Sustainable Leadership and the Food Waste Paradox in Danish Nursing Homes: Navigating Structural Constraints, Care Ideals, and Organizational Complexity

Introduction: *Food waste represents a material, ethical, and organizational challenge in long-term care, where nursing homes must balance person-centred nutrition with standardized procurement systems, regulatory safety requirements, and extensive documentation procedures. These structural conditions frequently lead to over-ordering and unavoidable waste. Leadership is therefore central to understanding how organizations navigate the tension between individualized care and system-imposed constraints.* ***Methods:*** *A convergent mixed-methods design was employed, combining a national survey of nursing-home leaders with supplementary semi-structured interviews. The survey captured leadership characteristics, leadership styles, and sustainability practices across Danish nursing homes. Interviews explored leaders' interpretations of sustainability, structural barriers, and everyday routines related to food provision. This approach enabled the integration of generalizable quantitative patterns with in-depth qualitative insight.* ***Results:*** *Survey findings indicate that leaders with higher seniority, advanced educational qualifications, and closer proximity to frontline practice more frequently implement sustainability initiatives. Relationship-oriented and change-oriented leadership styles were associated with stronger sustainability orientation, whereas task-oriented leadership demonstrated limited influence. Qualitative analysis revealed a persistent* ***food-waste paradox****: the simultaneous requirement to uphold resident autonomy while working within inflexible procurement cycles and regulatory frameworks. Leaders described navigating this paradox as an ethical and relational task requiring psychological safety, reflective dialogue, and interdisciplinary collaboration between care and kitchen staff.* ***Discussion:*** *These findings correspond with established evidence on ethical leadership development and with known barriers to effective nurse leadership. They also echo broader hospital and elder-care research emphasizing the importance of leadership and system design in reducing food waste. The study contributes by illustrating how leadership practices intersect with structural conditions, underscoring the need for regenerative leadership approaches, greater procurement flexibility, and the careful implementation of digital monitoring tools that support learning rather than surveillance.*

Introduction

Background and Rationale

Across Europe, long-term care (LTC) faces intensifying demographic and organizational pressures. Within this context, food waste has become a prominent sustainability and quality issue, with hospital and care-service research identifying structural barriers such as standardized production, limited adaptability, and insufficient monitoring (Cook et al., 2023; Mu'awanah et al.,

2024)). In Denmark, bulk procurement, fixed menus, and regulatory demands often clash with individualized nutrition and daily variability in appetite, fostering predictable surpluses. These tensions mirror broader New Public Management (NPM) dynamics that prioritize efficiency and standardization over local responsiveness.

Understanding leadership is therefore central. Leadership shapes culture, decision autonomy, and adaptive capacity. Prior studies in care settings show that ethical and interpersonal challenges are arenas for leadership learning (Laaksonen & Tenhunen, 2023), while barriers to effective nurse leadership include limited preparation, resource constraints, and organizational silos (Hughes, 2018). Beyond hospitals, sustainability scholarship connects caregiver roles to eco-conscious behaviours and highlights multi-dimensional sustainability in LTC—economic, social, environmental, and technological (Park et al., 2025; Tur-Sinai et al., 2025)

The Food-Waste Paradox in Nursing Homes

We conceptualize the Food-Waste Paradox as the simultaneous need to uphold autonomy and appetitive choice while operating within inflexible systems. Personalization versus standardization, flexibility versus regulation, efficiency versus quality, and environmental goals versus workload pressures must be navigated rather than solved. Behavioural studies and guidance documents suggest that waste prevention requires both technical and organizational strategies, including staff engagement and routine monitoring (Visschers et al., 2015; WRAP, 2017)

Leadership, Sustainability, and Organizational Complexity

Contemporary sustainability leadership emphasizes relational capacity and systems thinking; regenerative leadership extends this by seeking net-positive effects for people and systems(Elkington J, 1997; Paul et al., 2025). In practice, LTC leaders must cultivate psychological safety and cross-boundary collaboration while negotiating NPM constraints.

Purpose and Contribution

This study examines how leadership styles, identities, and structures shape food-waste practices in Danish nursing homes and articulates implications for organizational design. By integrating paradox theory with regenerative leadership and organizational perspectives, we contribute a multi-level explanation of why some homes reduce waste while others struggle (Park et al., 2025; Smith & Lewis, 2011) .

Literature Review

Food Waste in Institutional Care

Hospital and LTC studies identify recurring structural drivers of waste (standardized menus, portioning routines, rigid logistics) and emphasize leadership-enabled monitoring and diversion strategies (Cook et al., 2023; Mu'awanah et al., 2024). Systematic reviews highlight donation, composting, and industrial reuse, but also barriers related to contamination risks and workflow alignment (Cook et al., 2023).

Sustainability Dimensions in LTC

Sustainability in LTC spans economic, social, environmental, and technological dimensions (Park et al., 2025) . Broader sustainability and circular-economy literatures report opportunities for prevention, reuse, and valorization (Elgarahy et al., 2023; Zhang et al., 2022). The 'safe operating space' perspective reinforces the relevance of planetary boundaries for institutional practice (Rockström et al., 2013).

Caregiving, Behaviour, and Engagement

Caregivers often show higher engagement in eco-conscious behaviours than non-caregivers, suggesting potential leverage in professional care teams (Tur-Sinai et al., 2025). Behavioural surveys and guidance in households and care contexts point to planning, portioning, and feedback as levers for change (Visschers et al., 2015; WRAP, 2017).

Leadership in LTC

Ethnographic and conceptual work depicts leadership as a distributed, relational practice that shapes quality and responsiveness; ATINER scholarship documents ethical learning in difficult situations and barriers that impede nursing leadership advancement ((Hughes, 2018; Laaksonen & Tenhunen, 2023).

Summary

The literature motivates a leadership-centred, systems-aware analysis of food waste in nursing homes, integrating structural constraints and relational capacities (Cook et al., 2023; Smith & Lewis, 2011).

Theoretical Framework

Paradox Theory

Paradox theory conceptualizes persistent, interdependent tensions (e.g., personalization vs. standardization) and recommends iterative navigation through dialogue and learning (Smith & Lewis, 2011).

Sustainable and Regenerative Leadership

Sustainable leadership emphasizes long-term, values-based practice; regenerative leadership seeks net-positive outcomes and organizational learning (Elkington J, 1997; Paul et al., 2025). Psychological safety enables voice and experimentation (Edmondson, 2018).

Organizational Theory and NPM

NPM logics of efficiency, measurement, and centralized procurement can constrain local responsiveness, creating structurally produced waste unless counterbalanced by relational leadership and flexible system design (Park et al., 2025; Thyberg & Tonjes, 2016).

Methods

We employed a convergent mixed-methods design, integrating an online national survey of nursing-home leaders and semi-structured interviews. The survey covered leadership characteristics, styles, sustainability orientation, food-waste practices, and organizational context. Reliability was acceptable (α = .78–.91). Interviews explored understandings of sustainability, routines, barriers/enablers, interprofessional collaboration, and leadership strategies. Transcripts were coded in NVivo using descriptive, pattern, and theoretical coding. Integration used joint displays to compare convergences, complements, and divergences. Ethical approval and GDPR compliance were ensured; participation was voluntary and anonymized.

Results

The integrated mixed-methods analysis provides a comprehensive understanding of how leadership styles, organizational structures, sustainability beliefs, and contextual constraints influence food-waste management in Danish nursing homes. The expanded findings presented here deepen and nuance the previously reported results.

Quantitative Findings

Analysis of the national survey (N =) revealed substantial variation across nursing homes in sustainability practices, food-waste monitoring, and leadership behavior. Leaders working in municipalities with centralized procurement reported lower flexibility in ordering and adjusting meal production, which correlated with higher levels of reported food waste. Conversely, decentralized or hybrid procurement models were associated with more responsive ordering routines and lower waste levels. Leaders' **educational background** played a significant role. Those holding a bachelor's or master's degree in nursing, public health, or management showed significantly higher sustainability orientation scores. Leadership seniority also emerged as a key predictor, with leaders exceeding 8–10 years of experience demonstrating greater ability to implement multi-layered sustainability strategies, including staff-led innovation processes, menu adjustments, and interdepartmental learning forums. The strongest predictors of sustainability engagement were **relationship-oriented leadership** and **change-oriented leadership**. Regression models showed that leaders who rated highly on relationship orientation were more likely to implement participatory approaches such as joint menu planning, resident involvement, and interdisciplinary discussions around food waste. Change-oriented leadership predicted more concrete outcomes such as revised ordering routines, staff training in portioning, pilot tests of digital monitoring tools, and collaboration with local suppliers. In contrast, **task-oriented leadership** did not significantly predict implementation of waste-reduction actions. Homes led primarily through task-direction, control, and procedural enforcement showed weaker staff engagement, fewer innovations, and less adaptability to fluctuating resident needs. Contextual variables moderated these relationships. For instance, high administrative load attenuated the positive impact of relationship-oriented leadership. Leaders who spent the majority of their time on documentation tasks reported difficulty maintaining presence in daily care practice, which weakened their ability to influence staff behaviors around portioning, leftover handling, and monitoring.

Qualitative Findings

Interviews with 6 participants offered in-depth insights into how food waste emerges in everyday practices, how staff interpret sustainability, and how leaders negotiate systemic constraints.

Theme 1: The Food-Waste Paradox as a Lived Experience

Participants consistently described food waste as an unavoidable tension between ensuring resident autonomy and upholding environmental responsibility. For example, kitchen staff repeatedly emphasized the ethical discomfort of discarding uneaten portions, yet they also described how providing sufficient choice for residents — especially those with cognitive decline or diminished appetites necessitated preparing more food than required. This paradox was especially acute in units caring for residents with dementia, where

food preferences varied unpredictably and fluctuated throughout the day. Care staff expressed frustration when they could not adjust meal orders closer to serving time due to procurement deadlines. This mismatch between real-time knowledge of resident appetite and rigid ordering systems contributed significantly to food waste.

Theme 2: Leadership as Ethical Framing and Emotional Work

Leaders described sustainability not only as a technical objective but as an ethical stance linked to responsibility, respect for resources, and intergenerational justice. Many spoke of food waste as "morally wrong" and felt personally accountable for addressing it. Some leaders described emotional strain from witnessing waste while lacking the authority to change procurement systems or reduce administrative obligations. Leaders with stronger ethical framing tended to communicate sustainability values more frequently and explicitly, which fostered shared purpose among staff.

Theme 3: Structural Barriers and System-Induced Waste

Procurement systems emerged as the strongest structural barrier. Several leaders described systems that forced ordering 5–7 days in advance, with fixed meal components that could not be altered after submission. Others described contractual obligations requiring ordering in fixed portion sizes (e.g., trays of 10 or 20), even when resident numbers fluctuated. Regulatory rules, particularly those related to hygiene, also contributed to waste. Staff emphasized that they were not permitted to reuse leftovers even when the food was intact.

Theme 4: Psychological Safety and Cross-Disciplinary Collaboration

Homes with low waste were characterized by a strong culture of trust and communication between care and kitchen staff. Leaders created opportunities for teams to exchange observations about resident appetite and adjust routines accordingly. This often occurred informally — through hallway conversations, shared lunches, or quick debriefs — but was consistently described as crucial. In contrast, high-waste homes showed clear siloing. Kitchen staff reported feeling invisible or undervalued, while care staff felt excluded from meal planning and production decisions.

Theme 5: Adaptive, Locally Driven Innovation

In several nursing homes, leaders encouraged staff to experiment with meal-planning innovations such as "mini portions", shift-based forecasting, or trial days where residents provided feedback before full-scale menu rollout. These innovations often came from frontline staff — especially kitchen personnel who observed waste first-hand.

Discussion

Findings indicate that relationship- and change-oriented leadership are associated with sustainability engagement, consistent with regenerative leadership's emphasis on relational capacity and learning(Edmondson, 2018; Paul et al., 2025). Leaders framed sustainability as an ethical responsibility yet faced moral stress under rigid procurement and documentation, a pattern parsable via paradox theory (Smith & Lewis, 2011) Systemic factors—centralized contracts, standardized menus, administrative load—help explain why even motivated leaders achieve uneven results, echoing institutional analyses of NPM in care contexts (Park et al., 2025; Thyberg & Tonjes, 2016). Practical implications include leadership development in reflective, adaptive skills; redesign of procurement for local flexibility; structured interdisciplinary forums; deliberate cultivation of psychological safety; and careful deployment of digital monitoring as learning tools(Visschers et al., 2015; WRAP, 2017).

Interpretation of Key Findings

This study demonstrates that leadership — particularly in its relational and change-oriented dimensions — plays a decisive role in shaping sustainable food practices in nursing homes. The positive association between leadership seniority, education, and sustainability engagement suggests that more experienced and highly educated leaders possess stronger adaptive capacity, professional judgment, and ability to mobilize interdisciplinary collaboration. However, the findings show equally clearly that leadership cannot be understood in isolation from organizational structures. Procurement rigidity, administrative overload, and regulatory constraints reduce leaders' ability to translate intentions into practice. This tension between agency and structure is the very essence of the **food-waste paradox**.

Integration with Paradox Theory

The data align strongly with paradox theory, which argues that leaders must navigate persistent contradictions rather than resolve them. Nursing leaders face competing demands: honoring resident preferences, meeting nutritional requirements, ensuring safety, fulfilling documentation requirements, and reducing waste. Successful leaders were those who embraced paradox by:

- legitimizing competing values (care vs. efficiency)
- engaging staff in reflective dialogue
- supporting iterative experimentation
- framing sustainability as a collective, meaningful project

Leaders who avoided or minimized paradox tended to fall back on standardized routines that unintentionally reinforced waste.

Integration with Sustainability and Regenerative Leadership

Regenerative leadership emphasizes developing the organization as a learning system capable of adaptation, renewal, and holistic well-being. Many of the practices observed in low-waste homes cross-disciplinary learning, moral reflection, psychological safety, experimentation reflect regenerative leadership principles. Homes with regenerative leadership characteristics achieved:

- stronger collaboration
- more innovation
- greater alignment between values and actions
- reduced waste

In contrast, homes relying on traditional managerial styles exhibited compliance but not engagement.

Integration with Organizational/NPM Theory

NPM reforms introduced efficiency logics into elder care, often at the expense of professional autonomy. This study shows how such reforms shape food production systems in ways that inadvertently create waste. NPM-driven documentation loads also reduce leaders' availability for frontline engagement, and the absence of leadership presence weakens staff capacity to adapt routines. Thus, food waste can be interpreted as an unintended outcome of NPM rationalization: efficient on paper, inefficient in practice.

Methodological Strengths

The study's convergent mixed-methods design is a key strength. By combining a national survey with in-depth interviews, the study captures both breadth and depth. Quantitative data allow for generalizable insights about leadership predictors, while qualitative data illuminate mechanisms, emotional dynamics, and contextual complexity. Sampling diversity enhances credibility. Leaders from multiple regions, organizational sizes, structures, and care models were represented. Similarly, qualitative sampling included leaders, care workers, and kitchen staff, producing a rich, triangulated dataset. Analytically, the use of pattern coding and theoretical coding strengthened conceptual integration. The use of joint displays enabled systematic comparison of quantitative and qualitative findings.

Methodological Limitations

However, several limitations must be acknowledged. **Cross-sectional design**: Because data were collected at a single point in time, causality cannot

be inferred. Leadership style may influence sustainability but sustainability challenges may also shape leadership style.

Self-reported data: Survey responses are subject to recall bias and social desirability bias. Leaders may overestimate their engagement in sustainability.

Lack of observational data: The study relied on interview accounts rather than direct observation of meal production and waste handling. Observational studies could capture tacit practices and micro-level routines not articulated in interviews.

Procurement system complexity: Some procurement constraints were described but not independently verified. Future studies could analyze procurement contracts and ordering data.

Variation across municipalities: Structural differences between municipalities are significant and may confound some leadership effects.

Implications of Methodological Choices

Despite these limitations, the design is well-suited to the study's purpose: understanding how leadership and structures interact. The methodological triangulation enhances credibility, especially given the complexity of sustainability work in elder care.

Conclusion

Sustainable food management in nursing homes hinges on leadership that can navigate organizational paradoxes while advocating for structural flexibility. Relationship- and change-oriented practices enable progress, but durable impact requires procurement reform, reduced administrative burden, and a learning-oriented culture (Cook et al., 2023; Mu'awanah et al., 2024).

Implications for Practice

The findings suggest several actionable implications for leaders, municipalities, and policymakers. The following table synthesizes key organizational and leadership strategies that can enhance sustainability efforts within care and food-service settings. The themes highlight the need for strengthened leadership capacity, more flexible procurement systems, responsible use of digital tools, cross-disciplinary collaboration, and a supportive work culture. Together, these elements outline how institutions can create the conditions for adaptive, learning-oriented, and ethically grounded practices that reduce food waste while supporting resident well-being.

Table 1. *Organizational and Leadership Recommendations*

Topic	Key Points
Leadership Development	• Leaders need training in paradox navigation, ethical leadership, and regenerative leadership approaches. • Leadership programs should include modules on psychological safety, reflective practice, and interdisciplinary facilitation.
Procurement Reform	• Municipalities should provide greater flexibility in ordering systems (e.g., shorter ordering cycles, adjustable portioning, modular meal components). • Procurement must shift from bulk efficiency logics toward "adaptive supply", responsive to resident need.
Digital Tools for Monitoring	• Digital portioning and waste-tracking tools can help identify patterns, but implementation must be paired with training and learning forums. • Data should be used for collective reflection rather than control or surveillance.
Cross-Disciplinary Collaboration	• Establish regular forums where care staff, kitchen staff, and leaders meet to discuss menu planning, appetite trends, and improvement opportunities. • Co-creation with residents and families should be explored, especially in dementia units.
Psychological Safety and Work Culture	• Leaders should model openness, admit uncertainties, and encourage experiment-driven learning. • Recognition practices should highlight staff contributions to sustainability (e.g., innovations in portioning, feedback loops).

Future research should examine:

To better understand causality, future studies should track leadership practices and sustainability outcomes over time, perhaps across policy or procurement reforms. The table outlines central research avenues that could deepen understanding of the food-waste paradox and its organizational dynamics. The proposed designs span longitudinal, intervention-based, observational, and multi-level methodologies, while also emphasizing international comparison and resident-centered inquiry. These lines of research can help illuminate the complex interplay between policy, leadership, everyday practices, and resident needs—ultimately informing more effective, context-sensitive solutions.

Table 2. *Directions for Future Research*

Topic	Key Points
1. Longitudinal Designs	• To better understand causality, future studies should track leadership practices and sustainability outcomes over time, potentially across policy or procurement reforms.
2. Intervention Studies	Pilot studies could test: • co-designed menu planning • digital monitoring tools • flexible procurement models • cross-disciplinary learning forums
3. Observational Studies	• Direct workplace observations could uncover tacit practices, embodied knowledge, and micro-routines that shape food waste beyond formal procedures.
4. Multi-Level Modeling	• Useful for analyzing how municipal policies interact with organizational culture and individual leadership behavior.
5. Comparative International Research	• Comparing Nordic, continental, and Anglo systems could illuminate how different governance models shape the food-waste paradox.
6. Resident-Centered Research	• More work is needed on how resident preferences, dignity, appetite fluctuations, and cognitive decline intersect with sustainability.

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