User-Driven Innovation under Pressure: Grassroots Solutions in Early Care Contexts

Abstract

Innovation research has largely focused on formal organizational settings, overlooking everyday practices as sites of innovation. This paper examines early mother–infant feeding as a context of user-driven and grassroots innovation under conditions of sustained pressure, constraint, and emotional intensity. Drawing on an exploratory mixed-methods design (survey, interviews, and field research), the study identifies three forms of innovation: modification of existing artefacts, improvisational problem solving, and user-created solutions shared informally.

The findings show that pressure and perceived risk act as key drivers of innovation, enabling rapid and highly situated responses. Building on this, the paper introduces the concept of *everyday extremity* to describe contexts where high-stakes conditions are persistent yet normalized. By foregrounding care practices, the study extends user-driven innovation theory and contributes to debates on social and responsible innovation, with implications for inclusive innovation management and participatory design.

1. Introduction

Innovation management research has traditionally focused on formal organizational settings, market actors, and structured innovation processes. Within this dominant framing, innovation is typically associated with deliberate activities such as R&D, product development, or entrepreneurial initiatives, and is often assumed to occur under conditions of relative stability, resource availability, and strategic intent (Fagerberg et al., 2005; Eric von Hippel). As a result, everyday practices—particularly those located in private or informal domains—are rarely considered relevant sites of innovation.

Early mother–infant feeding provides a striking example of this blind spot. It is commonly framed as a routine, private, and largely non-innovative care activity, positioned outside the boundaries of formal innovation systems. However, research from health, sociology, and care studies suggests a markedly different reality. Early feeding contexts are frequently characterised by intense time pressure, emotional strain, physical exhaustion, and high perceived consequences of failure (Dykes & Flacking, 2016; Schmied et al., 2011). These situations are shaped by embodied knowledge, relational dynamics, and rapidly changing conditions, which challenge standardised solutions and require continuous adjustment (Mol et al., 2010; Lucy Suchman).

Under such conditions, commercially available feeding products and guidelines often fail to meet situational needs. This failure is rarely attributable to isolated technical deficiencies. Rather, it reflects a persistent misalignment between design assumptions—such as stable routines, predictable users, and clearly articulated preferences—and the realities of care under pressure (Oudshoorn & Pinch, 2003). As a consequence, users are compelled to actively adapt, combine, and create artefacts in order to sustain care practices. These activities resonate with research on user-driven and grassroots innovation, which highlights how novel solutions frequently emerge from users' attempts to cope with unmet needs in situated contexts (von Hippel, 2005; Smith et al., 2014).

At the same time, a growing body of research suggests that constraint, urgency, and resource limitation can act as catalysts for innovation rather than barriers (Baker & Nelson, 2005; Mehta & Ramaswami, 2018). Studies of crisis-driven and extreme contexts show that high-stakes conditions can accelerate problem solving and foster unconventional solutions (Linnenluecke et al., 2020). However, these insights have largely been derived from episodic disruptions—such as disasters, organisational crises, or resource shocks—while paying limited attention to contexts in which such conditions are persistent and normalised.

This paper argues that early care practices constitute such a context. It introduces the concept of *everyday extremity* to capture situations in which temporal pressure, emotional intensity, perceived risk, and limited exit options are structurally embedded in everyday life rather than occurring as exceptional events. In these contexts, innovation is not a discretionary or opportunity-driven activity, but an ongoing requirement for making practice possible.

Despite advances in user-driven and social innovation research, existing studies have paid limited attention to how innovation unfolds in contexts where pressure is not episodic but persistent, and where innovation is embedded in morally charged care practices rather than discretionary activities. This represents a significant gap, as such contexts challenge core assumptions about agency, intentionality, and the nature of innovation processes.

Addressing this gap, the present study explores how user-driven innovation emerges in early feeding contexts and how innovation processes are shaped by pressure, constraint, and emotional intensity. Drawing on an exploratory mixed-methods design, the paper empirically examines situated innovation practices and develops a conceptual lens for understanding innovation under conditions of everyday extremity. In doing so, it contributes to innovation management and social innovation research by expanding the empirical scope of innovation and by challenging dominant assumptions about where and how innovation occurs.

2. Theoretical Background

Innovation research has increasingly recognised that novel solutions often emerge outside formal organisational settings. However, existing perspectives still rely on implicit assumptions about stability, agency, and resource availability. This section brings together research on user-driven and grassroots innovation with insights on innovation under constraint to develop a lens for understanding innovation in contexts of sustained pressure.

2.1 User-Driven and Grassroots Innovation

User-driven innovation research has established that users are not merely passive adopters but active contributors who develop and modify solutions to address unmet needs (e.g., Eric von Hippel). This perspective has significantly expanded the understanding of where innovation originates, highlighting distributed and decentralised processes of knowledge creation.

Building on this foundation, subsequent work has broadened the scope toward grassroots, informal, and community-based innovation, emphasising that innovation frequently occurs outside formal organisations and market structures (Hargadon & Fanelli, 2002; Smith et al., 2014). These approaches foreground experimentation, bricolage, and situated problem solving, often under conditions of limited resources and institutional support (Baker & Nelson, 2005; Hargreaves et al., 2013).

At the same time, more recent work in social innovation has shifted attention toward the embeddedness of innovation in social practices and everyday life (Cajaiba-Santana, 2014). From this perspective, innovation is not only the outcome of intentional design activities but also emerges through ongoing adjustments within practice.

Despite these advances, the empirical focus of user-driven and grassroots innovation research remains relatively narrow. Much of the literature concentrates on technical domains, hobbyist communities, or sustainability initiatives, where users are often characterised as motivated, skilled, and relatively autonomous. In contrast, care-related contexts—despite their complexity and societal relevance—remain largely underexplored. This neglect reflects broader socio-material and gendered assumptions that position care as routine, reproductive work rather than as a site of innovation (e.g., Lucy Suchman).

As a result, existing frameworks provide limited insight into how innovation unfolds in contexts where users operate under constraint, responsibility, and emotional intensity.

2.2 Innovation under Pressure and Constraint

A growing body of research challenges the assumption that innovation requires resource abundance and stable conditions. Instead, studies on innovation under constraint highlight how scarcity, urgency, and limitation can act as catalysts for creative problem solving. In particular, work on bricolage shows how actors "make do" by recombining available resources in novel ways under conditions of constraint (Baker & Nelson, 2005).

Related research on crisis-driven innovation and extreme contexts demonstrates that high levels of urgency, risk, and consequence can accelerate innovation processes and foster unconventional solutions (Linnenluecke et al., 2020; Mehta & Ramaswami, 2018). These studies suggest that pressure does not necessarily inhibit innovation but can fundamentally reshape how it occurs.

However, existing research in this area predominantly focuses on episodic and large-scale disruptions, such as natural disasters, organisational crises, or resource shocks. Less attention has been paid to contexts in which pressure and constraint are not exceptional but persistent features of everyday life.

To address this gap, this paper introduces the concept of *everyday extremity* to capture situations characterised by sustained temporal pressure, emotional intensity, perceived risk, and limited exit options. Unlike crisis-based perspectives, everyday extremity refers to conditions that are structurally embedded and socially normalised rather than temporary disruptions.

Early care practices provide a particularly relevant empirical context to examine these dynamics. They combine high stakes, embodied knowledge, and situational variability, while simultaneously remaining largely invisible within dominant innovation frameworks. As such, they offer a theoretically rich site to explore how user-driven innovation unfolds when pressure is not an exception, but the norm.

3. Research Design and Methods

This study adopts an exploratory mixed-methods design to capture informal, situated, and often invisible innovation practices in early care contexts. Such an approach is particularly suitable for investigating underexplored phenomena where existing theoretical frameworks remain limited and where innovation processes are embedded in everyday practice rather than formalised structures (Creswell & Plano Clark, 2018; Edmondson & McManus, 2007).

Data collection comprised three complementary components, allowing for methodological triangulation and a richer understanding of user-driven innovation under conditions of everyday extremity (Jick, 1979).

First, an online survey was conducted to identify recurring challenges, adaptation practices, and patterns of artefact use in early feeding contexts. The survey provided a broad empirical overview and helped to map common situations of misfit between user needs and existing solutions.

Second, semi-structured interviews were carried out to explore lived experiences, decision-making processes, and the meanings attached to user-developed solutions. This method enables access to subjective interpretations and tacit dimensions of practice that are not easily captured through standardised instruments (Kvale & Brinkmann, 2009).

Third, the study incorporated action-oriented field research, allowing for situated observation of problem-solving practices and artefact modification in real-world care settings. This approach aligns with practice-based research traditions that emphasise the importance of studying phenomena in situ, particularly when action is embodied, time-sensitive, and difficult to reconstruct retrospectively (Nicolini, 2012).

Participants were mothers in early feeding phases, selected to capture variation in experiences and contexts rather than statistical representativeness. This sampling strategy follows principles of theoretical and purposive sampling, which are appropriate for exploratory research aimed at generating conceptual insights (Glaser & Strauss, 1967; Patton, 2002)

Data were analysed inductively, focusing on innovation processes rather than finished outcomes. The analysis followed established principles of qualitative coding and constant comparison to identify recurring patterns and mechanisms across cases (Corbin & Strauss,

2015). This process-oriented perspective is particularly suited to capturing emergent, informal, and context-dependent forms of innovation that remain largely inaccessible to outcome-focused or retrospective research designs.

4. Findings: User-Driven Innovation under Everyday Extremity

Across all cases, early feeding practices emerge not as routine care, but as situations of everyday extremity, characterised by temporal compression, emotional intensity, bodily exhaustion, and high perceived consequences of failure. Within these conditions, commercially available feeding solutions frequently fail—not due to isolated technical flaws, but because of a persistent misfit between design assumptions and the realities of care under pressure.

This misfit triggers user-driven innovation in the form of situated, adaptive practices. The analysis identifies four distinct modes of care-oriented innovation, each shaped by different configurations of pressure, stability, and agency.

4.1 Survival-Oriented Creation

In situations of acute escalation, innovation emerges as an immediate response to breakdown. Caregivers abandon normative guidelines and focus on ensuring functionality in the moment. Solutions are created through ad-hoc reconfiguration and improvised artefact use. These innovations are highly local, rarely stabilised, and primarily oriented toward restoring care viability. Innovation here is not opportunity-driven, but a necessity under extreme constraint.

4.2 Negotiated Hybrid Innovation

Under conditions of ongoing pressure, innovation takes the form of iterative adjustment. Caregivers negotiate between normative expectations (e.g., “proper” feeding practices) and practical feasibility. This results in hybrid solutions that combine, adapt, and repurpose existing artefacts. These configurations stabilise temporarily but remain context-dependent. Innovation is thus an ongoing process of alignment rather than a discrete outcome.

4.3 Momentary Sense-Making

In highly unstable situations, innovation becomes ephemeral and processual. Caregivers engage in continuous micro-adjustments, guided by embodied knowledge and real-time feedback from the infant. Solutions are intentionally non-stabilised and evaluated solely by immediate effectiveness. This mode highlights that innovation can be transient and still functionally sufficient.

4.4 Distributed Coordination Work

Innovation also extends beyond individual users. In fragmented care settings involving multiple caregivers, innovation emerges through coordination and alignment across actors, artefacts, and routines. Solutions are designed to be transferable and workable across contexts. Agency is distributed, and innovation resides in relational configurations rather than individual actions.

4.5 Cross-Case Insight

Across all four modes, user-driven innovation does not follow a linear or cumulative trajectory. Instead, it emerges as a situated accomplishment of care under pressure—often improvised, provisional, and distributed. Pressure and perceived risk act as key drivers, not barriers, of innovation. These findings challenge dominant assumptions that innovation requires stability, planning, and resource slack.

5. Contributions and Implications

This paper contributes to innovation research by reframing user-driven innovation as a form of care work under conditions of everyday extremity.

Theoretical Contribution

First, the study extends user-driven and grassroots innovation research by demonstrating that innovation can emerge from necessity, constraint, and moral responsibility, rather than from opportunity and user empowerment. The identified modes show that innovation may be

improvised, non-stabilised, and distributed across people and situations. This challenges dominant models that conceptualise innovation as intentional, cumulative, and outcome-oriented.

By introducing the concept of *everyday extremity*, the paper provides a lens for analysing contexts in which high-stakes conditions are persistent yet normalised. This shifts the focus of innovation research toward everyday practices that have remained largely invisible despite their structural relevance.

Managerial and Design Implications

Second, the findings have important implications for innovation management and design. Failures of feeding products are not isolated design flaws but reflect systemic mismatches between product assumptions and real-world use conditions.

Designing for such contexts requires moving beyond idealised user scenarios toward:

- flexibility and adaptability,
- support for improvisation and hybrid use,
- and consideration of distributed care settings.

Engaging users operating under pressure can provide critical insights into unmet needs and situational constraints that remain invisible in conventional innovation processes.

6. Discussion

This study examined how user-driven innovation emerges in early feeding practices under conditions of sustained pressure. The findings point to a fundamental shift in how innovation in such contexts should be conceptualised.

6.1 Rethinking User Innovation under Constraint

The results challenge dominant assumptions in user innovation research that frame users as empowered, intentional, and opportunity-driven innovators (e.g., Eric von Hippel). Instead, innovation in early care contexts emerges primarily from necessity rather than choice. Users

innovate not to explore new possibilities, but to ensure that care remains viable when existing solutions fail.

Moreover, innovation does not follow linear or goal-oriented processes. Across the identified modes, it appears as improvised, provisional, and often non-stabilised. While prior research has shown that constraints can foster innovation through processes such as bricolage (e.g., Baker & Nelson, 2005), this study extends these insights by demonstrating that such conditions can be persistent rather than episodic. Innovation here is not a response to temporary scarcity, but an ongoing requirement of everyday practice.

6.2 Everyday Extremity as an Innovation Context

By introducing the concept of *everyday extremity*, this paper contributes a new lens for innovation research. Existing work on innovation under extreme conditions has largely focused on crises, disasters, or exceptional events (e.g., Linnenluecke et al., 2020). In contrast, everyday extremity captures contexts in which pressure, risk, and constraint are continuous and normalised.

This distinction is theoretically important. It suggests that innovation is not only triggered by rare disruptions but can be a structural feature of everyday life in certain domains. Care practices, in particular, represent environments in which high-stakes conditions are routine, yet largely overlooked in innovation research. As a result, significant forms of innovation remain empirically underexplored and conceptually underdeveloped.

6.3 From Individual Innovation to Relational Practice

The findings further suggest a shift from viewing innovation as an individual activity toward understanding it as a relational and practice-based phenomenon. Particularly in the mode of distributed coordination work, innovation emerges through the alignment of people, artefacts, and routines rather than through individual problem-solving.

This perspective resonates with practice-based approaches to organising (e.g., Davide Nicolini), which emphasise that action is situated, embodied, and distributed. It also aligns with research on emergent and collective processes in organisations (e.g., Beck & Plowman, 2009). By applying these insights to user innovation, the study expands the analytical focus from the individual user to care configurations as the locus of innovation.

6.4 Implications for Innovation Management

For innovation management, the findings suggest that current approaches may systematically overlook critical sources of innovation. Conventional methods—such as user workshops, ideation sessions, or lead-user identification—typically rely on stable environments, reflective users, and clearly articulated needs.

In contrast, users operating under conditions of everyday extremity:

- have limited capacity for reflection and articulation,
- develop solutions in real time,
- and prioritise immediate functionality over optimisation.

This implies that organisations need alternative modes of engagement. Rather than extracting ideas from users, innovation processes should focus on observing situated practices, identifying moments of breakdown and misfit, and supporting flexible and adaptable solutions.

Such an approach aligns with emerging perspectives in social innovation that emphasise context sensitivity and embeddedness (e.g., Cajaiba-Santana, 2014). Ultimately, designing for care under pressure requires a shift from optimising products toward supporting practices and enabling coordination across actors and situations.

7. Implications for Innovation Management and Policy

The findings suggest that innovation management needs to broaden its understanding of where and how innovation emerges. In contexts of everyday extremity, users do not engage in structured ideation or reflective problem-solving but develop solutions in real time under pressure. As a result, conventional approaches—such as workshops, lead-user identification, or scenario-based design—risk overlooking critical forms of situated innovation.

For innovation managers and designers, this implies a shift from designing for idealised use cases toward designing for situational variability, breakdown, and adaptation. Products and services should enable flexible use, recombination, and improvisation rather than assuming stable routines and clearly articulated needs. Engaging with users in context—particularly in moments of misfit and failure—can provide deeper insights into latent needs that remain inaccessible through traditional methods.

From a policy perspective, the study highlights care practices as under-recognised but highly relevant sites of innovation. Innovation policies typically prioritise formal actors, technological outputs, and scalable solutions. However, the findings show that significant innovation occurs informally, embedded in everyday practices, and often remains invisible to established innovation systems. Recognising and supporting such forms of innovation can contribute to more inclusive and socially responsive innovation policies. This includes creating mechanisms to capture experiential knowledge, integrating users in participatory design processes, and valuing small-scale, situational solutions as legitimate innovation outcomes.

8. Conclusion and Outlook

This paper conceptualises early care practices as overlooked sites of user-driven and grassroots innovation. By empirically examining how innovation emerges under conditions of everyday extremity, it challenges dominant assumptions that innovation is intentional, resource-driven, and oriented toward stable outcomes. Instead, innovation appears as a situated, relational, and often non-stabilised accomplishment of making care possible under pressure.

In doing so, the study contributes to innovation management and social innovation research by expanding the empirical and conceptual boundaries of user-driven innovation. It foregrounds care contexts as environments in which innovation is not exceptional but structurally embedded in everyday practice.

While exploratory in nature, the findings open several avenues for future research. Comparative studies across different care domains—such as elder care, chronic illness

management, or disability support—could further refine the concept of everyday extremity and examine the transferability of the identified innovation modes. Longitudinal research may also provide insights into how situational and provisional solutions evolve, stabilise, or diffuse over time.

More broadly, the study invites a reconsideration of innovation theory toward contexts in which innovation is not driven by opportunity, but by the necessity of sustaining practice under constraint.

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