performance, rendering her authority unremarkable yet enduring.

These variations suggest that while legitimacy dimensions are contextually contingent, effective female successors often weave multiple forms into a sequential or layered strategy. For instance, Fan and Kadri both engaged in cognitive framing over time, embedding their legitimacy into institutional memory, even as their initial strategies emphasized pragmatic or moral appeals.

**Table 1.**  
Legitimacy Dimensions and Strategic Emphases.

Case	Female Successor	Organization	Dominant Legitimacy Form	Strategic Emphasis	Supplementary Legitimacy Layering
A	Fan Hongwei	Hengli Group	Pragmatic	Alignment with state environmental priorities, investor expectations, and ESG disclosure frameworks	Later embedded cognitive legitimacy through institutional memory
B	Ilham Kadri	Solvay	Moral	Values-based leadership and ethical responsibility, ESG KPIs in governance, public moral framing	Gradual cognitive framing over time
C	Christine Toretta	S.W. Jack Drilling	Cognitive	Intergenerational continuity and normalization of leadership presence	Reinforced through performance consistency

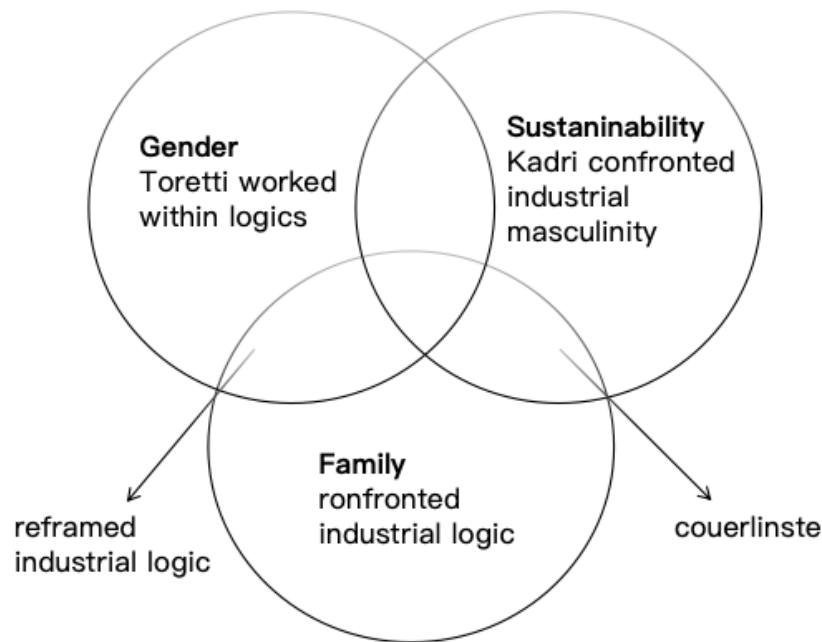
### 5.2. Navigating Institutional Logics: Gender, Family, and Sustainability

Across all cases, the successors operated at the intersection of competing institutional logics: the patriarchal family business tradition, the masculine-coded norms of industrial leadership, and the emergent logic of environmental sustainability. Each successor navigated these logics differently, balancing adaptation with transformation.

Fan reframed industrial logic by embedding green innovation into operational metrics, allowing her to recast sustainability not as an ethical disruption, but as a source of strategic advantage. Kadri confronted industrial masculinity more explicitly, positioning sustainability as a moral counter-logic that justified strategic realignment and legitimized her outsider status. Toretta, rather than overtly challenging institutional logics, worked within them, employing symbolic continuity and unmarked leadership to allow gender to recede as a basis for contestation.

This comparative lens reveals that legitimacy construction is not merely about gaining acceptance; it is also about reconfiguring the meaning of leadership, succession, and innovation within an industry. The female successors did not passively inherit institutional roles; they actively reshaped their contours through narrative, symbolism, and structural embedding.





**Figure 2.**  
Navigating Institutional Logics: Gender, Family, and Sustainability.

### 5.3. Mechanisms of Legitimacy Construction: Symbolic and Material Practices

Despite differences in industry position, geographic context, and succession pathways, the three cases reveal several convergent mechanisms through which female successors construct legitimacy in family-owned high-carbon enterprises. These mechanisms operate across symbolic and material domains, intertwining performative leadership with institutional embedding to gradually resolve the legitimacy deficit often associated with non-traditional successors.

A central mechanism across all cases is strategic narrative framing. Each successor employed a distinct narrative logic to align their leadership with broader organizational values and societal expectations. Fan Hongwei framed her leadership around a discourse of technocratic modernization, linking green transformation with national policy priorities and global investor standards. Ilham Kadri adopted a moral framing that cast sustainability not merely as strategy but as ethical responsibility, thereby expanding the evaluative criteria of leadership beyond operational performance. Christine Toretti, by contrast, invoked a legacy-based narrative, emphasizing continuity and generational trust to normalize her authority within a traditionally masculine industry. These narrative framings served as cognitive anchors, reducing ambiguity, affirming identity, and creating a shared interpretive space in which female leadership could be perceived as appropriate and necessary.

Another shared mechanism is the institutionalization of legitimacy through organizational practices and structures. Rather than relying solely on personal charisma or informal influence, all three successors embedded their leadership into the formal architecture of the firm. Fan institutionalized her vision through ESG reporting systems and sustainability-linked investments, creating measurable indicators of transformation that resonated with stakeholders. Kadri introduced governance reforms, integrated ESG performance into executive incentives, and established formal partnerships with climate organizations, concrete actions that reinforced the credibility of her moral claims. Toretti leveraged intergenerational rituals, professional governance protocols, and stable performance metrics to habituate her leadership within the company's normative structure. Through such mechanisms,

legitimacy becomes routinized, no longer contingent on individual persuasion but sustained by institutional logic.

Equally important is the boundary-spanning nature of legitimacy work. The successors in all three cases engaged audiences beyond the immediate family or enterprise, reaching across stakeholder domains to negotiate legitimacy with regulators, investors, employees, and the public. Tools such as public speeches, media interviews, external sustainability ratings, and industry recognition were mobilized to project an image of competent and committed leadership. These symbolic practices served to align the internal transformation of the firm with external expectations, thereby reducing institutional dissonance and extending the sphere of legitimation beyond organizational boundaries [14].

Finally, and perhaps most subtly, is the gender positioning strategy employed across cases. None of the successors explicitly mobilized gender identity as a primary claim to legitimacy. Instead, gender was backgrounded or strategically neutralized, professionalized in the case of Fan, embedded in ethical universalism for Kadri, and rendered invisible through familial continuity in Toretto's case. This suggests that gender, while undeniably salient in shaping legitimacy barriers, is rarely foregrounded in the successor's own narrative. Rather than overtly confronting gender norms, these leaders often disarm them through competence, alignment, and habituation, allowing legitimacy to emerge through what might be called "non-gendered excellence."

Taken together, these mechanisms underscore that legitimacy construction is neither episodic nor purely discursive. It is a sustained and multifaceted process, involving narrative articulation, institutional embedding, external engagement, and identity negotiation. Through the orchestration of these mechanisms, female successors in family-owned petrochemical and energy firms not only secure authority but also expand the repertoire of what legitimate leadership can look like in legacy industries.

#### 5.4. Toward a Typology of Legitimacy Work in Female Succession

Based on the three cases, a preliminary typology can be constructed:

**Table 2.**

Toward a Typology of Legitimacy Work in Female Succession.

Type	Core Logic	Legitimacy Focus	Primary Mechanism	Case
Technocratic Reframing	Strategic Performance	Pragmatic Legitimacy	ESG Alignment, Innovation Metrics	Fan (Case A)
Ethical Repositioning	Values-Based Vision	Moral Legitimacy	Governance Reform, Moral Narrative	Kadri (Case B)
Generational Embedding	Familial Continuity	Cognitive Legitimacy	Symbolic Framing, Institutional Habit	Toretto (Case C)

This typology suggests that legitimacy construction in female succession is neither monolithic nor reactive. It is a strategically differentiated process, influenced by institutional context, leadership style, and succession timing. Importantly, it highlights the agency of female successors in designing legitimacy, not merely inheriting or defending it [15].

In conclusion, the cross-case analysis demonstrates that legitimacy for female successors in petrochemical family enterprises is constructed through the active orchestration of narrative, performance, and symbolic resources, strategically tailored to the challenges and opportunities of their organizational contexts. Whether through technocratic expertise, ethical authority, or generational continuity, these successors expand the repertoire of leadership legitimacy in traditionally exclusionary domains, offering alternative models for navigating institutional transformation.

## 6. Conclusion

This study has explored the complex processes through which female successors in family-owned petrochemical and high-carbon enterprises construct leadership legitimacy while spearheading strategic

innovation and green transformation. Situated at the intersection of gender, family governance, and institutional change, these cases provide rich insight into how non-traditional successors navigate contested terrains of authority and meaning in legacy industries undergoing environmental transition [16].

Drawing on a multi-case qualitative approach, the research examined three distinct pathways of legitimacy construction: Fan Hongwei's technocratic repositioning of the Hengli Group through ESG performance and innovation narratives; Ilham Kadri's moral reframing of Solvay's industrial identity via values-based sustainability leadership; and Christine Toretti's intergenerational embedding of authority within S.W. Jack Drilling through symbolic continuity and institutional habituation. Each case demonstrated how female successors mobilize differentiated combinations of pragmatic, moral, and cognitive legitimacy to establish their leadership as both effective and appropriate in contexts historically resistant to female authority.

Theoretically, this study extends the literature on legitimacy and institutional work by foregrounding how gendered actors enact legitimacy not through confrontation, but through adaptive, layered, and often understated mechanisms. It highlights that legitimacy is not a binary state but a dynamic and multi-dimensional resource constructed through narrative framing, institutional embedding, boundary work, and identity positioning. In contrast to traditional views that treat legitimacy as conferred by formal succession or performance alone, the findings reveal that female successors often engage in recursive, relational, and symbolic practices that simultaneously conform to and transform existing institutional logics.

From a gender perspective, the study contributes to research on female leadership in family enterprises, particularly within high-carbon, male-dominated industries where gender norms are rigidly institutionalized. The findings show that legitimacy gaps for female successors can be effectively managed, not necessarily by foregrounding gender identity, but by weaving gender into broader strategic and organizational narratives. This suggests that gender-neutralization, rather than gender-assertion, may be a more viable pathway in certain institutional contexts.

Practically, the research offers important implications for family business governance, succession planning, and green transformation strategy. For incumbent leaders and boards, the cases underscore the importance of creating institutional scaffolding, including reporting mechanisms, stakeholder engagement platforms, and governance structures, that can support successors beyond the moment of transition. For female successors, the findings provide a repertoire of legitimacy-building strategies that extend beyond formal authority, emphasizing the value of symbolic alignment, stakeholder resonance, and narrative coherence.

Several limitations should be acknowledged. The sample size, though theoretically saturated, remains limited to three cases in specific regional and industry settings. While this enables in-depth exploration, it constrains generalizability. Moreover, the retrospective nature of data collection may privilege successful legitimacy narratives while obscuring failed or contested transitions. Future research could extend this inquiry by incorporating longitudinal designs, comparative analysis across industries or cultural contexts, and examination of non-successor female leaders who similarly challenge institutional norms.

In conclusion, this study contributes to a growing body of work that seeks to understand how leadership legitimacy is constructed under conditions of institutional complexity, gender asymmetry, and strategic change. By tracing how female successors in legacy industries navigate the dual imperatives of continuity and innovation, it offers a theoretically grounded and empirically rich account of leadership legitimacy as both a constraint and a capability, one that is socially produced, strategically enacted, and crucial for sustainable transformation in the family enterprise.

## Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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