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Value co-creation and co-destruction dynamics in a service system: contradictions in geocaching

Tero Vartiainen
School of Technology and Innovations, University of Vaasa, Vaasa, Finland
Mengcheng Li
School of Artificial Intelligence, Jiangxi Normal University, Nanchang, China, and
Tuure Tuunanen
Faculty of Information Technology, University of Jyväskylä, Jyväskylä, Finland

Abstract

Purpose – We propose contradiction as a theoretical lens for explaining the micro-level dynamics of value co-creation (VCC) and value co-destruction (VCD). Although these phenomena are often treated as interconnected, their exact relationship – how they dynamically interact, emerge and evolve in specific service contexts – remains insufficiently theorized and empirically examined.

Design/methodology/approach – We draw on data from online discussion forums and in-depth interviews with geocachers. Through interpretive content analysis, we identify disturbances such as problems, errors and conflicts. These disturbances are categorized as VCC or VCD tensions from which underlying contradictions are derived.

Findings – Our study shows how to uncover the dynamics of VCC and VCD in a service system. We identify eight distinct VCC and VCD practices and illustrate the associated contradictory poles embedded in the geocaching context.

Research limitations/implications – We offer a micro-level analytical approach to studying VCC and VCD within service systems. By integrating the dialectical concept of contradiction, we are the first to explicitly conceptualize and justify its embedded connections with VCC and VCD.

Practical implications – The findings provide actionable insights for the management of service systems, such as geocaching and related services. By identifying specific contradictions, managers can target interventions that enhance VCC while reducing VCD.

Originality/value – This research bridges service-dominant logic and dialectical theory to empirically examine the duality of VCC and VCD within a service system. Thus, the study advances the understanding of the dynamics between these two phenomena.

Keywords Contradiction, Value co-creation, Value co-destruction, Dynamics, Service system, Geocaching
Paper type Research article

1. Introduction

Understanding value co-creation (VCC) is pivotal for achieving competitive advantage, driving product and market success (Gustafsson *et al.*, 2012), reducing costs (Prahalad and Ramaswamy, 2004), enhancing efficiency (Grönroos and Ravald, 2011), and elevating customer satisfaction within service contexts (Oliver, 2006). The service-dominant (S-D) logic framework, predicated on the exchange of service for service and the centrality of resource integration among actors, has emerged as the dominant theoretical paradigm for conceptualizing value creation within service systems (Vargo and Lusch, 2016; Vargo *et al.*, 2023). S-D logic posits that value is always co-created, inherently phenomenological, and determined by the beneficiary within unique use contexts.

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Despite its widespread adoption, the S-D logic perspective operates primarily at a meta-theoretical level (Vargo and Lusch, 2016), rendering the empirical observation and granular analysis of VCC processes challenging. Consequently, the literature is rich in conceptual studies but relatively impoverished in providing actionable, VCC micro-level insights and their empirical implications (see, e.g. Laamanen and Skålen, 2015; Schulz *et al.*, 2020; Vargo and Lusch, 2016; Vargo *et al.*, 2023; Skålen, 2026). Furthermore, while S-D logic implicitly acknowledges the potential for negative outcomes, its primary focus has been on the generative potential of VCC, often overlooking the inherent duality of value creation.

We argue that successfully navigating service encounters requires careful consideration of how value is co-created among different stakeholders, while acknowledging the ever-present potential for misalignment and destructive outcomes (Lusch and Nambisan, 2015; Vartiainen and Tuunanen, 2016; Li and Tuunanen, 2022; Skålen, 2026). A growing body of literature recognizes that value creation is not unilaterally positive. Plé and Cáceres (2010, p. 431) define value co-destruction (VCD) as "an interactional process between service systems that declines the well-being of at least one of the systems, which, given the nature of a service system, can be individual or organizational." Echeverri and Skålén (2011) investigated value creation and how value is either reinforced or recovered by VCC and VCD. Recently, Lumivalo *et al.* (2024) emphasized the importance of understanding the dynamics of VCD within service encounters. Thus, in service systems, understanding how value is co-destroyed is as important as understanding how it is co-created within service encounters.

More importantly, Lumivalo *et al.* (2024) argue for the strong interconnection between VCC and VCD and how these interact dynamically—either weakening or strengthening—during service encounters. Vartiainen and Tuunanen (2016) state that VCC and VCD are not merely opposites; they are interdependent phenomena. They coexist within the complex fabric of a service and cannot be fully understood in isolation, but they should be studied together. In other words, the root causes of VCC and VCD behavior differ. This contrasts with the extant view that the outcome of VCC can be either positive or negative while the practice itself remains the same (see, e.g. Vargo *et al.*, 2023; Skålen, 2026). Dynamics refers to "forces or properties that stimulate growth, development, or change within a system" (Merriam-Webster, n.d.). Examining VCC and VCD concurrently offers a richer understanding of the dynamics and inherent tensions in and between service systems (Li and Tuunanen, 2022). Furthermore, the precise nature of the dynamic interconnection of VCC and VCD—how they dynamically interact, manifest, and transform in specific service contexts—remains inadequately explored and theoretically underdeveloped (e.g. Lumivalo *et al.*, 2024; Skålen, 2026). We propose the concept of contradiction as a theoretical lens for micro-level analysis of VCC and VCD dynamics.

Contradiction theory, deeply rooted in organizational science, activity theory, dialectics, and Western philosophy, refers to structural tensions or opposing forces inherent within a system that threaten its stability and core motives (Allen *et al.*, 2013; Engeström, 2001). Contradictions manifest as struggles between opposing elements (Engeström and Sannino, 2011) and become visible through tangible problems, breakdowns, ruptures, and clashes in practice (Kuutti, 1999). Far from being mere weaknesses, contradictions are fundamental drivers of change, revealing systemic inefficiencies and, critically, opportunities for innovation and transformation (Engeström, 2001; Karanasios and Allen, 2014).

Recognizing contradictions within service systems offers a pathway for identifying embedded problems or conflicts that actively inhibit VCC or precipitate VCD. Resolving these contradictions can yield crucial insights into system design, development, and governance, ultimately fostering improved service experience and management (Schulz *et al.*, 2020). Consequently, investigating contradictions can elucidate the intended and unintended consequences of service encounters and explain how such interventions exacerbate or mitigate tensions within service systems. To foster VCC and prevent VCD, a deep understanding of contradictions can help identify the antecedents of both VCC and VCD by

interpreting actors' diverse service experiences and formulating solutions to inhibitors, which are manifestations of contradictions (Schulz *et al.*, 2020).

Applying contradiction theory can thus extend S-D logic by providing actionable, visible elements for examining service phenomena, thereby enabling a more granular, micro-level understanding of service systems and yielding practical insights (Schulz *et al.*, 2020). However, despite the potential of contradiction, no study has systematically articulated how this concept can be rigorously applied to understand the dynamic interplay of VCC and VCD, nor has research effectively leveraged it to analyze these phenomena in a rich empirical context.

Therefore, this study addresses the following research question: How do poles of contradiction elucidate VCC and VCD dynamics in a service system? We investigated this question through an in-depth study of geocaching, a global outdoor treasure-hunting game in which participants use GPS devices to locate hidden containers ("geocaches") (Gentry, 2006; Schlatter and Hurd, 2005). Geocaching is an ideal empirical setting because it embodies a complex service system involving multiple actors (players, cache owners, reviewers, platform providers, landowners, and the non-participating public) engaged in resource integration governed by formal guidelines and informal community norms. Our experiences as active geocachers reveal the core tension: While geocachers enthusiastically develop and seek caches for mutual enjoyment (i.e. experiencing VCC), significant negative consequences arise, including environmental erosion, conflicts with outsiders ("muggles"), and community disputes over guideline adherence (i.e. experiencing VCD). These empirical tensions make geocaching a quintessential site for observing how the dialectical poles of a contradiction—each essential to the system—simultaneously drive VCC and VCD. Thus, geocaching provides fertile ground for identifying structural contradictions whose disturbances illuminate the simultaneous and dynamic interplay of VCC and VCD.

Next, we review the literature on VCC, VCD, and contradiction theory, establishing their conceptual linkages within service systems. After describing the study's research methodology, we report how VCC and VCD are involved in geocaching contradictions. Finally, we discuss the implications for research and practice, note the study's limitations, and propose avenues for future research.

2. Theoretical background

2.1 VCC and VCD in service-dominant logic

VCC has evolved from a strategic concept emphasizing customer engagement (Kambil *et al.*, 1996) to a core principle of S-D logic, broadly defined as collaborative processes in which multiple stakeholders integrate resources for mutual benefit (Barile and Saviano, 2013; Prahalad and Ramaswamy, 2004). The key definitions include the following elements. Value arises in use during interactive encounters (Grönroos and Voima, 2013), and actors must be actively engaged and relational (Barile and Saviano, 2013), learning from and influencing one another in service encounters (Grönroos, 2011). Fundamentally, value remains uniquely and phenomenologically determined by each beneficiary (Vargo and Lusch, 2008). Actors participate for diverse motivations—cognitive, hedonic, social, reputational, and altruistic—and seek varied benefits from the process (Nambisan and Baron, 2009; Oreg and Nov, 2008).

Although the literature often refers to VCC as intrinsically positive, and engagement in interactive value creation processes is mainly explained as unproblematic (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004), users' service encounters do not always have positive outcomes (Lintula *et al.*, 2018; Vartiainen and Tuunanen, 2016). This duality of VCC and VCD is recognized in the literature, which acknowledges that in interactive value creation, value destruction exists as an opposing phenomenon to VCC (see, e.g. Lumivalo *et al.*, 2024). Crucially, VCD is not merely the absence of VCC; it is an active process of value diminution. This value diminution can stem from resource misuse—when an actor fails to competently integrate their own or others' resources in a manner that is expected or appropriate in the

interaction context (Plé and Cáceres, 2010). VCD can be accidental (e.g. a user misunderstanding) or intentional (e.g. vandalism or sabotage). Antecedents are diverse and include technical failures and usability issues causing user frustration (Lintula *et al.*, 2018), inadequate communication leading to misunderstandings and increased costs (Vafeas *et al.*, 2016), customer misbehavior or norm violations (Echeverri and Skålén, 2011), and incongruent practices or unexpected actions (Quach and Thaichon, 2017).

Recent systematic reviews have highlighted the growing importance of IT as both an enabler and a potential disruptor of VCC processes, emphasizing dynamic and systemic perspectives (Zhang *et al.*, 2024). However, understanding the holistic value landscape—encompassing both positive (VCC) and negative (VCD) poles—is essential for effective service system management. VCC and VCD are interdependent dimensions of value creation (Echeverri and Skålén, 2011), dynamically shaping service experiences and service system evolution (Li and Tuunanen, 2022; Vartiainen and Tuunanen, 2016). Skålén (2026) further argues that this dynamic value creation in services involves both VCC- and VCD-related practices. Thus, the co-occurrence of VCC and VCD necessitates integrated theoretical frameworks capable of capturing their complex dynamic interplay.

2.2 A dialectical perspective on service systems

To theorize the inherent interdependence and tension between VCC and VCD, we engage a dialectical perspective. Dialectics is an analytical mode concerned with process, change, and the dynamic interplay of opposing forces within a social totality (Benson, 1977; Seo and Creed, 2002). A core premise is that social arrangements, though appearing stable, are temporary and continually reproduced or transformed through human agency and practice (praxis).

From this worldview, we focus on two principal concepts: totality and contradiction. Totality represents a system of interconnected social patterns and relations (Benson, 1977). In the context of this study, a service system spontaneously sensing and responding spatial and temporal structure of largely loosely coupled, value-proposing social and economic actors interacting through institutions, technology, and language (Vargo and Lusch, 2016)—constitutes such a totality. Crucially, dialectics holds that all totalities are inherently contradictory. Contradictions are structural tensions generated by the coexistence of opposing yet mutually constitutive elements in a system (Benson, 1977; Hargrave and Van de Ven, 2017). They are the "engine" of instability and change, manifesting empirically as conflicts, dilemmas, and breakdowns.

Contradictions might result in a purposeful collective change effort (Engeström, 2001). Instead of being seen as weaknesses in the activity system, contradictions should be viewed as an opportunity to develop (Karanasios *et al.*, 2018). Contradictions can be turned into congruences through a process of feedback and action to achieve the "stabilizing processes within activity systems" (Allen *et al.*, 2013, p. 841). For example, Schulz *et al.* (2020) identified how contradictions serve as triggers for adaptations in the mobility sector and ultimately transform into congruencies, leading to the formation of a VCC relationship (see also Karanasios and Allen, 2014; Koskela-Huotari *et al.*, 2016; Laamanen and Skålen, 2015; Schulz *et al.*, 2020).

Service systems are inherently complex social systems embedded with diverse actors possessing conflicting values, beliefs, attitudes, and practices (Eriksson *et al.*, 2020; Rossi and Tuurnas, 2021). Contradictions are thus a daily reality of organizational and service life. Conflicts, as a type of contradiction, are recognized as key drivers of service system transformation (Laamanen and Skålen, 2015; Skålén *et al.*, 2015). Contradictions often manifest as imbalances in values and practices among actors attempting to collaborate (Rossi and Tuurnas, 2021), mirroring the potential for both VCC and VCD within the same interaction. Critically, Rossi and Tuurnas (2021) argue that conflicts cannot be rigidly categorized as purely generative or destructive; actors' sensemaking can transform destructive

outcomes into generative learning over time. This dialectical view aligns with our core proposition: Contradictions can precipitate both VCC and VCD, contingent upon actors' experiences, interpretations, and the system's capacity for adaptive resolution.

2.3 Synthesizing dialectical contradiction with VCC and VCD duality

A dialectical view of contradictions provides a powerful lens through which to explain the dynamic interplay of VCC and VCD. We posit that the structural tensions (opposing poles) within a service system are the primary source from which both VCC and VCD simultaneously emanate. Their relationship can be understood through three core dialectical principles, synthesized in Table 1.

Complementarity and interdependence: Contradictory poles (e.g. autonomy vs control) are complementary and necessary for the whole system's function, much like VCC and VCD are interdependent facets of interactive value formation (Echeverri and Skålén, 2011). One cannot be fully understood without the other. For instance, the creative freedom in designing geocaches (enabling VCC-like unique experiences) inherently conflicts with the need for guidelines to prevent environmental harm or public nuisance (mitigating VCD). Both poles are essential for a sustainable game.

Mutual implication and dynamism: Contradictions are mutually implicating; focusing on one pole inevitably invokes its opposite. Similarly, VCC and VCD dynamically affect each other. Disturbances (e.g. resistance—VCD) can stimulate the adaptation and reformulation of practices, potentially leading to enhanced VCC (Fyrberg Yngfalk, 2013). Conversely, successful VCC can introduce new contradictions (e.g. popularity leading to overcrowding and environmental damage—VCD). IT acts as a constant mediator and potential source of new tensions within this dynamic (Karanasios and Allen, 2014; Uppström and Lönn, 2017).

Polarization and praxis: Contradictions exhibit polarizing tendencies; neglecting one pole destabilizes the system (Carlo *et al.*, 2012). Focusing solely on VCC risks underestimating VCD potential, making systems vulnerable to unexpected failures (Plé and Cáceres, 2010). Conversely, excessive focus on VCD risks paralysis due to the fear of negative outcomes. Effective service system management requires balancing these poles. The congruency–contradiction lens (Karanasios and Allen, 2014; Schulz *et al.*, 2020) provides a systemic

Table 1. VCC and VCD dialectics: a contradiction-based synthesis

Dialectical principle	Explanation in contradiction theory	Manifestation in VCC/VCD dynamics	Illustrative geocaching tension
Complementarity and interdependence	Opposing poles (e.g. autonomy vs control) form a complementary, necessary whole	VCC and VCD are interdependent outcomes of the same interactive process within a service totality	Creativity (of hiders) and regulation (by platform) are both essential for a sustainable game
Mutual implication and transformation	A focus on one pole inevitably invokes and shapes its opposite; tension drives change	VCC can spawn conditions for VCD, and VCD can be a catalyst for innovative VCC	A popular cache (VCC) leads to trail erosion (VCD), prompting new placement guidelines (new VCC)
Polarization and praxis	Contradictions exhibit polarizing tendencies, and the tension between poles creates problems, necessitating practical action (*praxis*) to resolve or manage it	Overemphasis on one pole destabilizes the system, and disturbances (e.g. conflicts and dilemmas) force actor responses that determine value outcomes	A cache rejection (VCD for hider) leads to community debate (*praxis*), resulting in a refined, better-rated cache (VCC)

Source(s): Authors' own work

view, capturing how underlying tensions (contradictions) contribute simultaneously to VCC and VCD for different actors within the same interaction. For example, a ski resort geocache might offer an exhilarating experience for players (VCC) but violate commercial content guidelines or require paid access (potential VCD for players or platform). Recognizing this contradiction (recreation access vs commercial prohibition) is key to understanding the dual value outcomes.

Contradictions are latent structures that are identified through disturbances (Engeström, 2000; Helle, 2000). By analyzing breakdowns, conflicts, and dilemmas within a service system such as geocaching, we can uncover the underlying structural tensions and explicate how they manifest in VCC and VCD practices for different actors (Forsgren and Byström, 2018; Uppström and Lönn, 2017). This approach provides the missing micro-level analytical tool for S-D logic, moving beyond the phenomenological assessment of value to uncover the systemic tensions that shape its co-creation and co-destruction.

3. Research methodology and data

3.1 Research context: geocaching as a contradiction-rich service system

To identify structural contradictions, we employed an interpretive content analysis (Ahuvia, 2001) of geocaching-related texts. Geocaching is a service system consisting of the geocaching website (http://www.geocaching.com), which includes a world map and each geocache's location, and geocachers, who create caches for each other and try to find them. Each geocache includes its description, a description of the terrain, and the difficulty values. The geocache description also contains log entries by geocachers who have found or not found the geocache. Because geocaches may be hidden next to or in historical places, the geocache description may include information about the location. Geocaching etiquette guides how the geocaching community should conduct geocaching (Schlatter and Hurd, 2005). Its norms include how the geocache is to be hidden, where it should be hidden, and where it should not be hidden.

Therefore, geocaching constitutes an ideal empirical context for studying structural contradictions. As a service system, it inherently concentrates tensions between, for example, individual creativity and platform regulation, exploration of locations and their preservation, and community autonomy and centralized governance (Groundspeak Inc, 2026). The activity is governed by both formal platform guidelines and informal community etiquette (Schlatter and Hurd, 2005), creating a constant field of negotiation in which conflicting actor logics—and thus potential VCC and VCD—manifest in discourse.

3.2 Methodological approach: interpretive content analysis

To investigate how structural contradictions manifest in VCC and VCD, we adopted an interpretive, abductive research approach (Tavory and Timmermans, 2014). This was appropriate because our research question sought to uncover the subjective meanings and latent tensions that constitute value and conflict from the actors' perspectives—the core phenomenological tenets of S-D logic and dialectical theory. We operationalized this approach through interpretive content analysis (Ahuvia, 2001). Unlike purely quantitative content analysis, this method allows for the systematic yet flexible examination of textual data to interpret context, uncover underlying norms and conflicts, and build a theoretical understanding of observed phenomena. It is thus uniquely suited to identify the disturbances (e.g. dilemmas and conflicts) generated by contradictions in community discourse, moving from raw text to first-order codes, second-order themes, and, finally, to the aggregate theoretical dimensions of contradictions (Gioia *et al.*, 2013).

This interpretive content analysis approach was particularly suited to our investigation of structural contradictions. As latent tensions within a system (Engeström, 2001), contradictions are not directly observable but manifest through discursive disturbances—conflicts,

dilemmas, and breakdowns (Engeström and Sannino, 2011). Interpretive content analysis allowed us to move beyond counting disturbances. Instead, we treated forum posts and interview transcripts as cultural artifacts (Kozinets, 2020) that revealed the underlying, often conflicting, logics of different actors. By interpreting the latent meanings in these texts, we sought to understand how actors' praxis in navigating disturbances leads to experiences of VCC or VCD and to reconstruct the opposing poles (e.g. autonomy vs interdependence) that form a contradiction. This method is not used for positivist validation but for the hermeneutic task of uncovering the systemic tensions that explain VCC and VCD practices.

In our content analysis, we interpreted the latent meanings underlying the text and considered the context when making those interpretations. The insightfulness of the interpretations was a criterion when we reviewed the quality of the results. Our interpretive content analysis followed the classic stages of content analysis (Ahuvia, 2001): selection of the focal texts, coding, and interpretation of the coding results. Figure 1 illustrates the phases of our empirical study.

3.3 Data collection

Our data were collected from two sources: discussion forums and interviews.

3.3.1 Data gathering from discussion forums (2008–2018). Two data sources were selected because they were promising for identifying disturbances (Engeström and Sannino, 2011), specifically VCD. First, we selected a discussion forum from a Finnish geocaching community (https://www.geocache.fi) because the discussions appeared to be active and the forum participants did not hesitate to raise geocaching-related issues. We selected the discussion threads by reading the thread title and a few posts within each thread. The selection was based on the possibility of identifying disturbances from expressions that might indicate conflicts, problems, clashes, and ruptures (Engeström, 2000; Engeström and Sannino, 2011; Kuutti, 1999). Examples of discussion thread names included the following: "Everything is always wrong," "Therapy corner for geocache creators," "Criteria for finding a geocache," and "Freeriding in geocaching." Discussion threads concerning purely technical issues, such as buying new devices, were omitted from the analysis. The selected threads span from April 2008 to February 2018. Fifty-two discussion threads were included (Appendix).

Second, a discussion forum was selected from the geocaching website discussion forum (https://forums.geocaching.com/GC/). The "What irks me" discussion thread concerns issues that bother geocachers worldwide. This thread began in May 2013, and we selected all posts published until the end of January 2018 for analysis ($n = 2043$). Following accepted ethical guidelines for online research (e.g. Kozinets, 2020), we used pseudonyms for all forum usernames and interviewees. Direct quotations used as illustrative extracts were reviewed for anonymity, and explicit informed consent was obtained for the interview data.

3.3.2 Geocacher interviews (2024). For this part of the data collection, interviewees were recruited through social media discussion groups in two separate geographical areas in Finland. Table 2 summarizes the interviewees' demographic information and includes the numbers of found and hidden geocaches, which indicate their experience with the activity. The

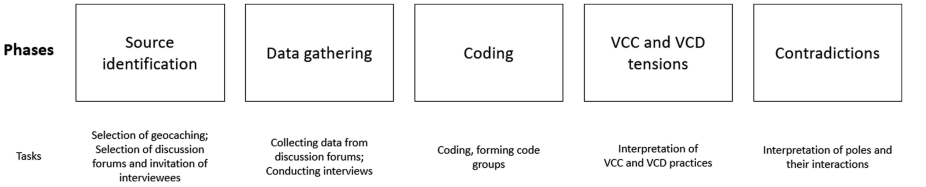

Figure 1. Phases of the empirical study and their tasks. Source: Authors' own work

Table 2. Interviewees' demographic data

Interviewee	Age	Gender	Geocaching experience (years)	Found caches (number)	Hidden caches (number)	Interview length (minutes)
1	68	F	13	8,200	0	21
2	65	F	9	8,000	1	13
3	54	F	13	6,770	2	15
4	34	F	15	360	7	11
5	45	M	13	20	0	14
6	44	M	5	30	0	13
7	42	F	8	2,950	0	10
8	43	F	4	6,700	2	14
9	41	F	2	1,500	0	21
10	50	F	10	49,200	45	10
11	54	M	10	10,000	200	16
12	64	M	18	5,350	20	11
13	33	M	7	8,000	1	13
14	54	F	8	5,660	6	12
15	48	F	15	1,000	2	11
16	43	F	4	3,230	0	8

Source(s): Authors' own work

interviews were open-ended, and the interview question was: "Describe topics, situations, or events where things did not turn out the way you wanted." The objective of the interviews was to identify disturbances. The interviewer asked probing questions, such as "Please clarify this" and "Does anything else come to your mind?" We obtained permission from all interviewees to use their expressions in the illustrative extracts in this article. The interviewed geocachers provided a range of perspectives, varying in experience from novices with a few hundred finds to veterans with tens of thousands (see Table 2).

This two-phase approach allowed for data triangulation (Denzin, 2002). The archival forum data provided a longitudinal record of naturally occurring community discourse, while the interviews offered deeper, reflective accounts of personal experiences. Together, they enabled a robust identification of contradictions across different temporal and experiential dimensions. The analysis followed an iterative, two-stage process of first-order coding and second-order thematic development, detailed below.

3.4 Data analysis process

In the data analysis process, we applied the Gioia methodology (Gioia *et al.*, 2013). This approach is designed to build grounded, inductive theory from rich empirical data while maintaining strong links between informant perspectives and researcher interpretations. It uses a systematic data structure—moving from first-order informant-centric concepts to second-order theoretical themes—to ensure rigor, transparency, and theoretical contributions in qualitative research. Following the inductive identification of first-order codes, we engaged in a second-stage analysis using Engeström and Sannino's (2011) typology of contradiction manifestations as a sensitizing framework. This typology—distinguishing conflicts, dilemmas, double binds, and ruptures—provided a theoretically grounded vocabulary for categorizing the disturbances we had inductively identified, while preserving our commitment to interpretive meaning-making. For instance, when we encountered first-order codes describing situations where geocachers felt "forced to choose between creative expression and guideline compliance," we recognized these as dilemmas —a discursive manifestation where actors articulate competing pressures. When we identified explicit disputes between cache owners and reviewers, these were categorized as conflicts. This categorization was not a

deductive imposition but an interpretive refinement that helped us systematically link manifest disturbances to the latent contradictions we subsequently identified. The coding process thus moved iteratively between inductive first-order codes and theoretically informed second-order categorization, maintaining analytic transparency while building conceptual depth.

Next, we report how we generated a data structure to show the development of the analysis from coding geocachers' perceptions of VCC and VCD dynamics and structural contradictions in geocaching.

3.4.1 Analysis of discussion forum data. The analysis process began with coding the data from the discussion forums (Phase 1 of data gathering). We performed the coding with the data analysis tool ATLAS.ti in two phases: naming and categorizing the data (Moghaddam, 2006). Each phase was iterative. In our study, there were three text coders, one of whom was actively involved in geocaching (Coder 1), was well immersed in the studied phenomenon, and was fully able to understand the meanings found in the texts.

Initially, Coder 1 went through the text and labeled the text sections that described a possible disturbance. The coder studied the meanings of the texts to understand whether a disturbance was latently present in the text. In total, 456 codes for relevant extracts were created (109 and 347 codes were created from the Finnish discussion forum and the discussion forum on the geocaching website, respectively). For example, in the following extract, a geocacher reflects on the consequences of a cache becoming known to non-participants. The extract was coded as a "Creating caches in muggle rich locations":

> I've placed a couple of caches by dog parks and tried to make them easy, with clear hints. According to the logs, one geocacher found a cache while there were muggles around and ended up explaining geocaching to them. After that, it seems the dog people started recognizing what was going on. From later logs, I noticed that they directly told other geocachers where the cache was or asked them if they were looking for it, effectively giving away the cache location.

Thereafter, Coder 2 and Coder 3 checked the 456 developed codes, comparing them with the original texts to achieve final consensus that all labels adequately summarized the extracted texts after several rounds of discussion and modification. After unrelated codes were deleted, 451 codes remained for further analysis.

Next, Coder 3 reorganized the codes into larger overlapping categories using the code-group functionality of the ATLAS.ti software. This process entailed 422 codes and 22 groups. Then, the other two coders went through each code and checked its assigned group. Coder 1 initially disagreed on the grouping of 43 codes, resulting in an initial agreement level of 94.1% between the coders. All discrepancies were resolved through discussion until full consensus was reached, enhancing the interpretive credibility of the coding framework.

Finally, 19 groups were identified for the final discussion (cf. Table 1). An example code group, "Geo-erosion and littering," consists of the following codes: (birdhouses are hung on a tree with iron → damage the tree), (cache in a tree → the tree may be cut), (caches in old historical walls → cachers damage the wall), (caches in tree → eventually the tree is harmed), (caching creates trails in nature), (geo-erosion, nature damaged when cachers seek for caches), (glass containers may be broken), (if CO [cache owner] does not maintain the cache → littering in nature), and (the environment around GZ [ground zero] damaged because of caching).

3.4.2 Analysis of geocacher interview data. Following the Gioia methodology (Gioia *et al.*, 2013), the first-order analysis proceeded by coding the interview notes and transcripts. In this phase, we performed the coding in a way like that in the previous phase. Coder 1 performed the initial coding on the interview notes and transcripts, which resulted in 103 codes of disturbances that were further categorized into 12 groups. Coder 2 verified the codes and groups, and no changes followed. The analysis resulted in an additional six code groups compared with those stemming from the analysis of the discussion forums. The additional code groups were as follows: adjust your cache behavior because of outsiders; disappointments when there is no success; geocaching increases carbon footprint; one needs increasingly more resources for caching; geocaching as a business platform; and social

integration into the group. The emergence of these additional code groups showed that the interviews complemented our prior analysis of the discussion forums well. See the Supplementary File for the codes and their groups.

Our analysis then proceeded to the second-order stage. We analyzed the code groups through VCC and VCD lenses. This means that we identified practices that related to similar phenomenon from both creation and destruction of value viewpoints. For this purpose, we further grouped the code groups to reveal actors' VCC and VCD practices (Figure 2). This process was iterative, entailing five VCC and VCD tensions. For example, the code group "Geo erosion and littering" showed directly that geocachers put pressure on nature just by walking and spending time in it (VCD). The reason for this activity is, however, joy and happiness achieved through spending time in nature and finding geocaches those others have hidden there (VCC). By studying other related code groups, we determined the VCC and VCD tension: "Enjoyment via geocaching harms the locations."

Five VCC and VCD tensions functioned as the basis for the recognition of contradictions. We began by identifying the poles that interacted with each other in such a way that unity or a joint outcome could be found in their interactions (cf. Allen *et al.*, 2013; Carlo *et al.*, 2012). Contradictions oppose the purpose of individuals when they use the system, and the existence of the system is threatened by the contradiction (Allen *et al.*, 2013). This implies that whereas the poles of contradictions represent the essentials of the activity, the interaction between the poles causes phenomena that might aim to destroy the activity (Allen *et al.*, 2013). Our approach was to consider poles as underlying values that should be upheld simultaneously. These underlying values would be negations of each other but nevertheless would be needed to form the activity.

With these characteristics in mind, we identified from the five tensions those values that needed to be upheld and protected. For example, the "Enjoyment via geocaching harms the locations" suggests that enjoyment and happiness are important values for geocachers. Moreover, the "Creativity and freedom cause dissatisfaction" tension suggests that creativity is an important value. We merged these values into self-actualization as a pole for the first contradiction. As the second pole, we identified the location quality. After many iterations with the five tensions and the values they promoted, we determined four pairs of poles, i.e. contradictions (aggregate dimensions). An overview of the analysis process is depicted in Figure 2.

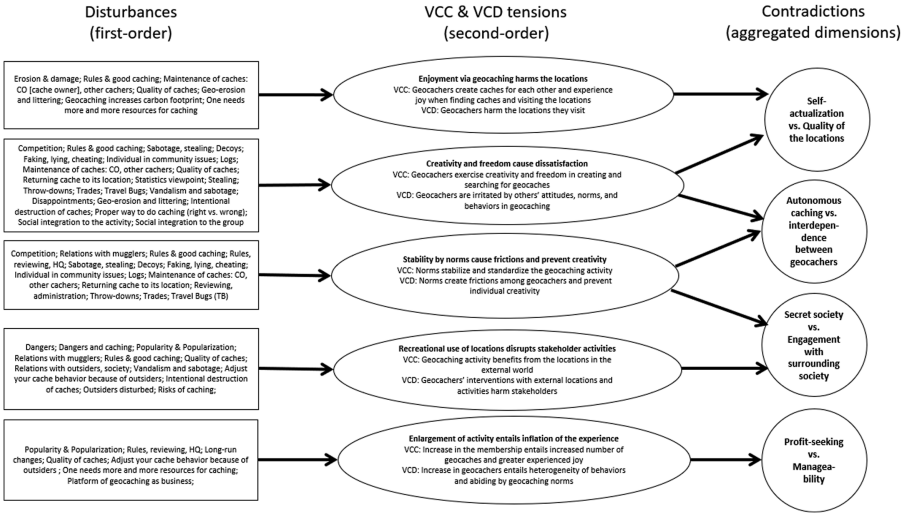

Figure 2. Data structure. Source: Authors' own work

4. Findings: identifying structural contradictions in geocaching

Our findings revealed that the geocaching service system is fundamentally structured by persistent internal tensions. These are not mere problems but structural contradictions—interdependent yet opposing poles that are both essential to the system's existence. The dynamic interplay between these poles, manifested in the community's everyday practices and conflicts, are systematically manifested in both VCC and VCD practices. Below, we identify and analyze four core contradictions with examples of the VCC and VCD practices.

4.1 Contradiction 1: self-actualization versus preservation of location quality

This contradiction is defined by the tension between the geocacher's drive for self-actualization (seeking hedonic enjoyment, creativity, and discovery) and the imperative for preserving the quality of the physical locations used for the activity. The activity is fueled by the first pole but depends on the integrity of the second.

In "Enjoyment via geocaching harms the location," tension exists with respect to erosion and damage, which are widely recognized harmful consequences. If a geocache is created in a vulnerable place, it is likely to suffer from repeated visits. The purpose of caching is to introduce interesting locations, such as nature parks, and it seems nearly impossible to avoid any negative effects. The following interview extract shows concern for the hobby's harmful effects:

> What really should not happen: . . . blatant disregard of your environs. It is not only the 150 yards off the tracks in a protected area (which would be forbidden), but also the drilling of holes in perfectly healthy trees; it is finding a lot of rubbish in a place where most of it must come from fellow geocachers; it is the destruction of constructions to get to the geocache . . .

Vandalism and sabotage occur when cachers purposefully destroy or damage things while geocaching. For example, some geocachers mentioned in their posts that they felt angry when someone put nails into a living tree and left trash in caches or in the surroundings.

VCC and VCD in Contradiction 1. We posit that a central motivating factor underlying the popularity of geocaching is the sense of fulfillment derived from seeking and hiding caches. More generally, this relates to self-actualization (Pole 1). Geocachers experience such fulfillment when they create and search for caches in locations that provide hedonic experiences and depend on the quality of those locations (Pole 2).

VCC is realized when a synergistic balance is achieved. This occurs when self-actualization is channeled into creating caches that enhance appreciation for a location without damaging it—for example, a creatively hidden cache that draws attention to a historical site while causing no erosion. The poles interact productively: The location's quality enables a rewarding experience (Pole 2 enables Pole 1), and the geocacher's responsible behavior maintains that quality (Pole 1 respects Pole 2). We call this "experimental synergy VCC practice".

VCD contradicts this when geocachers who aim to actualize themselves cause negative consequences for a location's quality due to their acts (self-actualization destroys the location quality; Pole 1 destroys Pole 2). If outsiders or geocachers themselves prohibit or restrict caching behavior because of the possible deterioration of a location, geocaching possibilities decrease (protecting the quality of locations destroys possibilities for self-actualization; Pole 2 destroys Pole 1). We call this "experimental degradation VCD practice". As one geocacher starkly concluded, eliminating this VCD would "practically mean ceasing geocaching activity," highlighting the inescapable dialectical nature of the tension.

We propose that there is a contradiction between self-actualization and the preservation of location quality. Both are essential in geocaching, as people engage in caching partly to actualize themselves through seeking caches in different locations. The interaction between these poles creates disturbances that can deteriorate the activity as a whole. At a more abstract level, we argue that these reflect the contradictory poles of hedonic behavior and societal norms.

4.2 Contradiction 2: secrecy of the "tribe" versus open engagement with society

This contradiction centers on the opposition between geocaching as a secretive, tribe-like activity with its own norms and codes and its necessary open engagement with the broader society in which it operates. The thrill and identity of the hobby depend on secrecy, but its practical viability depends on social tolerance and recruitment.

As geocaching occurs in common spaces, geocachers travel to locations where they do not typically go. They may encounter outsiders and situations that result in different kinds of tensions due to differences in people's behaviors (e.g. "Recreational use of locations disrupts stakeholder activities"). An outsider may worry about the behavior of an unknown person (the geocacher) and, for example, call the police or guards. However, when geocachers openly describe their activities, outsiders often react neutrally. In these confrontations, geocachers need to balance upholding secrecy and maintaining relations with outsiders. The following interview extract is from a guard who was also a geocacher. He described a situation in which geocachers acted suspiciously:

> When I was on duty during the night, I recognized two men walking with flashlights in the area that belonged to my patrol area. As a guard, I went to ask them the purpose of their activities, and in response, they laughed and said, "We are searching for a hidden thing." When I probed for the quality of the hidden thing, the response I got was, "These things are undiscussed with anyone." Because I have been geocaching myself and I recognized that they had GPS devices, I assumed they must be geocachers. However, this style of responding to outsiders should change, or someone could call the police. . . .. Not everyone knows that geocaching is a hobby, and such behavior does not make it look good.

VCC and VCD in Contradiction 2. We propose that there is a contradiction between geocaching as a secret society (Pole 1) and geocaching as engagement with the surrounding society (Pole 2). Geocaching must remain in contact with the surrounding society—otherwise, the activity would not attract new members. Management of this insider/outsider boundary directly shapes value. Consequently, we argue that contradictory poles of closed systems versus open systems exist.

VCC occurs through successful boundary work that sustains both poles. This happens when geocachers engage in stealth activity and experience the excitement of a secret society (Pole 1) while searching for caches in public spaces within the surrounding society (Pole 2), respectfully navigating those spaces so as not to alarm outsiders. The existence of the surrounding society and the idea that caches should be well hidden create the possibility of engaging in stealth activity and developing creativity in learning how to do it successfully. VCC also occurs when positive engagement—such as explaining the hobby to a curious landowner—strengthens the activity's social standing. Concurrently, geocachers receive hedonic experiences that promote their well-being (enjoyment through finding geocaches) and health (physical exercise) that also benefit the surrounding society, as geocachers are part of the surrounding societies. We call this "boundary-negotiating VCC practice".

VCD occurs when the boundary breaks down. For example, when geocachers enter locations to search for caches, they may cause concerns for members of the surrounding society (Pole 1 destroys Pole 2). When geocaching becomes increasingly popular and newspaper and magazine articles on geocaching emerge, the secret nature of caching vanishes. Similarly, when geocachers disregard the rules of stealth activity and search caches overtly, they break the rules of secrecy (Pole 2 destroys Pole 1). We call this "boundary-breaking VCD practice".

4.3 Contradiction 3: individual autonomy versus communal interdependence

This contradiction arises from the tension between the individual geocacher's autonomy in how they play the game and the communal interdependence required to maintain a shared,

functional service system. The hobby thrives on personal initiative but requires collective adherence to norms.

Geocaching promotes creativity and freedom both in hiding and seeking the geocache. Imagination is the limit in the creation of geocaches, and one can freely and independently travel to hunt. This has entailed a variety of ways of doing geocaching and dissatisfaction with how others do geocaching (e.g. "Creativity and freedom cause dissatisfaction"). The concept of "caching it wrong" has been introduced by geocachers themselves and relates to the perceptions of those who claim that other geocachers should change their behavior regarding how they hide and seek caches. These perceptions relate, for example, to opinions about logs, expectations of geocaching, responsibility for maintaining caches, appropriate behavior with trades, and returning caches to their location. In discussions about how to engage in geocaching, those opposing a caching-it-wrong attitude emphasized that geocaching is a hobby that should not be taken too seriously. In the next extract, a geocacher reflected that they constantly received complaints about the caches they had created:

> Geocaching is a nice hobby, and you can do it in many ways. If you get upset because someone recorded another person's nickname in the logbook up in the tree, and that person was just watching beside the tree—you need to think why it makes you upset. In my mind, you can ask for help from the mysteries. It does not hurt me if someone receives hints for the mystery caches I have made. I have made my caches to be found.

In line with the above extract, competition regarding found caches and FTF (first-to-find) is another example of divided opinions. To some, competition means an extra possibility to actualize themselves, whereas to others, competition violates the good spirit of geocaching.

VCC and VCD of Contradiction 3. We propose that there are two poles regarding the interaction of geocachers: autonomy (Pole 1) and interdependence (Pole 2). Both are essential in geocaching. Without autonomy or interdependence, geocaching loses its characteristics. The service system's health hinges on the resolution of this autonomy–interdependence dialectic.

VCC occurs when autonomous actions align with and reinforce the communal fabric. For example, geocachers acting on their own initiative contribute to the activity as a whole by creating new caches and observing the rules while caching, thus maintaining good relations among geocachers. VCC is also realized when the community collectively develops norms that channel individual energies productively. Geocaching as an activity would not exist without autonomous actors (Pole 1) working together (Pole 2). We call this "communal-aligned autonomy VCC practice", in which Pole 1 and Pole 2 synergistically strengthen each other.

VCD occurs when the poles are driven into opposition, for example, when individual geocachers engage in or refrain from activities that constitute violations of relationships between geocachers. An individual geocacher may decide not to follow the rules and thus harm other geocachers. Individual geocachers also hold views about the appropriate way to engage in geocaching (e.g. how caches should be hidden and sought, and how competition should be approached), and they may criticize other geocachers' behavior, creating bad feelings (Pole 1 destroys Pole 2). VCD also occurs when the relations between geocachers involve a situation in which individual geocachers' autonomy is violated. Caching rules concern situations in which the geocache ideas of each geocacher may be unaccepted by the reviewer, entailing disappointment. The competitive nature of geocaching is experienced by some geocachers as disturbing, for example (Pole 2 destroys Pole 1). We call this "antagonistic autonomy VCD practice".

4.4 Contradiction 4: platform profit seeking versus system manageability

This contradiction stems from the tension between the commercial platform's drive for growth and profitability and the community's need for a manageable, high-quality experiential

system. The platform's business model benefits from expansion, but uncontrolled growth can dilute quality and overwhelm social governance.

The privately owned geocaching platform requires a constant stream of income, such as premium membership subscriptions, to maintain profitability. To maximize revenue, there is a tendency to expand the activity by allowing the number of geocachers and geocaches to increase. This trend has led some geocachers to criticize inflation of the activity, as adherence to guidelines and the quality of caches have suffered (e.g. "Enlargement of activity entails inflation of the experience"). In the following extract, a geocacher reflects on this issue:

> The headquarters are over there across the pond. Originally, it started as a kind of hobby-related idea, but they also had dollar signs in their eyes. They want to attract more hobbyists and sell them a variety of stuff. You can clearly see that they do not want to limit growth in any way.

Geocachers become irritated when low-quality caches are created and hidden. Low quality relates to a poor location or an inadequate description of the geocache on the website. It may be perceived as a lack of creativity or accuracy when determining locations or inventing and describing containers. Sometimes, low-quality caches are connected to geocache creators' insufficient attempts to produce a geocache, but at other times, it is because of the inaccuracy of technology. In the following example, a geocacher complained that low-quality containers were placed in a nice location and that this combination decreased their caching experience:

> A CO (geocache owner) hogs a whole darn area with crappy containers. This weekend, we were excited to see a nice concentration of caches in a forest area. The first few finds were the same crummy ineffective container with a damp log and a rusted lid, so we passed up that road and did a run on a nearby jeep trail—also by the same CO. It was OK. Just OK. I counted 45 caches in a 6-square-mile area by this one CO. So, the whole area is saturated (hogged, IMHO) by so-so micros in the forest and leaky, rusty containers. Kind of (a) shame—so much potential there.

VCC and VCD in Contradiction 4. We propose that there are two poles that relate to the tensions between the whole activity and geocachers: The whole activity needs to have a stable economic basis. Therefore, we posit that Pole 1 is profit seeking. However, geocachers also need to feel that their relationship to geocaching is manageable, which constitutes Pole 2, manageability. Both poles are needed to sustain geocaching as a platform-based activity with users who feel their role in it is manageable. The sustainability of the entire service system depends on balancing this economic–social dialectic.

VCC occurs when platform growth and system manageability are mutually reinforcing, for example, when many geocachers agree to pay a premium fee (Pole 1), and they are satisfied with the activity and perceive it to be manageable (Pole 2). VCC also occurs when revenue from a satisfied, stable user base (Pole 1) is reinvested into tools and features that help the community manage itself better—such as improved review tools or educational resources—enhancing the overall experience quality (Pole 2). The dynamics between these poles creates possibilities for other VCCs to flourish (e.g. hedonic experiences). We call this "sustainable scaling VCC practice".

VCD occurs when the pursuit of one pole systematically erodes the other, for example, when geocachers manage their experience by stopping geocaching after they have experienced negative sides of this activity (e.g. anti-social behavior from other geocachers and low-quality caches), which leads to lower profits (Pole 2 destroys Pole 1). VCD also occurs when more geocachers are allowed to adopt the activity, leading to a situation that increases profits but also diversity in abiding by the rules, and low-quality caches, for example, are created. This leads to a situation in which the whole activity is perceived as non-manageable by geocachers (Pole 1 destroys Pole 2). We call this "destructive growth VCD practice".

4.5 Summarization and abstraction of the contradictions

We abstracted the contradictions, poles, and VCC and VCD practices at the service system level. Table 3 summarizes both geocaching-specific contradictions and their abstractions. These contradictions may be found in other service systems. The abstractions provide an example of how the unity of a service system is formed with opposing poles and show that this service system does not exist in isolation but with individual actors and their collaboration, while interaction with external society and even nature creates the service system.

5. General discussion and implications for theory and practice

This study considered VCC and VCD dynamics in a service system through the lens of contradiction. We conducted an in-depth empirical study of geocaching by studying discussion forums and interviewing active geocachers. Our interpretive content analysis of the discussion forum and interview data revealed VCC and VCD tensions. Based on our analysis, we identified contradictions and how they dynamically interact and polarize each other. Four contradictions were identified: (1) self-actualization vs quality of the locations; (2) secret society vs engagement with surrounding society; (3) autonomous caching vs interdependence between geocachers; and (4) profit seeking vs manageability. For each contradiction, we identified VCC practices in which the two poles strengthened one another. We also identified VCD practices in which the two poles worked against each other and had the potential to eliminate the opposing pole.

Our study's primary theoretical contribution to S-D logic is operationalizing the dialectical concept of structural contradiction as a micro-level lens to analyze the dynamic interplay of VCC and VCD. We demonstrate that contradictions are not just background noise but the generative engine of value dynamics, with each pole representing a core, necessary element of the service system whose tension produces observable outcomes. Although contradictions in perceived value have been recognized in the literature, it remains unclear how they relate to VCC and VCD. Examining contradictions in service encounters is therefore essential for understanding VCC and VCD. Such examination reveals aggravated tensions within or across service systems and shows how they lead to intended or unintended consequences. In contrast to the abstract concepts of VCC and VCD, contradictions are easier to observe through disturbances. A deep understanding of contradictions is useful for pinpointing the antecedents of VCC and VCD, understanding actors' collaborative behaviors, and identifying solutions to inhibitors (the disturbances generated by contradictions) that can foster VCC and prevent VCD.

5.1 Implications for theory

We contribute to theory by showing how to apply the concept of contradiction, specifically through its manifestations, to understand VCC and VCD in an empirical context, namely geocaching. While S-D logic effectively frames value as co-created and phenomenological, we argue that its meta-theoretical orientation can make the micro-processes of value formation difficult to observe. Our study addresses this challenge by integrating the dialectical concept of structural contradiction. Our study addresses this by integrating the dialectical concept of structural contradiction. We show that contradictions are not merely problems to be solved but are constitutive tensions that define the service system. Each identified contradiction comprises poles that are both essential and oppositional (e.g. the system requires both actor autonomy and communal rules). This lens provides a concrete analytical tool for moving from abstract value concepts to observable disturbances—conflicts, dilemmas, and breakdowns in community discourse—through which the dialectics of VCC and VCD play out. This offers an actionable method for studying the micro-foundations of service systems. Extending Schulz *et al.*'s (2020) integration of activity theory with S-D logic, our study explicitly brings the "dark side" of value dynamics—VCD—into this theoretical synthesis. We show that

Table 3. Summary of contradictions and VCC and VCD types of behaviors in geocaching, abstracted to service systems

Geocaching-related (context-based)			Abstracted to service systems (generalized)		
Contradictory poles	Types of geocachers' VCC practices	Types of geocachers' VCD practices	Abstracted contradictory poles	Abstracted types of VCC practices	Abstracted types of VCD practices
Self-actualization vs quality of the locations	*Experiential synergy:* Geocachers self-actualize by creating, hiding, and seeking caches in high-quality locations	*Experiential degradation:* Geocachers deteriorate location quality Geocachers restrict caching behavior because of possible location deterioration	Hedonic behavior vs Societal norms	Experiencing hedonism in use of the service system and upholding societal norms simultaneously	Upholding hedonism breaks social norms Upholding social norms deteriorates hedonic experiences
Secret society vs Engagement with surrounding society	*Boundary-negotiating:* Geocachers engage in stealth activity while going caching in locations and navigating public spaces to avoid alarming outsiders	*Boundary-breaking:* Geocachers concern members of the surrounding society When geocachers search caches overtly, the secret nature of caching vanishes	Closed system vs Open system	Upholding the system is closed enough so that external society is not disturbed	Upholding the closed nature of the system disturbs the surrounding system Acting as if the system was open deteriorates the needed closedness of the system
Autonomous caching vs Interdependence between geocachers	*Communal-aligned autonomy:* Geocachers contribute to the activity by creating new caches and observing the rules while caching	*Antagonistic autonomy:* Geocachers engage in activity that violates relationships between geocachers Geocachers' relations concern violation of an individual geocacher's autonomy	Autonomy vs Interdependence	Autonomous service system users jointly collaborate to make the service system possible	By upholding individual autonomy, collaboration deteriorates Upholding collaboration deteriorates individual autonomy

(*continued*)

Table 3. Continued

Geocaching-related (context-based)			Abstracted to service systems (generalized)		
Contradictory poles	Types of geocachers' VCC practices	Types of geocachers' VCD practices	Abstracted contradictory poles	Abstracted types of VCC practices	Abstracted types of VCD practices
Profit seeking vs Manageability	*Sustainable scaling:* Platform growth and system manageability are mutually reinforcing	*Destructive growth:* Geocachers drop geocaching after they have experienced the negative sides of enlarged activity, entailing lower profits	Profitability vs Sustainability	Keeping the activity profitable and sustainable at the same time	Upholding profit seeking deteriorates sustainability of the function Upholding sustainability deteriorates profit seeking

Source(s): Authors' own work

contradictions can explain the simultaneous emergence of VCC and VCD in a service system, moving the combined framework beyond a focus on positive co-creation.

In studying collaboration processes, it is vital to study both VCC and VCD to offer systematic insights into understanding the involved service system actors and activities. Doing so can provide an overall perspective on balancing or influencing a process to achieve the expected outcomes. Our findings demonstrate that contradictions are not merely obstacles but constitutive features of service systems that generate both VCC and VCD. This reframes the theoretical understanding of value dynamics from a linear, avoidable-failure model to a dialectical model in which tensions are inherent and must be managed conceptually before any practical intervention can be designed. Therefore, considering both VCC and VCD can provide a broader understanding of the value formation process from a systematic view (Akaka and Vargo, 2014), and the identification of contradictions can reveal the antecedents of such behaviors.

Furthermore, our empirical findings are consistent with research arguing that value is dynamic and should be assessed individually during collaboration (Laamanen and Skålén, 2015; Laud *et al*., 2019; Pinho *et al*., 2014). For example, Laamanen and Skålén (2015) and Wang *et al*. (2019) suggest that conflicts are neither positive nor negative but inherent in the dynamics of interactions. Further, value is subjectively determined by system actors' perceived trade-offs between benefits and sacrifices within relationships (Blocker, 2011). Our study extends phenomenological value theory by showing how such subjective trade-offs are concretely shaped by structural contradictions between system poles. This advances S-D logic beyond the general premise that "value is phenomenologically determined" to a more precise, testable proposition: an actor's perception of value (as co-created or co-destroyed) is systematically influenced by which pole of a contradiction dominates in each interaction, and how the actor resolves the resulting tension. Our findings reinforce and extend this phenomenological view by showing how these subjective trade-offs are concretely shaped by structural contradictions between system poles, such as autonomy vs interdependence.

Lastly, our findings also have implications for studying the design of service systems. Our framework shifts the design imperative from simply "enabling VCC" to diagnosing and managing inherent contradictions. Little research exists regarding the negative consequences

of design and the possible effects of value destruction by users and other stakeholders in the value-creation process (Echeverri and Skålén, 2011; Plé and Cáceres, 2010). This aspect is particularly interesting for practitioners and for the design of service systems. The concept of a paradoxical frame (Smith and Tushman, 2005) may also be helpful when further considering the contradictory poles (Engeström and Sannino, 2011) of VCC and VCD and how to apply these in service system design. A paradoxical frame can be used to develop cognitive processes that enable the consideration of inconsistencies. Through differentiation and integration, both poles reinforce each other. Consequently, we argue that understanding the contradictory poles of VCC and VCD in a solution space enables better design and service management. Rather than designing systems to suppress one pole of a contradiction (e.g. stifling creativity to enforce rules), designers can create architectures that acknowledge and accommodate both. For example, a platform could offer structured avenues for creative expression within clear guardrails. Our abstract contradictions (see Table 3) provide a generative foundation for applying theories from institutional logics, systems science, and sociology to the design of sustainable service systems.

5.2 Implications for practice and design

Our findings enable service managers and designers to make better decisions regarding rules, institutions, and system design by continually balancing contradiction poles to maximize benefits for the service system. Practitioners can use the four identified contradictions as diagnostic tools. For example, when a cache owner experiences rejection (VCD) due to guideline violations, managers can intervene not by suppressing creativity but by creating structured channels for creative expression within clear boundaries—thereby "manipulating related poles" to transform antagonistic autonomy into communal-aligned autonomy.

Moreover, service managers and designers can use our findings to recognize contradictions in their services. However, solutions to these contradictions should be context specific. Other services can employ the same approach as in our study to understand service users' behavior and inhibitors of VCC. For instance, any location-based game (e.g. Pokémon GO) will grapple with self-actualization vs location quality. Any platform reliant on user-generated content and community governance must manage autonomy vs interdependence. Recognizing these inherent tensions is the first step toward managing them intentionally rather than reacting to disturbances. Service managers should systematically map the multiple actors in their service ecosystem and assess how each perceives trade-offs between contradictory poles. For instance, in geocaching, cache owners prioritize creativity (autonomy) while reviewers prioritize guideline adherence (interdependence). Recognizing these divergent perceptions enables targeted interventions—such as collaborative guideline workshops—that address each actor's concerns rather than imposing a one-size-fits-all solution (cf. Osei-Frimpong *et al*., 2015).

Furthermore, some services may encounter contradictions like those identified in geocaching, and the implications for service management and design may therefore also apply to them. For instance, harmful effects may arise in services related to outdoor activities (e.g. Pokémon GO) that involve interactions between people and the outdoor environment. Rule-breaking behaviors should likewise attract the attention of service designers in similar contexts, such as games in which such behaviors often occur and can be mitigated through better service design once the relevant contradictions are understood. Next, we provide a concrete example of what service managers and system designers can do in relation to identified contradictions.

In geocaching, although harmful effects such as erosion and damage to locations are unavoidable because of repeated visits, they can be reduced and better managed through improved system design. For example, system designers can consider adding a feature whereby users can evaluate whether a cache causes erosion or damage to the environment or if the cache is in a place that is too dangerous. At the same time, it would be helpful to ask users to

rate their experience in terms of whether it is meaningful, exciting, fun, pleasing, or recommendable. By considering both pros and cons through user evaluations, service managers can make more rational decisions about whether to keep or archive a cache; such decisions can also help reduce poor-quality caches. For damage that has already occurred, the service provider or community can organize activities to repair it or otherwise improve the place, for example by planting trees or grass (where appropriate) or cleaning the area if needed. Doing so can build a better social image for the geocaching community and contribute to the platform's corporate social responsibility.

5.3 Limitations and future research

Every study has limitations, and we acknowledge that this study concerns only one service system, namely geocaching, which limits the findings to this context. However, we see potential for the implications of the findings to extend to similar settings, such as gameplay, and the guidelines for identifying contradictions from the perspective of VCC and VCD can be applied to other service systems in which contradictions might occur. In our interpretive content analysis of the data, we studied and analyzed how the forum participants perceived geocaching as a service system and how the activity enabled them to co-create or co-destroy value for themselves and the community. Our findings should be considered contextual, although we see interesting connections emerging among the recognized contradictions between the VCC and VCD practices. Further research on theorizing and conceptualizing contradictions and VCC and VCD should be undertaken to better understand this phenomenon to form a solid theory and recognize the potential of how it can add to or even revolutionize the S-D logic literature (Vargo and Lusch, 2016, Vargo *et al.*, 2020). To this end, larger datasets should be gathered, and a wider variety of service contexts should be studied to enable broader generalization of the findings.

6. Conclusion

Our study shows how to use the concept of contradiction to reveal VCC and VCD dynamics in a service system: geocaching. By integrating dialectical theory with S-D logic, we provide an actionable framework for moving from abstract value concepts to the analysis of concrete, observable tensions in service interactions. The four contradictions identified in geocaching—between self-actualization and preservation, secrecy and engagement, autonomy and interdependence, and profit and manageability—offer a template for diagnosing similar tensions in a wide array of contemporary digital service systems. Ultimately, acknowledging and skillfully managing these inherent contradictions, rather than attempting to eliminate them, is the key to designing sustainable and resilient service systems.

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Appendix

Table A1. Selected texts from the discussion forum

Discussion threads from "the sky is the limit" subsection	Discussion threads from the "general issues" subsection
Caches with ideologies	Achieved caches
A log removed without a reason	Suspectable activities
A geocache was suspected as a bomb at Salo town hall	Dislikes of different cache types
Geocaching in the light of sustainability	First to find
Geo-destructor moving in Turku area	First to find and untouched nature
Everything is always wrong	Stealth activities and muggles
Critique on critique	Ways of stealth activities at the caches
Who defines the challenge caches	International Earthcache Day
Opinions on reviewers and on the selection of reviewers	Cachers upstairs and downstairs
Acceptance of logs of earth caches	National parks and premium caches
Whining by the campfire	Power trail of Kiilopää
Couple of words about events	Quality and meaningfulness of caches
Are you allowed to spoil a mystery	Returning the cache to the correct location
On safety	Therapy corner for cache creators
This kind of geocacher has visited Finland	Caches in birdhouses
A new list about caches hidden in stone walls	The logbook is full
Fake containers and whining on other issues	Meaningfulness of the logbook
Responsible geocaching	Criteria for finding a cache
Virtual cacher on the move again	Thinking about geocaching
Is it so that one can go in for geocaching only in the wrong way	What does geo-erosion mean
	What would you do in other way
	Mysteries and solving them
	About the guidelines
	Right to remove a log
	Odd news
	The best caching injuries
	Police and geocaching in Finland
	Tick time has begun
	Freeriding in geocaching
	Create a premium cache and then you can stalk
	The incredible traveling railway station
	For you, knowledge shutdown of the power trail in Nuuksio

Source(s): Authors' own work

Supplementary material

The supplementary material for this article can be found online.

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Corresponding author

Tero Vartiainen can be contacted at: tero.vartiainen@uwasa.fi