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Rendering soil care across hotel, retailer, and farm, with a Mutuality Service Blueprint

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Abstract: Food retailers and hoteliers aiming at eco-social transitions struggle to show tangible impact on the ground. Since sustainable food systems necessitate internal reconfigurations of service structure, exploring value creation concerning the local environment and community is essential. Design management tools are challenged to deliver mutualist conditions that respond to the needs of soils and humans. We explore what an eco-social Mutuality Service Blueprint entails based on an empirical pilot case. Here, 13 hoteliers and 17 retail customers in Hong Kong became soil care service providers over 43 weeks by diverting 4800 liters of food waste for composting and growing 1500 kg of organic crops that provided food assistance to families in need. Our redesigned blueprint helps clarify the pragmatics of care practices and prompts the redefinition of success parameters and fail points. It calls for forging cross-sectoral partnerships, practical experimentation, and organizational diversity. Inversing the blueprint's onstage and backstage subordinates service performances to eco-social conditions but also provokes questions on how to accomplish circularity while holding market offerings accountable to these conditions. Our paper presents an implementation case in soil-caring hospitality and concludes with a human/soil disposition matrix for inspiring further service-by-mutuality prototyping.

Keywords: Hospitality; Eco-social agriculture; Food waste; Mutuality by design

1. Introduction

Food retail and hospitality businesses seeking sustainability accounting through external Environmental Social Governance ratings (ESGs) are challenged to substantiate measurable impact on the ground (Berg et al., 2022). Because adaptations in upstream food production and downstream waste management depend on the *internal* reconfiguration of operation and service structure in Food & Beverage (F&B) industries, exploring new value-creation opportunities in relation to the local environment and community is essential (Legrand & Matthew-Bolofinde, 2020).

Specifically, if a hotel or food retailer wants to collaborate with a local farm to regenerate soils using their food waste, what resources can they draw upon? Design research offers robust frameworks for 'services delivery.' Yet, these are restricted to human clientele and do not address the specificities required in environmental care arrangements, such as regenerating local soils. In this paper, we adapt the popular and respected service innovation resource, Service Blueprint, to support more-than-human mutualist care innovations across hospitality, retail, and agriculture sectors. We call this adaptation a Mutuality Service Blueprint. We use this adaptation to pursue a shift from customer service systems to a "viable systems service" (Metcalf, 2010), whereby the biosphere becomes the protagonist onstage, served diligently by human industries backstage. This inversion of onstage and backstage, figure and ground, resonates with posthumanist insight. Here, humanity receded to the backstage by emerging as a geological force in the Anthropocene, and the Earth system is subjected onstage as a socio-historical phenomenon (Danowski & Viveiros de Castro, 2017). Foregrounding the backstage for service delivery oriented at soil care, we respond to criticism underscoring the importance of socially reproductive care practices often hidden or undervalued in our service deliveries.

By blueprinting a foodwaste-cycling social pilot named Soil Trust (Figure 1), we consider how intersectoral innovation can be reframed as a service by mutuality for sustaining life support systems, including local soil biodiversity. Service innovation here reframes the hospitality workplace to a multidimensional enactment of humans as agents amongst other agents, sites, materials, and techniques—highly contingent on environments that are specific, materials that are capricious, technologies that are fragile, and trust that is delicate (Mol et al., 2010). In particular, we consider how hospitality service innovation can be reframed to subordinate workplace arrangements to the functioning of soil ecologies. In this paper, we ask how an adapted Service Blueprint might endorse eco-social mutuality in hospitality innovation and how such a Mutuality Service Blueprint informs social value development and relationality to our biophysical foundation.

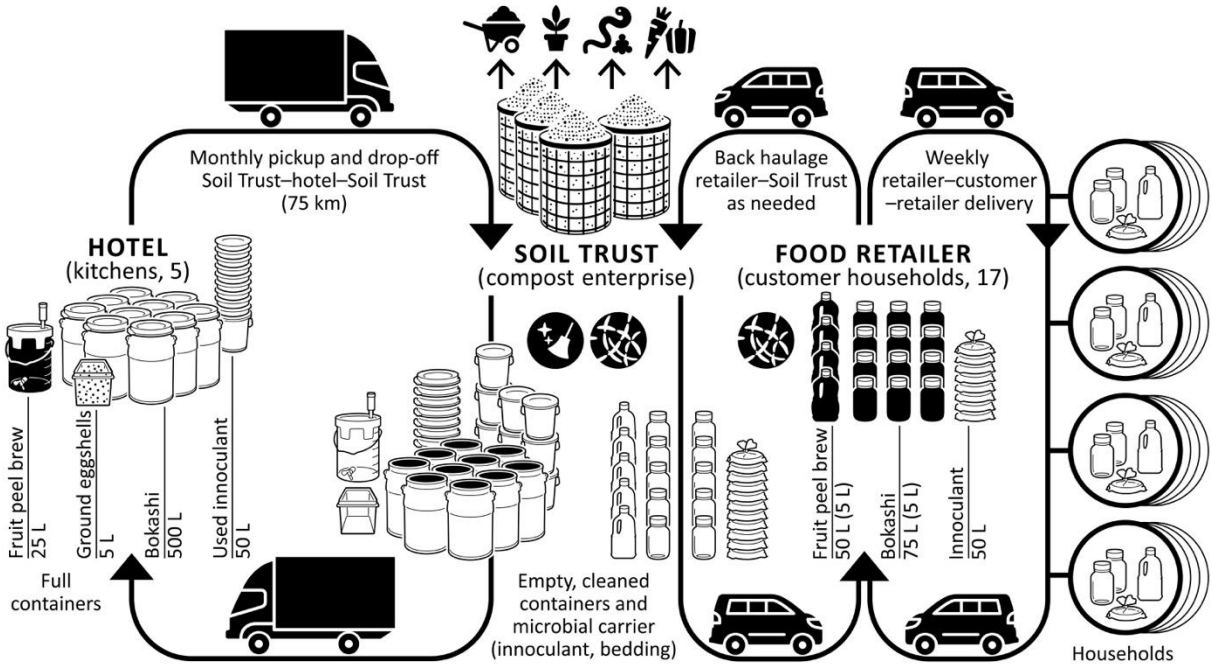

Figure 1 Logistic setup of the Soil Trust nutrient cycling service in Hong Kong (2020–23). The source-separated waste diversion targeted the regeneration of soil biodiversity: fruit peel brew destined to soil microbial life, ground eggshells to Calcium supplementation, and Bokashi kitchen scraps to soil organic matter. The hotel collected kitchen scraps inter-layered with a microbial carrier in 50 L barrels (recycled from industrial wholesale). The retailer's customer households recovered their foodwaste with wide-mouth containers of various sizes (recycled grocery bins).

2. Background: Service by mutuality

Care entails complex practices of mutuality that involve – beyond interpersonal exchange – relationships between communities, species, and industries. The care-seeking process extends over multiple time-space scales and, therefore, relies on a multiparticipant reality of durational care, where needs and values cannot be captured by a single-user persona, scenario, and blueprint. In the functional complexity of an eco-social setting, the role of design expands from individualized service planning to stakeholder networking through co-creation (Jones, 2014). Food system care should then be strategically reconceived whereby hoteliers or retailers are service providers, farmers are service conditioners, and food-regenerating soil biodiversity is the service enabler. Arguably, placing nonhuman soil systems onstage to be served by humans goes against the grain of current service paradigms. However, given that the F&B industry seeks to expand its horizon of eco-social value creation, our proposed mutuality blueprinting may be a promising design strategy by sliding across various scales and layers of complexity. This scalar re-framing may challenge rigid assumptions, invite collaborations from communities overlooked or forgotten, and create new opportunities inappreciable by existing frameworks (Hunt, 2020).

Hospitality and food retail industries depend on the viability of healthy soils. Besides yielding crops, soils purify our drinking water, absorb carbon from the atmosphere, and shelter more

than one-quarter of all living species (Wallander, 2014). While our food system excels at getting food from soil to plate, the critical backstage logistics of returning organic waste regeneratively to the soil is largely absent (Nele & Lou, 2019). This paper is concerned with the intersectoral service design of a soil-caring economy in Hong Kong that diverts food waste from hotels and food retailers to contribute to regenerative farming practices and rural communities.

We see this process as an exploration of hospitality-led service design that affirms our interdependence with other humans and the biosphere at large. Service design is advancing from a goods-dominant logic of services that deliver value-added properties to commodities toward a service-dominant logic that shifts value creation from the producer to collaborative processes (Maglio et al., 2009). In linguistic terms, we replace the plural 'services' (delivery of efficiency) with the singular 'service' (specificity of contribution). It also shifts our conventional assumptions about economic exchange relations. If the co-creation (or destruction) of value considers all entities involved, service design becomes integral to the viability of larger natural and artificial systems (Beer, 1984; Norman, 2011). Reconciling human economics with biological exchange relations is contested. Social Darwinism has proposed 'the survival of the fittest,' legitimizing relentless market forces and rational choice rooted in blind self-interest. Competition at all costs was somehow assumed to be the only 'natural' way economics works (De Waal, 2009). While markets seem to work best at large scale, recent biological conceptions foreground how social dilemmas of distribution and exploitation are best addressed in small groups and personal relationships that entail co-regulating limitations, ethical negotiations, and social codes (Friedman, 2008, p. 18). Evolutionary biology asserts that members of the same species usually do not prey on each other (Grossman, 2009). In humans, mutualist outcomes depend on the intricate understanding between parties and mediating disputes, thus requiring strong interpersonal networks that foster respective levels of familiarity, connection, and trust (Friedman, 2008, p. 119). We take this as a proposition for service design to bring such overall checks and balances based on small-scale group orientation back into the economic equation. In response, service system researchers describe service as a relationship-building continuum that provides net benefits to all partners involved, which resonates closely with ecological mutualism (Tung & Yuan, 2008; Metcalf, 2010).

Recent design research illustrates how those deeper aspects of humanity linking us to mutualism and other life forms have never left us (Healy & Kuch, 2021). The question then is how mutuality by design can tap into and play host to such inherent mutuality toward instituting its durability. Research on mutualism underscores how organizations (including businesses) will have to invest in human relationships, community commitment, and ethical negotiation necessary to continuously validate the social relevance of their service outcomes (Metcalf, 2010).

Chilean economist Manfred Max-Neef (1991) was well aware that small-scale networks conducive to trust and social value creation are in direct tension with the large-scale interconnected world of our time. He understood mutuality as balancing global processes with local

activity, peoples' ambitions with nature and technology, personal matters with social affairs, and planning with autonomy—all based on satisfying fundamental human needs. Max-Neef's work suggests that people create socioeconomic mutuality through constant trial and error guided by loosely defined principles. This process allows deep reflection about one's individual and community situation and leads to critical awareness, possibly action at the local economic level. It foregrounds a heuristic process that specifies the methods of hands-on, joint discovery for enabling all involved to adapt their behavior in the given situation (Friedman, 2008, p. 172). When we understand mutuality as evolving and interdependent engagement in an ever-changing world, what design tools can help us with complex processes—like getting regenerative foodwaste from hotel to farm?

Service designers grappling with the complexity of systems have developed the Service Blueprint as a means of diagramming. Lynn Shostack applied a process she called "service blueprinting" (1982) in the banking sector to indicate time sequences and depth of interactions in service encounters. Later, IBM researcher Susan Spraragen (2009) enhanced the Service Blueprint's expressive potential. However, as Don Norman (2011) notes, services are onion-like, recursive systems whose complexity quickly escapes categorizations of frontstage, backstage, and lines of visibility. Every backstage entails multiple contexts and conflicting values among the parties involved. Thus, while service blueprinting is widely used for defining the customer experience and service structure, it can be both effective and deceptive since it does not account for the backstage operations in detail and ignores the complexity of environmental effects altogether (ibid, p. 156). Since hospitality and food retail constantly rely on freshwater, crop, and air supply (Rockström et al., 2016), we suggest accommodating these taken-for-granted soil provisions in hospitality and service models currently prioritizing human parameters and intrasectoral efficiencies.

Therefore, we seek to appropriate the generativity of the Service Blueprint for making the pragmatics and challenges of soil care practices more accessible and actionable. Since blueprinting originates in finance, we ask: What if we banked on soil care that approaches service encounters as mutuality between hotel and farm, waste and nonwaste, human and nonhuman? How can blueprinting be in the service of human needs and nonhuman life forms they depend on? What complexities are involved when we try to blueprint intersectional research collaborations? Ultimately, we seek to harness blueprinting as a design method for engaging people in systemic, durational thinking and acting.

In response, we explore the possibilities of a soil-caring economy in the next section with an empirical social pilot case in Hong Kong that mobilized a hotel, retailer, farm, and design school around their organic wastes. We draw on design, organization research, and science & technology studies (STS) to prioritize services as mutualistic and, therefore, open to renegotiation and reconfiguration. In the final sections of this paper, we explore how experimenting with a soil-caring blueprint and intersectoral food waste diversion (illustrated in Figure 2) can map relevant vectors in reconfiguring economic, ecological, and social dimensions in kitchens and soil communities across the city.

Figure 2 Food waste recovery at food localization retailer and its subscribers' homes: The left image shows the customer families during a bimonthly meeting at the retailer's headquarters preparing microbial carrier material ('bedding') that is consequently used for inter-layering and fermenting kitchen scraps at home ('bokashi') depicted in the right image.

3. Methods: Piloting ecological mutuality

Organic waste presents us with a situation where there is an urgency to intervene in an old, broken system, where there is a common recognition that something needs to be done, and the consequences of doing nothing. Following the spirit of service by mutuality, we established, through trans-sectorial action research, a university-backed social pilot over two years whereby a hotel and food retailer upcycled their organic waste for soil regeneration at a local farm.

Context: Hong Kong has one of the highest densities of restaurants and hotels per capita worldwide that contribute to 3300 tons of organic waste daily, ending up in landfills, water bodies, and biogas facilities (Nele & Lou, 2019) instead of restoring local soils. Without a waste charging scheme in place (as of spring 2024), there is no incentive for businesses and households to divert their waste. At the same time, the territory's depleted agriculture sector relies on cheap imports for its fertilizer needs; thus, neither has the appetite nor the capabilities to reintegrate food waste.

Social pilot: The systemic disconnects motivated us to create a test case for a mutuality-led economy linking a four-star hotel in downtown Hong Kong and 17 subscribers of a food localization platform to a regenerative farm in the rural New Territories that was operational for nine months from September 2022 to May 2023. The social pilot was jointly funded by an eco-hospitality foundation and the university. Besides the authors, the research team included a permaculture educator and veteran farmer who became key protagonists in running our experimental farm studio named Soil Trust (泥玩). We engaged a generous veteran farmer who offered us a fallow plot without rent to support our mutual ambition to establish a transferrable test case in regenerative farm practices that improve soil productivity without external inputs.

Bioremediation techniques: Our social pilot prototyped infrastructural transitions inside workplace settings through instigating, studying, and coproducing intersectoral ecologies of participation (Ryghaug & Skjølsvold, 2021). Social piloting is essential in advancing farm techniques, distributing care responsibilities, and rebuilding capacities in what is a socially fragmented countryside and city. Adopting climate-aware farming methods (USDA, 2021), our Soil Trust farm studio carefully trained the hotel's Food & Beverage (F&B) staff, retailer subscribers, and volunteers (including design students) in recovering their kitchen scraps at the source. Our self-generated microbial carrier material ('bokashi') allowed chefs and home cooks to collect, handle, and store their organic residues without smell emissions in airtight containers, essentially 'pickling' it. This organic ferment was then periodically transported to our farm studio for composting, soil reintegration, and cultivation of more than 40 crops (Wernli & Chan, 2023a).

Engagement: For building our soil-caring pilot, we advanced from a situated exposure and analysis of diversities and restrictions in Hong Kong's food system – what we called "collaborative encounters" (Wernli & Chan, 2023b) – to a systemic intervention shaped by mutualist proposition, logistics and partnerships emerging along the way. Mutualist engagement here meant approaching soil ecologies as life-affirming matter, connecting people to organic processes through senses and science, and orienting participation on the pragmatics of fermentation protocols and pre-existing logistics. Accordingly, we harnessed the hotel's unused storage room at the loading deck (Figure 3) as a waste recovery site and the food retailer's empty back-haul delivery trucks for returning the pickled food waste from their subscriber families to the farm studio.

Figure 3 Food waste recovery at downtown hotel bound for composting and soil care: The left image shows the Food & Beverage (F&B) team's hygiene manager and chef de cuisine collecting kitchen scraps across their five kitchens and inter-layering it with microbial carrier material ('bedding') produced by the farm studio volunteers. The right image shows F&B hotel staff visiting the farm studio to partake in hot-composting and community planting.

Organizational mutuality: We learned early on that to sustain the workload of our regenerative techniques, generate sufficient biofertilizer, and remunerate our farm studio manager, we needed to diversify our social assets. Thus, we developed a service learning program for

ethnic minority mothers associated with a rural welfare center and our undergraduate design students. It allowed our farm studio to increase its composting capacities and fecundity. In turn, we could offer our service to a hotel and an eco-hospitality foundation that sponsored the operation for pioneering soil-bound nutrient cycling in Hong Kong. Participants in this industry/community circularity invested time and resources toward fertilizer self-sufficiency, food access to the underprivileged, promoting soil health, bridging consumer/producer gaps, and enacting concrete forms of urban/rural co-development, as detailed in Table 1 (below).

Table 1 Scope of Soil Trust pilot involving hotel, food retailer, university, and farm.

Parties:	**Hospitality parties**	**Food retailer**	**Design school**	**Farm partner**
Positions:	Service sponsor	Service backer	Service instigator	Service host
Contingencies:	Hotel density Waste charging	Customer base Food security	Science expertise Research scape	Land tenancy Organic label
Investments:	HK$360K Grant 1 F&B director 12 F&B staff 180 Work hours HK$15K Transit 5 Hotel kitchens Hotel facilities	n/a 2 Retail directors 25 Customers 750 Work hours HK$1.5K Transit 17 Households Shop facilities	HK$200K Grant 3 Farm studio staff 36 Volunteers 2000 Work hours HK$15K Transit 10 Households Campus facilities 5000 L Mulch HK$5K Materials	Trust 0.5 ha free land n/a n/a n/a 1 Homestead Farm facilities Irrigation water Electricity, seeds
Soil deliverables:	n/a 2500 L Bokashi 225 L Peel brew 30 L Eggshell dust	100 L Bedding 500 L Bokashi 40 L Peel brew 1 L Eggshell dust	800 L Bedding 500 L Bokashi 100 L Peel brew 5 L Eggshell dust 9000 L Compost	20 L Cow dung
	• **4800 L Biofertilizer** (suitable for amending 200 m2 of topsoil) • **1500 kg local produce** (HK$20K value for volunteers and families in need) • **300 kg of estimated CO2 and CH4 emission reduction**			
Outreach:	Branding Project website Industry advocacy Video	n/a n/a Advocacy support n/a	Branding Impact case Public panel Video Publications	Event venue
Challenges:	Maintain quality Economy of scale Success fixation	Maintain quality Bedding resupply Risk-aversion	Fickle conditions Compost timeline Accountability Science backing	Land tenancy Urbanization Intruders

Unfortunately, Soil Trust lost its farm plot in May 2023 to make way for urban development. Yet, during its nine-month operation, it set a precedent and proof-of-concept for eco-social mutuality. Here, volunteers (including ethnic minority mothers, design students, and retail subscribers) maintained the composting operation to enable regenerative food waste collection at the hotel, in return receiving free access to land, harvest, companionship, and agricultural skills. Excess crops at the farm studio were redistributed as food aid to families in need through the nearby welfare center.

Data collection: Our organizational research into soil-caring hospitality service responds to the lack of empirical work on the subject. In this situation, qualitative research approaches are valuable since they allow insights from datasets with little conceptual structure (Graebner et al., 2012; Pentland, 1999). Our goal was to discern the posthuman service processes that impact workplaces and soil biodiversity. Such objectives require longitudinal ethnographic fieldwork to account for the chronology and underpinning dynamics in their natural setting (Koskinen & Krogh, 2015; Watson, 2011). Thus, we collected data from extended participant observation, field notes, photographs, audio recordings, and digital communication logs over two years, during which Soil Trust saw significant changes related to its service offering. We derived our dataset from over 80 site visits at the associated farm, hotel, retailer, and households with informal interviews (October 2022 to May 2023) and 62 semi-structured interviews with Soil Trust participants, ranging from 45 to 90 minutes (March to June 2023). This continuous data collection allowed us to develop our ideas intermittently by responding to emergent questions following the service processes over time. During data collection, we focused on discerning what participants were doing, why these actions became meaningful to them, and how they experienced the soil care service in their given context. This workplace ethnography allowed us to identify the underlying patterns in participants' physical realities, socialities, and imaginaries associated with the intersectoral service (Korsgaard et al., 2015).

Analysis: We compiled our dataset chronologically from interview transcripts, digital logs, photograph annotations, and field notes. Subsequently, we analyzed this text-based track sheet using coding, thematic analysis, and content structuring to study the phenomena from participants' vantage and compare their accounts against images, responses, and context (Austin, 1975). Our analytic process traced the linkages across events and participant groups in time to account for the practical intricacies involved (Langley, 1999; Spradley, 2016). To capture Soil Trust's orchestration of care services, we used a processual approach for analyzing the data, focusing on the inversion of onstage and backstage activities through the conceptual lens outlined above. We applied the constant-comparative method for iterating the Mutuality Service Blueprint. Here, the analyst gradually gains a text-derived sensibility for the topic through an iterative dialogue between data and concept until a coherent and comprehensive picture emerges consistent with participants' grasp of reality and the researchers' inquiry goals (Glaser, 1965; Jack & Andersen, 2002).

We set out the analysis by applying the temporal bracketing technique to identify the evolutionary steps (Langley, 1999) in the soil-bound waste cycling journey that we labeled as Soil

Care Stages in the Mutuality Service Blueprint. The technique assisted us in correlating conditions, events, and interventions for revisiting the data and exemplifying it with relevant service instances. It ensured a real-world foundation of the emerging analysis with accounts of the processes involved and the definition of the central service arenas. Subsequently, we developed the stages, processes, and arenas into a grounded Mutuality Service Blueprint outlining the relationships and synergies involved in situated soil care practices, as elaborated next.

4. Findings: Mutuality Service Blueprint

Our iteration of the Mutuality Service Blueprint (rendered in Figure 4) addresses two challenges: (1) to represent the issues of how we engage with reality (epistemology) and what we comprehend as reality (ontology), which are raised by mutuality, and (2) to mobilize these issues through a social pilot like Soil Trust for practically engaging with them. Taking the Service Blueprints of 'Overnight Hotel Stay' (Bitner et al., 2012) and 'Meal Catering for the Elderly' (Paquet et al., 2003) as points of reference, we first adapted the blueprint features to become conducive to ecological mutuality. Then, akin to a service redesign, we used the Mutuality Service Blueprint as a dialogical tool to reconceive Soil Trust's food waste recovery interlinking hotel, retailer, and farm from the vantage of soil biodiversity. As for visual rendering style, we followed the convention of flowcharting to help us create a wireframe that distinguishes inputs, preparations, processes, and outputs. This short paper cannot convey the richness behind the iterative process. However, we briefly review the features of the Mutuality Service Blueprint before describing the practicalities rendered and our observations thereof.

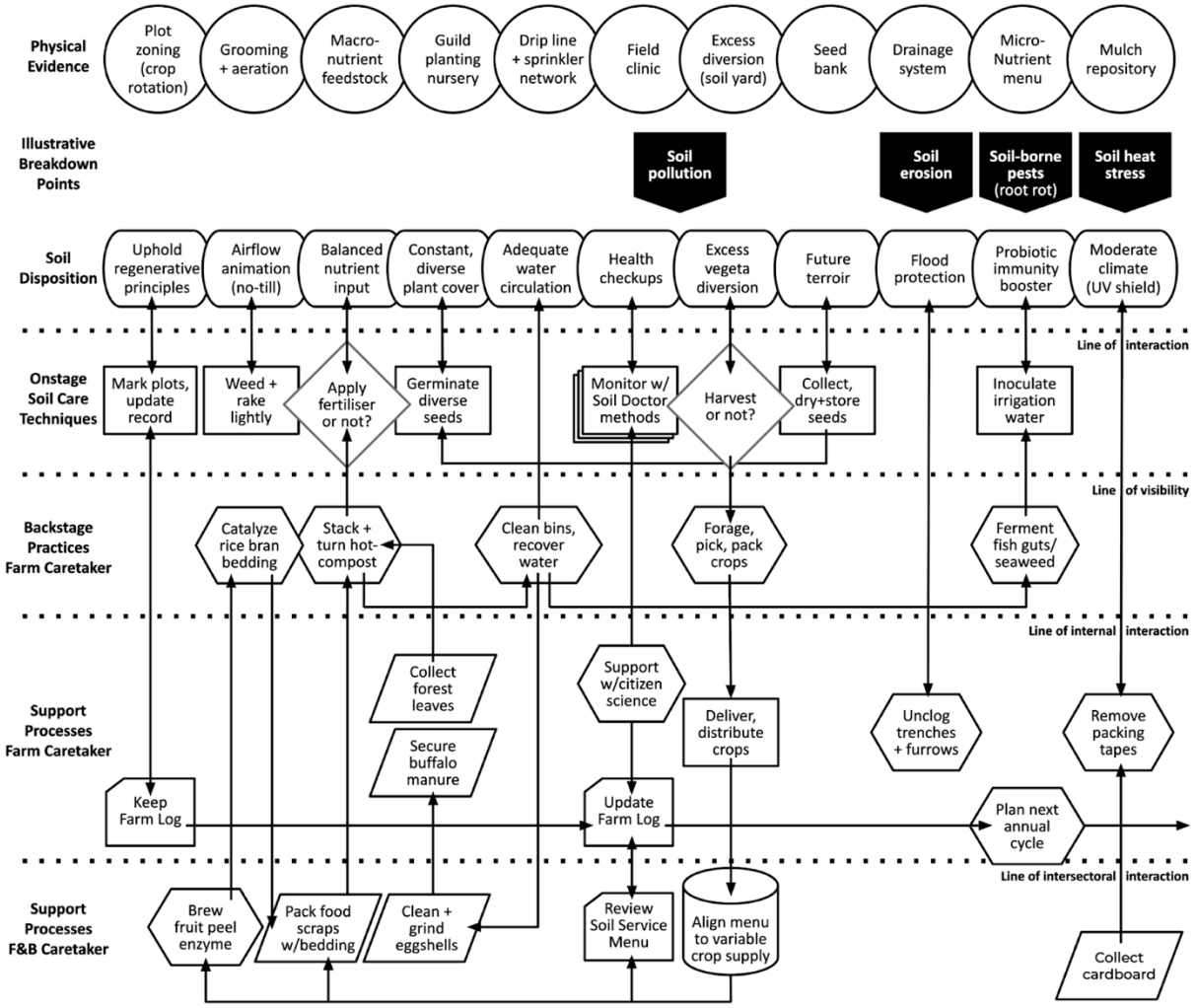

Figure 4 Mutuality Service Blueprint for soil-caring circularity across hotel, retailer, and farm: Our eco-social blueprint is re-labeled and reconfigured to encourage rethinking and engagement by putting soil health dispositions and soil care techniques onstage while foregrounding the backstage processes of caretakers at farm, hotel, and household.

Overall, we closely followed the structural convention and features of blueprinting that map parallel timelines of service activities, from the subject being served onstage to the ensuing processes taking place backstage. In the case of our social pilot, the serviced subject is not a predefined human *Customer* but instead soil biodiversity, which necessitated adapting the blueprint's elements as follows:

Soil Care Phases (subtropics): This feature replaces the *Customer Phase* of the conventional service journey. 'Soil Care' and the plural 's' in 'Phases' denote how this blueprint is about an extended, iterative commitment rather than one-off transactions. The phases are specified by the term '(subtropics),' which firmly situates our soil care operation in the climatic conditions of Hong Kong. It means that contrary to temperate zones, the prolonged, six-month-long summer entails successions of cyclones and torrential rains not conducive to cultivation, requiring the soil to be shielded and undisturbed. Therefore, the cooler fall, winter, and

spring seasons are the most fecund phases for local agriculture in Hong Kong, whereby regenerative practices help replenish soils, biodiversity, and stomachs.

Physical Evidence: This label is identical to the original blueprint and made us reconceive the farm operation as a field of touchpoints for soil care. We started noticing how the plot layout, topsoil treatment, devising companion planting, irrigation systems, soil monitoring instruments, compost stacks, and the dispensary of fermented supplements are the tangible channels of soils interfacing with humans. To foreground these concretized forms of readiness in soil care, we named our toolbox with bio-monitoring instruments 'field clinic.'

Illustrative Breakdown Points: This feature replaces the original 'Pain' in *Illustrative Pain Points* with 'Breakdown' since failures in soil biodiversity can be much more consequential than affecting human satisfaction or quality standards. We selectively point to the risks of pollution, erosion, pests, and heat stress that result from long-term disservice or neglect toward soil ecologies.

Soil Disposition: We ultimately renamed the original *Customer Actions* label since soil agency unfolds on its own terms that are beyond and above human volition and discernment. What we can do is take heed from ancient soil care wisdom and current sciences and ask ourselves what the vectors of thriving soils (with or without human caretaking) would require. Next to biological vectors like nutrient input, respiratory support, and physical protection, we also believe that agricultural principles should underpin such 'Soil Dispositions.'

Onstage Soil Care Techniques: 'Onstage' here refers to the frontline at the farm where 'Soil Dispositions' meet the human caretaker, in our case, the agriculturist. We substituted 'Technology Actions' in the original *Onstage Technology Actions* with 'Techniques' since soil regenerating agriculture relies not only on personal encounters but more so on the dexterity of manual methods like finger-kneading to evaluate soil texture, gentle raking, earthworm counting, or microbially enriched hand irrigation.

Backstage Practices—Farm Caretaker: This label replaces the *Backstage Contact Employee Actions* of the original. Because the social pilot brought to the backstage caretakers across five different employers, several dozen households, and one school, the original term *Contact Employee* was inappropriate. We also replaced 'Actions' with 'Practices' since producing microbial carrier, composting, or fermented supplements entails maintenance routines crucial to performing onstage soil-caring techniques.

Support Processes—Farm Caretaker, F&B Caretaker: We specified the original *Support Processes* feature with the added 'Farm Caretaker' and 'F&B Caretaker' to indicate their foundational roles in soil care services. 'Support Processes' both on the farm and in the kitchens were about collection, recording, and archiving practices. On the farm, it entailed gathering forest leaves or buffalo dung for stacking compost and keeping a farm logbook to record inputs/outputs and monitor soil health. In the kitchens, gathering activities were about source-separating food scraps, fruit peels, or eggshells and updating the hotel's work protocol file named 'Soil Service Menu.' These support processes were interwoven by monthly

supply transports between the farm and kitchens, prompting farm and F&B caretakers to exchange updates on both sides of the 'Line of Intersectoral Interaction.'

Our Mutuality Service Blueprint for rendering 'soil care journeys' in rural Hong Kong deliberately foregoes important human-concerned processes (like staffing, training, event hosting, and advocacy) to focus this paper on the service delivery toward soil health. Despite or because of this incompleteness, soil care journeying as a means of designing *with* soil biodiversity prompted the following observations:

- Use of language like 'soil care,' 'practices' or 'caretakers' (instead of *Customer Journey*, *Actions*, or *Employee*) becomes a "recoding" of terms (Fry, 2018, p. 47) for prioritizing the varied, durational facilitation that is necessary to help soils prosper. Obviously, soils do not overtly perform actions in a humanly conceivable sense; instead, they do a lot of invisible work beyond our comprehension;
- Give specificity to service activities through qualifying verbs like 'germinate,' 'inoculate,' or 'clean' (preparatory practices graphically rendered by hexagons) tangibly point to the many potential effects – intended, unintended, or something in between – that human doing has on materials, life forms, and processes involved;
- Draw out exchange relations inherent in care practices characterized by a dense, multipronged mesh of arrow vectors. These linkages interrelate successive Soil Care Phases (horizontally) and the supply and communication lines of human caretakers (vertically), thereby offering pathways for continued adaptation. The arrow vectors also represent diversified forms of economization, including F&B sales donations, hotel staff allocation, volunteer time, nonhuman processes or contributions, and shared harvests as the biosocial currency;
- Differentiate the work domains engaged whereby accounting for developments in 'Soil Disposition,' 'Farm Caretaker,' and 'F&B Caretaker' helps to validate the configuration of orders and flows, thus asking us what it means to be actors of or have agency in the processes involved.

These observations from ecologically mutualist blueprinting reminded us how gratifying human needs (like dining on wholesome foods) is not only provisional in the given context but also can be considered the collateral outcome of more-than-human, synergetic processes (like regenerating soil biodiversity) as shown in Figure 5. Rendering the soil-caring blueprint made us wonder what a decade-long or 50-year 'Soil Care Journey' would look like, whereby soil and human development would be positioned on a level playing field. Catering to soil care made us further ask how 'Soil Dispositions' would correlate to social value creation in service design, which we briefly explore in the next section.

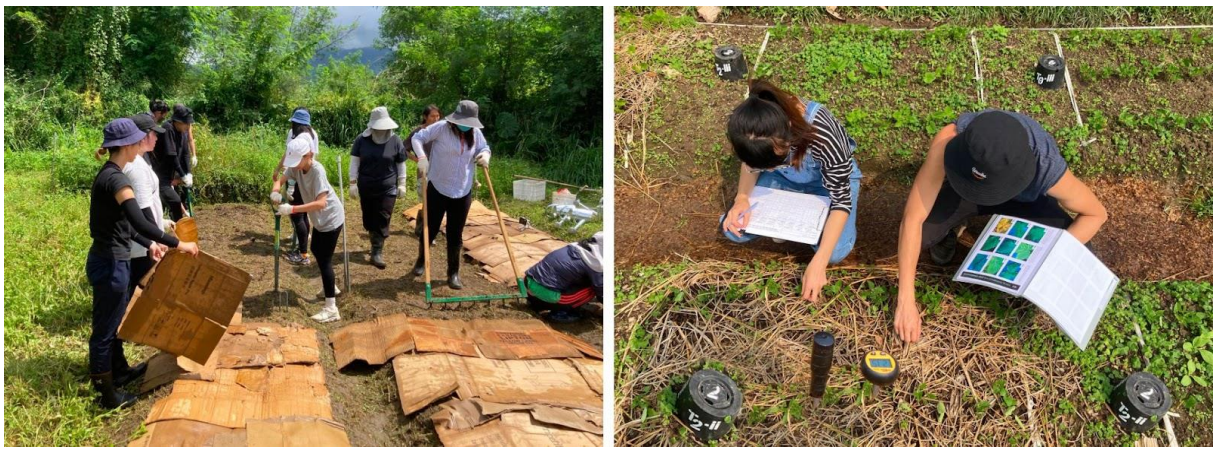

Figure 5 Soil care with microbially enhanced food waste from hotel and retailer: The Soil Trust farm studio implemented sheet-mulching with cardboards, fermented kitchen scraps recovered from the hotel, soil aeration using a 'broadfork' rake (left image), and a citizen science protocol implemented by design students for monitoring soil and crop health (right image).

5. Discussion: Service futures advancing humans *and* soils

With mutuality blueprinting in hospitality and retail, we do not advocate abandoning human needs altogether in favor of nonhuman dispositions. Instead, mutualism is about advancing all service parties in tandem and synergy. Mutuality blueprinting assisted us in shifting our analysis from predetermined customer-centric effectiveness (goal fixation) of behaviors and technologies toward revealing manifold effects (contingency attunement) in human-environment engagements. Through mutuality blueprinting, we realized how restoring soil biodiversity (and other natural habitats) depends on social values and overall continuity that accounts for nonhuman needs. Service blueprinting with and for soil care has exposed us to larger-than-person ecologies. It shifted the psychological economy away from satisfying individual needs to pursuing recognition processes, shared accomplishments, and even the rewarding enjoyment of delivering soil-care service, as the F&B director of the participating hotel illustrates:

> "Our F&B team has been touched by this [soil care] program and really enjoys the process. I know that our hygiene manager and the chefs are enlightened by being involved in this. The team enjoys the process of understanding what they can do with food waste. It touches the right people, and it is people who can make a difference. Food waste collection at the hotel is not really a challenge; it's just a matter of managing your time. But it doesn't put extra stress on operation; it's rewarding."

The food waste collection aimed at soil care included eggshell refinement, fruit peel brewing, and food scrap fermenting. Thus, performing soil care became rewarding to the busy F&B team because the practices integrated all at once essential (purposeful), substantial (physiological), and aesthetic (enjoyable) effects. Annemarie Mol (2021, p.72) points out how such integrative pleasure contributes to the vitality of person and services, what the F&B director described as the "team has been touched." Delivering soil care service at the hotel then was about the ongoing navigation of needs and satisfiers across humans, soils,

and everything in between. This dynamic prompted us to correlate human social value perspectives with soil-related dispositions. Adopting Manfred Max-Neef's (1991) taxonomy of human-scale development, we discussed with our permaculture educator and advising soil experts ways of correlating the matrix to soil-scale development. The outcome is the following side-by-side listing (Table 2) as our initial attempt to align hospitality service innovation with long-term societal interests like soil biodiversity and food system transformation.

Table 2 Relating social and soil-ecological value perspectives.

Human needs	**Soil dispositions**	**Developmental manifestations in soils**
Subsistence	Metabolism	*Conversion of feeds, bacteria, air, water, and minerals*
Protection	Protection	*Living plant cover (incl. weeds), woody mulch, drainage*
Affection	Mutuality	*Humus–human–humus biosocial exchanges*
Understanding	Geosystem memory	*Gaseous, liquid, solid, and (a)biotic record of soil evolution*
Participation	Permeability	*Work of physical flows, critter-drilling, chemical agitation*
Idleness	Non-disturbance	*Practices of relinquishing, fallowing, and no-tilling*
Creation	Pedogenesis	*Soil formation from millennia-long weathering of rocks*
Identity	Soil profile	*Type of topsoil (humus), subsoil (clay), and rock horizon*
Freedom	Immeasurability	*Respect for our shared, natural, and cultural inheritance*

Our intention of correlating human and soil development is to assert the inherent connections of mutual well-being across life forms. We draw on insights from our soil care praxis and sound pedology science (Wallander, 2014) to consider soil dispositions. In our view, the correlation can provoke affinities in humans whereby thinking with soil development and its manifestations can help us reassess the relevant vectors in service design for hospitality, retail, and beyond. We use 'soil dispositions' as correlated to 'human needs' rather than 'soil needs,' which could be seen as an anthropomorphic imposition on terrestrial ecologies. In actuality, we can already observe this mutualist sentiment of human/soil coevolution in the statement of the food retail director who was a longtime co-facilitator of our soil care program:

> "The concept of using food waste for regenerating soils is innovative in food localization retail, and it produces valuable opportunities for our subscribers to learn and to initiate a welcoming community setting. After almost two years of hard work together, I am very disappointed to see the project coming to an end since we witnessed our topsoil levels grow thicker and robust [...] Would it be possible to translocate our soil material before concrete is poured over it?"

Reading between the lines of the retailer's comments, we recognize how the development of soils and humans depends on conditioning factors, including facilitation of collaboration, rich contexts of deliberation, and diversity of expertise for supporting social and terrestrial ecologies to prosper. Our provocation suggests how service blueprinting as a means of mapping mutual care relations is a way to counter end-to-end, set-and-forget design approaches Manzini (2016) referred to as "solution-ism." Instead, mutuality blueprinting proposes an anticipatory persist-and-make-do approach to service design.

We acknowledge the somewhat limited external validity of our single case study into mutualist human/environment blueprinting aimed at diversifying our economization repertoires (Çalışkan & Callon, 2009). Soil Trust's dependency on external funding and the tragic loss of its farm plot to land speculation reveal two critical implications for the Mutuality Service Blueprint. First, to withstand unregulated market forces and inconsequential waste disposal that externalize environmental costs and undermine change, the inversion of onstage with backstage needs to be extended to all constituents to accomplish an economic circularity. For example, a hotel's food offering concerned with soil care would be prepared to pay for small-batch, seasonal, and imperfect local produce so that Soil Trust can reliably generate revenue. Second, the Mutuality Service Blueprint must be seen as a long-term investment process requiring regulatory and policy frameworks conducive to durational eco-social partnerships and mutualist service innovation (Bosworth et al., 2016). For example, for clarifying and substantiating ESG ratings in hospitality, the Mutuality Service Blueprint – employed as a systemic co-visualization technique – can underpin the strategizing and validating localized regeneration investments. Moreover, in policymaking, posthuman blueprinting would urge not only the introduction of waste-skipping charges but also the interlinking of waste reduction policy with other policy domains like agricultural policy, land zoning, and business licensing to give viability to eco-social enterprising in rural areas.

6. Conclusion

We opened this paper with the question: How can we adapt the Service Blueprint to support the emergence of eco-social mutuality in hospitality and food retail innovation? To answer this question, we first reviewed discourses in service science and science & technology studies (STS) on given assumptions in service-based economics and social value development toward system viability. This proposition became the starting point to explore the biological concept of mutuality in service design for integrating diverse ontologies and epistemologies into service innovation. As a result, we needed to make a 'mutualist turn' regarding existing service innovation frameworks and selected the popular and respected Service Blueprint for exploring its radically reciprocal application. We then reviewed the heuristic methods and sociometric evidence from the Soil Trust case initiated by the authors in Hong Kong. This durational social pilot involved a downtown hotel, food retailer, and production farm that collaborated on skillfully diverting their food waste to revitalize local soil biodiversity and rural communities. We then proposed the Mutuality Service Blueprint, which replaces the 'customer journey' with the annual succession of soil care circulations whereby hotel staff, retail

subscribers, and the farm team serve backstage the proliferation of terrestrial ecologies. We rendered the Mutuality Service Blueprint by visually centerstaging how the intricate care practices and situated processes hold together across actors, sites, and phases. This injection provokes helpful discussions on what constitutes mutually enhancing socio-material exchanges and the influence of given protocols or desirable norms.

Mutualist blueprinting as a dialogical tool foregrounds the importance of shared ownership over rewards as well as contingencies and a joined, self-implicating mission toward reciprocal accountability as the seeds for future-opening service innovation. Ultimately, experimenting with the Mutuality Service Blueprint can be part of an intersectoral systemic strategizing to put hoteliers, retailers, householders, farmers, and nonhuman journeyers into a position – in supportive and excitable ways – where they can prototype and reinvent hospitality services aligning with long-term societal interests like the viability of soil systems. Our study has limitations that can guide future research, such as its focus on a particular case and rural region, thus the need for organizational design studies in other application domains by firstly mapping the sequential phases of the biodiversity journey and secondly, letting associated care practices take centerstage.

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