Received: 23 February 2022 | Revised: 9 February 2023 | Accepted: 10 March 2023

DOI: 10.1111/tran.12612

ARTICLE

Everyday geographies of market transition: Agro-science, socio-technical relations, and the contingencies of market making in peri-urban Lhasa, Tibet

Junxi Qian[1] | **Han Zhang**[1] | **Yajing Liu**[2]

[1]Department of Geography, The University of Hong Kong, Hong Kong, Hong Kong

[2]Department of Tourism Management, Tibet University Lhasa, Lhasa, China

Correspondence
Junxi Qian, Department of Geography, The University of Hong Kong, Hong Kong, Hong Kong.
Email: jxqian@hku.hk

Yajing Liu, Department of Tourism Management, Tibet University Lhasa, Lhasa, China.
Email: yajing0803@163.com

Funding information
General Research Fund, Hong Kong Research Council, Grant/Award Number: 17601021; National Natural Science Foundation of China, Grant/Award Numbers: 41661032, 41871124

Abstract

State-promoted and market-oriented horticultural production has fundamentally reshaped land use and agricultural economy in peri-urban Lhasa, Tibet Autonomous Region, China. This paper examines two scenarios amidst this transformation. In the first, peri-urban land has been valorised for vegetable production through the erection of greenhouses and the introduction of agronomic science. However, Tibetans refrain from participating directly, preferring to lease the land to Han migrants, and citing structural inequalities between Han and Tibetans and Tibetan work ethic as explanation. In the second, the municipal government is more proactive in introducing agro-science and providing technical training to enrol Tibetans. However, the participation of Tibetans is selective and partial, contingent on the same non-market rationalities that Tibetans invoke to justify non-participation in the first scenario. This paper explicates the diverging modes of participation for Tibetans by engaging with the Callonian approach on economisation and marketisation, and interrogating how socio-technical relations established among humans, material infrastructure and agro-science culminate in variegated calculative and non-calculative agencies. Focusing in particular on the structural relations and cultural conventions that frustrate the unilinear enactment of a market order, this study contributes to the geographies of marketisation in two ways. First, it works with an analytical framework centred on the ongoing dynamic of framing, overflowing and reframing to argue that the marketisation approach can be expanded to account for the encounters between market agencements and local socio-cultural contingencies. Geographically, second, it also contributes to the agenda of interrogating diverse market variants and the richness of economic differences in real space-times.

KEYWORDS
agro-science, economisation/marketisation, everyday market economies, Lhasa, marketsite, socio-technical agencement, Tibet

1 | INTRODUCTION

This paper engages with the emergence of market-based agricultural economy in peri-urban Lhasa, the capital city of Tibet Autonomous Region (TAR), China, and unravels how Tibetans selectively connect with or disconnect from market participation and the allegedly 'scientific' methods of cash crop cultivation introduced by the Chinese state. Over the past decade, the local state of Lhasa has dedicated considerable efforts to enrolling Tibetan peasants into commercial agriculture. The principal rationale is to transform Tibetans' mindsets and behaviours so as to trigger a change from the 'backward' and *extensive* mode of cultivating subsistence crops to *intensive*, professional and entrepreneurial modes of planting cash crops. This is part and parcel of a broader poverty alleviation project endorsed and promoted by the Chinese state since the early 1990s and which has gained heightened momentum since the mid-2010s, in which both state and corporate actors regard commercial agriculture as an intervention to lever Tibetans out of the subsistence economy and turn them into market-savvy subjects, so as to contribute to political stability in a contested frontier region (e.g., Qiang, 2021). As of 2019, cash crop plantation in peri-urban Lhasa covered a land area of 128,300 mu (about 8553 hectares), accounting for 15.6% of total arable land in the city.[1]

In this paper, we interrogate two scenarios amid the agricultural transformation of peri-urban Lhasa. The first, drawing on fieldwork conducted in Chengguan, Todlungdechen and Tagtse Districts and in Chushur County, relates to the valorisation of peri-urban land for vegetable production through the erection of greenhouses and the introduction of green-revolution-style agronomic science. Interestingly, almost all the Tibetans we encountered during the fieldwork opted not to participate in the cultivation of vegetables directly, preferring instead to lease the land to Han migrants, China's ethnic majority, in return for rental income. They cite vegetable plantation as labour-intensive and opposed to Tibetans' conventions of work and rhythms of everyday life. Our study investigates Tibetan non-participation as a specific 'non-calculative agency', the term referring to behaviours not in accord with the pursuit of economic utility (Callon, 2007a). However, instead of viewing Tibetans as outsiders to market integration, we suggest that they are closely involved in this process through alternative '*calculative* agencies' (Callon, 2007a), referring to their alternative means of participating in market transition and extracting economic interests. The second scenario is related to the Health Industrial Park in Chushur County, operated by Lhasa Pure Land Industry and Investment Co. Ltd. (LPL). Here, the local state is more proactive in introducing agro-science and 'scientific management', while providing technical training to local Tibetans. As a result, many Tibetans have been enrolled in the programme as cultivators, even technicians. Still, the participation of Tibetans is selective and partial, contingent on the same non-market rationalities that Tibetans invoke to justify non-participation in the first scenario. This has prompted the Park to continually adjust the agro-scientific knowledge to make it more compatible with Tibetans' rhythms of life, conventions of work and discomfort with around-the-clock intensive farming (Figure 1).

The principal objective of this paper is to explicate the diverging levels of Tibetan participation under state-promoted agro-science, which is closely related to one of the most highlighted questions in studies on Tibetan development – that is, why Tibetans are involved or not in state-sponsored, market-based development (e.g., Fischer, 2014; Lafitte, 2013; Qiang, 2021; Yeh, 2013). To achieve this, we draw upon the theoretical approach built principally around the ANT-inspired works of Michel Callon (1998a, 2007a, 2007b) on the social studies of economisation. This approach sees the market as a socio-technical agencement (STA) formed by human and non-human actors and through the realisation of knowledge models or scripts to construct a rational market (Çalışkan & Callon, 2010). It is, as the thesis goes, the complex relational networks within STAs that create market devices and distributed agencies that equip diverse actors to calculate and act (Çalışkan & Callon, 2010; Callon, 1998a, 1998b). In this study, both scenarios are concerned with relations between humans and the technical and material properties of agricultural production. The scientific knowledge promoted by the local state and material conditions required to deliver it are directly aimed at creating a marketised horticultural economy and enhancing the market competitiveness of agricultural products. They also inform standards of qualification alleged to be 'optimal' and 'rational' – i.e., 'qualculation' in Callon and Law's (2005) term, which sees the judgement of quality for goods as part of calculations delimited by STAs. However, instead of indoctrinating a seamless pro-market mentality, market agencements are beset by myriad contradictions, ambivalences and setbacks. In the Lhasa cases, the market

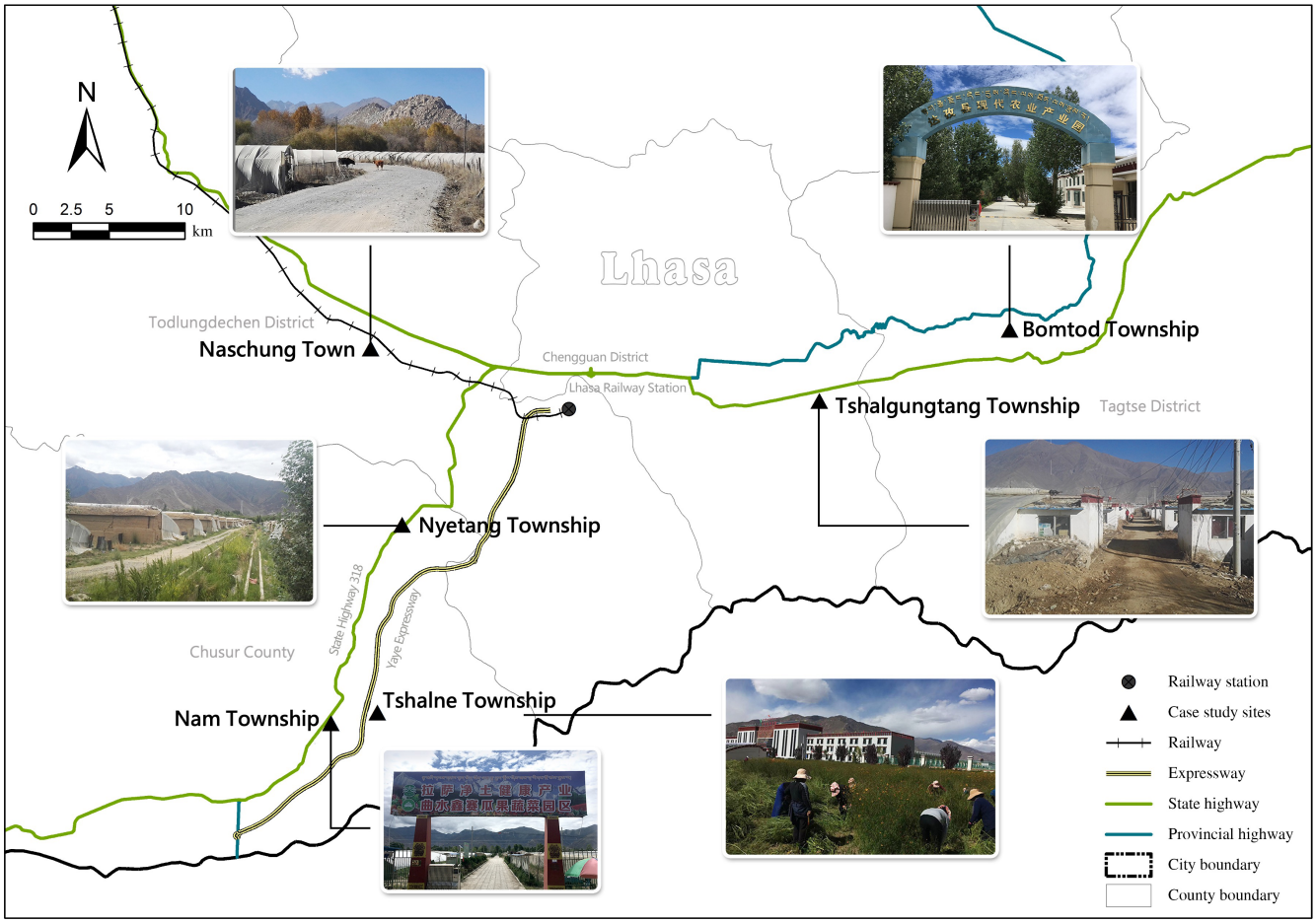

FIGURE 1 Locations of the case study sites.

transition introduced by agro-sciences and new socio-technical assemblages are contingent on structural factors and cultural conventions that shaped and routinised local agricultural activities prior to the advent of state projects – these include, prima facie, the structural marginality of Tibetans, their lack of access to education and skills, and their culturally instituted norms and ethics of work. In this sense, this study points to the importance of probing the encounters between market agencements and situated contingencies that are contextual, socio-culturally constituted and instituted (Peck, 2012, 2013, 2020; Polanyi, 1957).

Several attempts that situate the marketisation approach in everyday contexts have implied that it is not adequate to focus on social and technical conditions realigned to the realisation of abstract market principles; more importantly, the negotiated and expanding boundaries of the market in relation to its constitutive outside need to move centre stage (Berndt & Wirth, 2019; Langley, 2020; Mahanty, 2019; Miller, 2014; Ouma et al., 2013). While a number of works have considered how a rational market order constituted by socio-technical assemblages may be deferred and disrupted by the messiness and contingencies of the real world, expressed in power relations, social conventions, cultural ideas, affect, etc. (Berndt & Boeckler, 2011; Langley, 2016; Muellerleile, 2013; Ouma, 2010, 2015), they have not led to systematic theoretical thinking about how the marketisation perspective can be enriched and reworked, so that it is better suited for the incomplete, contested and ambivalent nature of marketisation processes (Berndt & Boeckler, 2023). Our study, however, suggests that such tensions can be effectively addressed by the theoretical vocabularies of the marketisation approach. We are particularly enlightened by the recent intervention by Berndt and Boeckler (2020, 2023), which further furnishes the Callonian distinction between framing, referring to the delineation of boundaries encompassing the networks of relations that serve calculation and perform economic knowledge, and overflowing, referring to the inevitability of elements exceeding the calculative order that the framing circumscribes. In the incisive analysis proposed by them, extra-market relations, values and logics can be analysed as overflows that disrupt the stability of a rational, self-contained market, only to be reincorporated into the framing to restore control and stem friction and tension. This process, termed *the*

proliferation of the social by Callon (2007b), may eventually recalibrate and rework socio-technical relations and realign them to mundane, vernacular knowledge that coheres around everyday sensibilities and practices. In this sense, it may be futile to attempt to identify the ways that rectify 'irrational' practices; rather, a more productive inquiry unpacks an actually existing market as 'a constant process of articulation and negotiation' (Berndt & Boeckler, 2023, p. 131) between multiple rationalities and logics. Building on this assertion, this paper puts forward a context-sensitive, place-based analytical framework for the study of marketisation, by elaborating on three problematiques and illustrating them with nuanced empirical analyses: (1) how socio-culturally sticky conventions and relations supply alternative logics and rationalities for the constitution of socio-technical agencements, beyond that of a rational market; (2) how the co-existence of multiple rationalities and logics result in an ongoing dynamic of framing, overflowing and reframing; and (3) how the dialectic of framing and overflowing is contingent on the issues of structure, inequality and power, as opposed to ANT's emphasis on horizontal relations at the expense of theorising structures, hierarchies and inequalities.

Geographically, this paper contributes to the agenda of interrogating diverse market variants and the richness of economic differences in real space-times (Berndt et al., 2020; Peck, 2012, 2020; Peck et al., 2020). The ways that standard, universal knowledge is implemented are locally shaped, contingent on specific material and social conditions. Still, local differences alone do not produce definite predictions about economic diversity and heterogeneity; rather, how locally specific factors shape economic formations varies according to their intersections with the technical and material conditions introduced by knowledge models or scripts. In sum, we argue that it is the hybridisation of market scripts and local instituted factors that produce contingent and heterogenous 'market species'. The actual unfolding of this process resonates closely with two issues central to the geographical study of marketisation: (1) global knowledge vs. local negotiations, namely how universal knowledge is entangled with local social, cultural and political logics (Berndt & Boeckler, 2009; Hall, 2007; Ouma, 2010, 2015); and (2) how spatial borders are drawn around spaces at different scales that enact market framings, while keeping out undesired relations and elements, though the need to address the precariousness and uncertainty of framing will eventually see the boundaries blurred and redrawn (Berndt & Boeckler, 2020, 2023; Mitchell, 2005, 2007). Together, these two geographies culminate in what Kear (2018) conceptualises as the *marketsite*, a location where heterogenous elements intersect to create the conditions for market integration and serve the performation of knowledge. Yet, as Kear (2018) argues, a marketsite always sits at the interface between the 'virtual', i.e., an abstract market ideal, and the 'real', i.e., the lived realities of places. A real-world marketsite is much more contested, hybrid and unstable than an ideal and rational market economy free of controversy and friction. In this study, marketsites are not only analysed at the interface of global vs. local, but also shot through microscopic spaces singled out and demarcated for market-oriented practices, as opposed to all kinds of alienated, even resistant identities that lie beyond, which affirm, negotiate and erode such spatial boundaries (Berndt & Boeckler, 2023; Callon, 2007b). In this vein, our empirical analyses will detail the ways in which these marketsites take shape locally, amidst socio-technical interventions and everyday negotiations.

2 | RETHINKING THE MARKETISATION APPROACH: ALTERNATIVE LOGICS, OVERFLOWING AND THE QUESTION OF POWER

Over the past decade, the economisation/marketisation approach has been widely applied to unravel the formation of market economies through the lens of socio-technical relations. Given that this thesis is now well rehearsed, it will suffice to reiterate the three central traits of the market. First, the market economy is a socio-technical 'agencement', borrowing the term from Deleuze and Guattari (2004), which refers to an assemblage of heterogeneous elements, human and nonhumans alike. Depending on how the STA is configured, it puts to work a wide range of rules, technical devices, texts, discourses, metrological methods and knowledge to enable the mechanisms of pricing, evaluation and exchange (Çalışkan & Callon, 2010; Callon, 2007a, 2007b). Second, this approach emphasises the performativity of economy, namely the ways in which economic statements, theories and models are applied to the construction of STAs. It is the knowledge scripts that establish the logics and criteria for evaluation and calculation (Callon, 1998a, 2007a; MacKenzie, 2007). *Homo economicus* exists not because people are born to be self-interested but because STAs equip people to pursue instrumental rationality in tandem with self-realised knowledge. Finally, the STA perspective expands the concept of agency beyond that of a human reserve. Instead, agency is theorised as widely distributed in hybrid collectives, and as an emergent and relational effect of socio-technical associations (Callon, 2007a, 2007b; Callon & Muniesa, 2005; Latour, 1999, 2005). Actors do not possess essential ontological statuses; instead, their properties or meanings are co-produced by the STAs in which they are imbricated (MacKenzie, 2007).

In sum, this approach is centred on the capacity of theories and knowledge to actualise specific 'worlds' and create conditions for market integration by aligning diverse elements into STAs. However, a number of studies have revealed that the translation and implementation of knowledge models to the lived world is contingent and ambivalent, subject to the unsettling effects of entrenched norms, political economies, cultural values, relations of power, institutions of governance, etc. Ouma (2015) points out that market integration is a contested process, and people face varied 'socio-technical puzzles' (p. 5), which lead to various 'moments of crisis, disruption and resistance' (p. 6). He pays particular attention to power, webs of relations, social structures, local principles of qualification and evaluation, etc., seeing the economy as driven by market devices and instituted factors at the same time (Ouma, 2010, 2015). Geographically, such frictions are reflected, on the one hand, in how translocal and transhistorical knowledge and rules clash with existing systems of economic coordination and regulation at the local scale (Hall, 2007; Ouma, 2010, 2015). On the other hand, they entail the clear demarcation between spaces scripted by market logics and alternative norms, values and relations that lie beyond. In the contact zones in-between, spatial borders are constantly negotiated and redrawn, eventually expanding market frontier into realms previously defined by non-market modes of production and livelihoods (Berndt & Boeckler, 2020, 2023; Ouma, 2015). While these situations can be analysed as part of counter-performativity (Bamford & MacKenzie, 2018; Callon, 2010), the ANT terminology denoting the failure for performed knowledge to reformat the world without contestation, a more nuanced theorisation is needed to unravel marketisation in real spaces and times. In particular, the analytical framework that we construct in this paper underscores three issues.

First, a plethora of structural factors and cultural conventions inherent to everyday economic practices widen the scope of legible knowledge and logics deployable in STAs. As Callon (1998a) once noted, calculation is premised on a process of 'framing', which includes elements and relations serving calculation but excludes those not compatible with a specific calculative order. Therefore, when objects entangled in uncalculated, disinterested relations, such as the gift economy and moral economy, are made into calculable commodities, the first step is to *detach* them from erstwhile relations – thus, 'a clear and precise boundary' is demarcated to enrol actors and relations that perform calculation without ambivalence (p. 14). Pre-existing ties and relations classified as non-calculation, on the contrary, are analysed as externalities or 'overflowing', to be guarded against by boundary-objects. However, as Callon (1998a) points out, disentanglement always brings back the spectre of (re-)attachment, i.e., the impossibility of fully erasing the traces of human practices and severing agents from erstwhile relations and meanings. In fact, Callon mentioned in passing that markets do not have to be pure, and it may be the co-existence of disentanglement and re-entanglement that enables certain markets to emerge and work, such as the circulation of money and the creation of markets of imperfect competition – modern economies are heavily populated by non-calculability, no less than in the traditional societies (1998a, p. 40). In this paper, we argue that contextual, structural and instituted factors constitute a key source of entanglements, expressing alternative logics and rationalities to abstract and asocial calculative orders. They provide a repository of values, discourses, beliefs and justifications that steer the constitution of socio-technical relations in alternative directions to market calculation and rationality. This view responds to criticisms waged against the marketisation approach for focusing solely on market expansion based on economic utility and reproducing abstract neoclassical economics (Berndt & Wirth, 2019), yet without dismissing the validity of socio-technical agencement as a lens for explaining the socio-technical constitution of markets.

Second, and related to the first, the framework of framing/overflowing provides a useful tool for interpreting how different rationalities are eventually reconciled to make the situation less controversial, or less 'hot', in the vocabulary of Callon (1998b). As we mentioned earlier, knowledge models intervene in material conditions to establish the boundaries within which interactions among different elements take place, while outside contexts are bracketed (Callon, 1998b). However, this framing process necessarily implies 'overflowing', i.e., relations and contingencies that exceed the demarcated order and thus need to be measured, contained and controlled. The collision between framing and overflowing produces unanticipated matters of concern and social identities that spur controversies, 'misfires' or even resistance (Bamford & MacKenzie, 2018; Berndt & Boeckler, 2020; Callon, 1998b, 2007a, 2007b, 2010). As a corollary, one of the most fraught politics in market making is concerned with bordering and boundary maintenance, namely the distinction between what are to be included in a legitimate economic formation and its errant and unruly outside (Berndt et al., 2020; Berndt & Boeckler, 2011, 2020; Callon, 1998a, 2010).

However, as Peck (2020, p. 63) argues, marketisation rolls with 'all its contradictions, crises and limitations'. Overflows are sources of controversy, debate, even resistance (Berndt & Boeckler, 2011, 2020, 2023; Çalışkan & Callon, 2010; Callon, 1998b, 2007b). If they fail to be contained, they erode the boundary between framing and overflowing and jeopardise the execution of calculation. To offer a solution to this problem, diverse agents need to 'negotiate an agreement by calculating their respective interests' (Callon, 1998b, p. 259). In doing so, controversies become pacified, and calculative

agency is extended to previously uncharted terrains of overflows. The hitherto uncontained overflows are hence *reframed*. This framing–overflowing–reframing loop, in the view of Berndt and Boeckler (2020, 2023), is a process of re-bordering that re-establishes control and re-stabilises the market framing. In this sense, overflows are not aberrations or anomalies. In contrast, they act in productive ways, reworking framings and equipping agents with new cognitive and calculative capabilities to adapt to new socio-economic upheavals (Callon, 2007b). Indeed, to reframe does not necessarily entail restoring the unity and coherence among multiple rationalities. In a re-bordered framing, which is by nature hybrid and diverse, different agents do not have to be evenly assimilated into a singular script; in contrast, no economic rationality may claim a privileged position over alternative principles (Berndt & Boeckler, 2023).

Finally, the dynamics of framing and overflowing are closely shaped by the issues of structure, power and inequality. The marketisation approach recognises that the 'generalised symmetry' (Callon, 1984) of STAs does not exempt agents from politics, because calculative capacities are unevenly distributed, leading certain agents to be more dominant than others (Callon, 2007a; Law, 1999). There are always agents with abilities to impose on others their visions of which elements, relations and knowledge are to be included or excluded (Çalışkan & Callon, 2010; Callon & Muniesa, 2005; Mahanty, 2019). Geographical studies, however, have revealed that this conception of power is barely adequate and largely reticent about the actual sources and modus operandi of uneven power. On the one hand, there have been studies that reveal how associations between humans and nonhumans are involved in the production of coercive or disciplinary power (Green, 2019; McFarlane, 2009). On the other hand, ANT and assemblage thinking have been criticised for failing to engage with political-economic structures as the 'contexts of contexts' (Brenner et al., 2011; Christophers, 2014). In response to these criticisms, McFarlane (2011) suggests that assemblages enrol social, economic and cultural logics that express diverse life cycles and historical traces, therefore contributing to relational production of political economies and structures. Other works argue that the powers involved in defining framings and overflows are often derived from political-economic structures, state institutions and the sedimented histories of inequalities and struggles (Berndt et al., 2020; Christophers, 2014; Green, 2019; Ouma, 2015; Ouma et al., 2013; Werner et al., 2022).

Nevertheless, the notion of distributed agency in STAs enables an inquiry into the productive roles played by less powerful agents and their constant self-renewal and re-invention. In STAs agency is not a somatic property that coheres in a bounded individual but widely distributed in relational networks (Callon, 2007b). Actions are always 'overtaken', shared among a gamut of agents and fraught with uncertainties about their sources (Latour, 2005). Agency is thus 'an infinite and never-ending project' that is constantly being trialled (Çalışkan & Callon, 2010, p. 10). As such, distributed agency creates possibilities of living and actions that traverse the crude binary of empowerment and disempowerment. In Lhasa, manifold human-material entanglements not only make negotiated and reframed market formations possible, but also support actions that bypass or offset disempowerment and marginality in some ways, although not radically subverting them. For instance, many Tibetans appear to be comfortable with the fact that they can keep market competition at arm's length through non-participation, but are nonetheless enrolled in market transition by exploiting other livelihood chances generated by multivalent socio-material processes (Callon, 2007b; McFarlane, 2011).

Under the auspice of these points, our empirical study will account for the ways in which the dynamics of framing, overflowing and reframing contribute to the making of spatial relations and local places. This process, to begin with, involves the tension of global vs. local, as allegedly universal knowledge models need to be anchored or fixed at the local scale. In consequence, some local spaces are tamed for market integration through the assembling of new socio-technical relations; in contrast, social relations, norms, values and emotions underlying non-calculative considerations and behaviours continue to define myriad everyday spaces and practices. To prevent these overflows from compromising the stability or economic utility of the emerging market, different actors need to find ways to articulate plural market and extra-market logics, so as to renegotiate and expand the boundaries of local 'marketsites' (Kear, 2018) – a process of 'rebordering' (Berndt & Boeckler, 2020, 2023). Indeed, as our empirical analyses reveal, the reframing of frictions, irritations and differences into market formation not only enables the state to keep social conflict at a controllable level, as so to veil the contradiction between market and non-market realms (Berndt & Boeckler, 2023), but even generates new possibilities of value production and market participation (Figure 2).

3 | MARKET TRANSITION IN TIBETAN REGIONS

The current study is situated in the broader context of state-led development in Tibetan regions, whereby the Chinese state regards its intervention in economic development as a key means to build the legitimacy for its rule in Tibet (Yeh, 2007, 2013). While in some cases Tibetans are proactive in market transition and draw empowerment from this

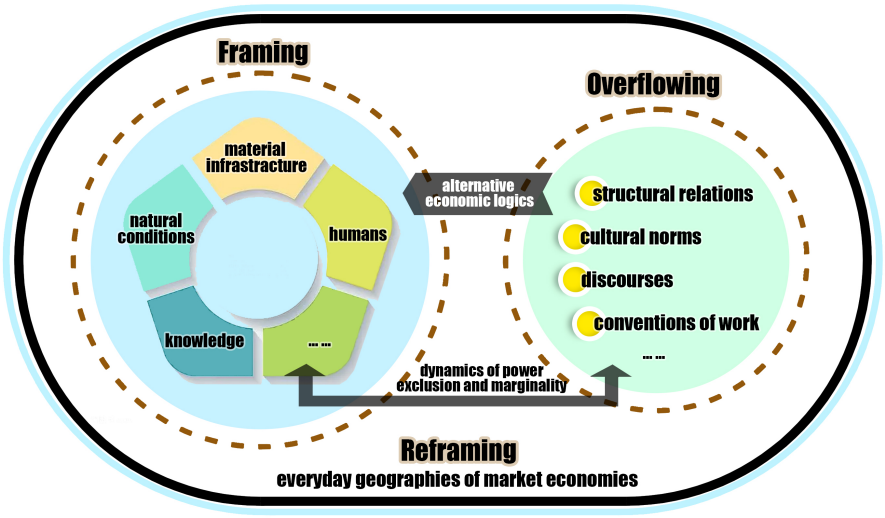

FIGURE 2 Conceptual and analytical model underlying this study.

astronomical change (Zhang, 2012), more often, as a prevailing academic discourse argues, they are reduced to a marginal position as mere spectators to state-led projects (Fischer, 2014; Yeh, 2013; Zhu & Qian, 2015). The massive financial subsidies from China's central state and provinces in China Proper have led to the large-scale migration of Han Chinese to urbanised areas in Tibet, who maintain considerable control over the most marketised and profitable economic sectors (Fischer, 2014, 2015; Yeh, 2013).

As Yeh (2013) has documented, greenhouse plantation was first introduced to Lhasa by state farms in the 1980s. But due to the lack of skill transfer to Tibetans, Tibetan farmers began to drop out of plantation and rent out their land to Han migrants in the mid-1980s, and by the early 2000s Han had assumed an overwhelmingly dominant position. Yeh's (2007, 2013) seminal works suggest that to explain their lack of interest in vegetable cultivation, Tibetans tend to portray themselves as lazy and indolent, in contrast to Han's tiring routines of work and endless pursuit of material interests. However, this trope is not an objective description of an intrinsic Tibetan self but a culturally constituted claim of difference that expresses Tibetans' internalisation of state-propagated discourses of development and simultaneously disenchantment with this agenda, vis-à-vis their marginality and exclusion. It also epitomises the profound ambivalence felt by Tibetans about Han idioms of work, morality and nature.

However, agricultural transformation studied in this paper represents a separate phase that is profoundly different from the earlier phase. Since the early 2010s, the local state in Lhasa has incorporated vegetable plantation into a poverty alleviation campaign, actively encouraged the involvement of Tibetans, and made much effort to enable Tibetans' access to knowledge. The scale of this transformation, therefore, is much larger than in the 1990s and 2000s (interview with Mr L, local official of Tibetan ethnicity, 14 October 2019). Meanwhile, to understand economic (dis)engagement primarily through a discursive schema of identity negotiation veils certain actualities of the economic practices on the ground. For this reason, this paper gives priority to *material* circulations and relations, and the encounters of different groups with the material properties of agricultural production. In doing so, we contribute two novel points to the literature on Tibetan development. First, we doubt that Tibetans can ever be reduced to mere spectators of market transition. We argue that immanent to socio-technical agencements are distributed agencies that transgress the rigid distinction between participation and non-participation. Still, second, this study engages with the structural context of state dominance and Han privilege. Uneven calculative agencies are shaped by an extended history of uneven development, state dominance and Tibetan marginality. Meanwhile, however, agency should be analysed as relationally and interactively constituted, diffused in networks of humans and nonhumans. As this study reveals, the intersection of structural relations and the generative potentials of socio-technical networks has culminated in subtle, granular and highly dynamic mechanisms of empowerment and disempowerment, which a binary of Han vs. Tibetans does not fully account for.

4 | METHODS

This paper drew upon extended fieldwork conducted from 2016 to 2019 in Lhasa, with three separate visits in October–December 2016, June–July 2018 and October 2019. The research team, comprising the authors and research assistants

of Tibetan ethnicity, spent 106 days in the field sites. While we accessed Han informants through direct contact and the snowballing method, for approaching Tibetans we relied heavily on key local figures – such as respected members of villages or village heads – as our gatekeepers, which facilitated rapport-building with local respondents. In order not to be directed to a highly selective group of informants and to make the interviewed sample more representative of the local population, we had regular discussions with the gatekeepers to ensure that they understood the purposes of the research and were relieved of unnecessary suspicion; we also tried to access Tibetan people directly using snowballing, though less commonly (Berg, 2001). As mentioned earlier, our overarching objective was to explicate Tibetans' (selective) participation in or withdrawal from commercial agricultural production. To this end, we raised questions to Han and Tibetans about their attitudes towards the new socio-technical conditions of agricultural production, the reasons underlying their diverging levels of participation, and a multiplicity of market and non-market considerations vis-à-vis market transition.

The research methods used in the field included in-depth interviews, focus groups and on-site observation, in addition to comprehensive collection of archival and second-hand data, including policy, planning documents and media reports. The two scenarios were selected because they represented the two most important business models of commercial agriculture in peri-urban Lhasa, also with fairly divergent approaches of knowledge transfer and degrees of participation from local Tibetans.

For the first scenario, we first examined the vegetable production in Tshalgungtang Township, Chengguan District, and Naschung Town, Todlungdechen District, during the 2016 fieldwork. As part of Lhasa's rapid urbanisation, both townships were targeted for redevelopment, and Han migrants decided to relocate further from Lhasa's urban core. Consequently, during the 2018 fieldwork, we extended our fieldwork to Bomtod Township, Tagtse District and Nyetang Township and Nam Township, both in Chusur County. In total, the two blocks of fieldwork resulted in interviews with 71 Han people (including local officials, migrant farmers, vegetable traders, fertiliser and pesticide sellers, freight drivers, etc.), 42 Tibetans (including local officials, village leaders, villagers, etc.) and four 'unity families' (i.e., households with a Han husband and a Tibetan wife).[2] Additionally, a focus group interview was conducted with six local Tibetans to understand why they had withdrawn from vegetable cultivation.

For the second scenario, we collected data during the 2018 and 2019 fieldworks in the Health Industrial Park (henceforth, the Park) operated by Lhasa Pure Land Co. Ltd. (LPL), an enterprise owned by the municipal government of Lhasa. In Tshalne Township, Chusur County, the use right of approximately 20,000 mu (about 1333 hectares) of agrarian land was transferred to LPL for establishing the Park. In the Park, Han experts from China Proper (Ch: *neidi*) and Tibetan experts from the Diqing Prefecture in Yunnan Province, a Tibetan region outside TAR, oversaw the operations. The experts led 82 'professional peasants' (Ch: *zhiye nongmin*), including Tibetan vocational school/college graduates and technically trained local peasants, to experiment with multiple cash crops. They are assisted by around 1000 Tibetan waged labourers from Tshalne. Our study draws upon in-depth interviews with 39 Tibetans in Tshalne and nearby villages (including local officials, Park managers, professional peasants and local villagers) and three Han experts. Also, two focus groups were conducted, involving five and six Tibetan villagers who were participants in the cash-crop cultivation programme, respectively.

5 | VEGETABLES, AGRO-SCIENTIFIC KNOWLEDGE AND TIBETAN NON-PARTICIPATION

Since the early 2010s, vegetable plantation has been part and parcel of a development project overseen and promoted by the local state of Lhasa. In a 2008 research report commissioned by the Lhasa municipal government, vegetable production was considered an essential means of poverty alleviation, and claimed that potential income was 8–20 times that from growing barley.[3] Indeed, it was the local state that enacted the fundamental conditions of marketisation, i.e., 'things' and 'science' (Boeckler & Berndt, 2012) – the former including infrastructural conditions such as greenhouses and the latter mainly introduced by Han experts hired by the local state. Tibetan villagers were encouraged to utilise government-built greenhouses at a discounted rent.

Tibetans, however, have rarely been incentivised by this initiative. Rather, it is mostly Han migrants who have rented land from Tibetans and become the dominant group in vegetable cultivation. Among our fieldwork sites, the local state's plan to enrol Tibetans achieved partial success only in Zhimsa Vegetable and Fruit Park in Nam Township, where local villagers started using greenhouses to plant watermelons in 2005. Still, the villagers withdrew almost completely from watermelon cultivation after the arrival of Han migrants in 2010, with the sole exception of a few 'unity families'. To make sense of their non-participation, Tibetan interviewees articulated two major points: (1) there was inequality between

Tibetans and Han in accessing and wielding technical knowledge; and (2) Tibetans were accustomed to *extensive* farming methods (namely, increasing productivity through the addition of land), which made it difficult for them to adopt *intensive* approaches to farming (namely, increasing productivity by raising the labour input per unit of land). The latter point also connotes that while the socio-technical networks enable the evaluation of qualities and turn vegetables into circulatable commodities, they also alter rhythms of everyday labour and thus incur feelings of alienation and resistance.

Through the work of state-hired Han experts, many of whom ended up planting vegetables themselves, a sophisticated portfolio of agro-scientific knowledge is codified and introduced to Han and Tibetan farmers. Local conditions are realigned and reassembled according to such knowledge to address four economic-technical issues, thus turning the greenhouses into the most active marketsites in the making (Kear, 2018). First, it is claimed that soil conditions in Lhasa are different from the *neidi*, because the soil lacks the organic matter and microbes that turn minerals into absorbable nutrients. Hence, the quantity of fertilisers needs to be carefully adjusted, with complicated techniques of application that involve a base layer and occasional supplementations. Second, pesticides need to be utilised to kill fungi and bugs. In Lhasa, productivity is constrained by high-altitude environments, and the use of pesticides must be implemented meticulously to minimise losses. Meanwhile, fertilisers and pesticides erode soil fertility, but vis-à-vis land shortage caused by urbanisation, the types of chemicals, as well as application techniques, require special caution to postpone land degradation. Third, for plants to bear fruit, pollination is essential, but in Lhasa the population of pollinating insects is small, and greenhouses prevent contact anyway. Hence, special chemicals containing components of natural pollens are needed to stimulate growth. Besides, chemicals are used to accelerate vegetable maturation, as Lhasa's low temperatures alter the lifecycle of plants. Fourth, vegetable plantation involves tedious 'field management', including weed control, watering, control of temperature and humidity, and use of cotton quilts for adjusting temperatures in greenhouses.

In this sense, for the vegetable economy to function, delicate relationships among humans, infrastructures, plants and other vital and non-vital elements in the ecological system need to be established, demarcated within specific spaces dominated by Han farmers. It is within these STAs that a particular calculative agency and a framework of qualculation are enacted (Callon & Law, 2005; Ouma, 2015), equating quality to the large sizes and good shapes of vegetables, and market efficiency to the maximal quantity of outputs. While the Tibetans understood the need for intensive farming to negotiate deepening competition from vegetable traders from *neidi*, they also expressed profound alienation from this system of knowledge and the socio-technical relations entailed. To begin with, due to the political and social peripherality of Tibet, many Tibetans are less educated and lack proficiency in Chinese, the default medium through which such knowledge is imparted. While the state provides training given by Han experts, the difficulty of translating between Chinese and Tibetan compromises the effectiveness of knowledge transfer. Moreover, knowledge is not mechanically transported from textbooks and implemented locally, but negotiated and revised in accordance with local environmental specificities. However, this process is largely tacit, relying on situated experiments, embodied awareness and intensive interactions based on informal mentor–apprentice relationships. Yet, interactions between Han and Tibetans are infrequent, and knowledge spillover is thus limited.

Another factor contributing to Tibetan non-participation concerns the access to consumer markets. Over the past two or three decades, Han vendors have gradually consolidated their monopoly over supply networks and market information via importing and selling vegetables from *neidi*. The competition imposed by vegetables from *neidi* and rapidly changing consumer preferences increase the risk of overproduction, prompting Han farmers to frequently change the varieties they plant. As a result, Han farmers often exploit hometown-based affinities for establishing long-term relationships with wholesalers and gaining access to information. They also tend to sell products exclusively to one wholesaler. The close-knit social networks are not easily penetrated by Tibetans. Such networks similarly contribute to processes of qualculation, and reinforce Han's preferences for large outputs, big sizes and good shapes, which further consolidates intensive farming as the dominant model of vegetable production.

These factors, also discussed in Yeh (2013), reflect how Han and Tibetans are positioned in unequal ways in the emerging market economies. Notably, they are contingent on asymmetry of power that spanned a long history of social and economic formation. However, as the next section on Tibetan professional peasants illustrates, many Tibetans, especially of the younger generation, are well poised to absorb technical knowledge. As Qiang's (2021) work shows, in the Shigatse region in southwestern TAR, vegetables are almost exclusively planted by local Tibetans, proving that barriers to knowledge transfer are not insurmountable. In our fieldwork sites, some Tibetans planted vegetables in the past, achieved notable success, but withdrew all the same. For these Tibetans, another prominent reason underlying their non-participation is that the socio-technical relations in commercial vegetable plantation require a specific work ethic, which disciplines bodies and the rhythms of everyday life in ways at odds with cultural conventions in Tibetan society. This highlights the culturally contested nature of agro-scientific knowledge implemented by Han, and the negotiation and proliferation of economic knowledge drawing on instituted socio-cultural discourses and conventions.

For Tibetans, first, vegetables in greenhouses demand around-the-clock care, and farmers need to spend long hours to closely monitor environmental conditions and ensure that all necessary technical interventions are executed. Tibetans describe to us their disinterest in such rigid, tedious and intensive work routines. Comparing vegetable cultivation with barley planting, Tibetan villagers state that for the latter, little care is required once the land has been tilled and seeds planted, 'we don't even bother too much about clearing the weeds' (interview with a female Tibetan, Nam, 18 October 2019). As Tibetans claim, they are not accustomed to rhythms dictated by rigid clock time, and disciplining bodies to serve material interests, but instead pursue a balance between work and leisure.

In contrast, Han farmers are more receptive to disciplined time and willing to re-arrange their rhythms of life to care for plants. This, as Han farmers explain, is because intensive farming is a key dimension of Han cultures after all, the point resonating with the argument that China is historically an agrarian civilisation in which people increase the input of labour to raise land productivity, even with diminishing marginal returns – a process of 'involution', in the words of Geertz (1963) and Huang (2002).

An intriguing vignette was raised by several Tibetans who formerly planted watermelons. They suggested that working in the greenhouses all day would lead to high blood pressure and cardiovascular diseases due to the high temperatures. For Tibetans, this may be an objective description of their bodily feelings, but bodies are culturally regulated and shaped, reflecting cultural and discursive negotiation affirming the boundary between marketsites and the lived realm of the everyday. A female Tibetan farmer suggested:

> I quit because the work was too exhausting. You know, I would rather be a waged worker ... Some years ago, I set up greenhouses and planted vegetables for three years. But then I decided to quit. I simply did not have the energy and my body could not bear the exhaustion.
>
> (interview, Nyetang, October 2019)

A second dimension of the work ethic dictates that interventions into the biological processes of vegetables must be executed with extraordinary care and fine-grained procedures, which further reinforces the time-consuming nature of the tasks. Similarly, Tibetans see this as a practice encoded by Han work ethic but rarely seen in Tibetan experiences. Commenting on Tibetan day workers in her strawberry fields, one Han respondent said:

> When I ask Tibetans to help clear old leaves and pick fruits, every time they would cause damage to the fruits, resulting in net losses of a few kilos! I pay them 120 RMB per day, but for Han workers the pay is 150 RMB plus a meal.
>
> (interview, Tshalgungtang, June 2018)

Thirdly, this work ethic distinguishes between Han, who are entrepreneurial and risk-taking, and Tibetans, who are less interested in an entrepreneurial culture. For Han farmers, vegetable cultivation in Lhasa is a major economic venture in their lifetimes and entails considerable investments in land rental, greenhouses, waged workers, etc. To maximise return from these fixed investments, they are willing to work around-the-clock and keep a close eye on market fluctuations. Tibetans, in contrast, consider an ideal economic situation to be one with stable and quick, even if moderate, returns, rather than having to endure the uncertainties associated with long-term investments.

It is tempting to see non-participation as belonging to the domain of non-calculation, and thus constituting an overflow external to the market framing (Callon, 2007a). Spatially, informal boundaries between greenhouses, where Tibetans rarely set foot, and local people's spaces of life, work and agricultural production are also evident. Conflict between the framing and the overflowing might ensue because Tibetans' exclusion from a lucrative activity might spur concerns over income disparity and resentment towards spaces dominated by outsiders. In our study, however, such conflicts rarely surfaced, due to the re-bordering of the framing through everyday, negotiated practices and arrangements. Here, reframing hinges on the possibility of deploying alternative ways of participating in market transition, which offsets the marginality and exclusion of Tibetans to some extent. Boundaries of local market transition, in this sense, are expanded to incorporate spaces of work for Tibetans.

First, Tibetans are not completely excluded from the emerging marketsites but tap into them through rental relations. Tibetan villagers are strongly predisposed to protect their interests and ensure optimal land rents, although this may involve ad hoc revisions to contracts. The rapid urbanisation of Lhasa forces Han farmers into rent-bidding processes, through which they compete for arable land. In townships such as Bomtod, Nyetang and Nam, Han farmers hope to bypass the rapid rent increase by signing long-term contracts with Tibetans. However, we are told by both Han farmers

and Tibetan villagers that even with contractual agreements, Tibetan landlords may charge a rent based on the latest market trends without adhering to the original terms. Speaking of such ad hoc revisions of the contracts, Han farmers frown upon what they called 'disrespect for the spirit of the contract' but nonetheless tend to accept the changes because extra rents can be easily compensated by profits from vegetable production. Tibetans, in parallel, defend this practice, stating for example that 'everybody wants to make money to improve their lives' (interview with a female Tibetan, Nyetang, October 2019), and it is unfair for them if the Han bypass market fluidities through rigid contractual relationships.

Second, Tibetans broaden the scope of the market framing to generate alternative means of employment and economic participation. Notably, rapid economic development has led to a proliferation of economic chances in peri-urban Lhasa, and some emerging employments are preferred by Tibetans because they are less governed by clock time and rigid schedules. For example, many Tibetan households have used incomes from land rental to purchase lorries and entered the freight transport sector, serving construction sites, factories and wholesale firms (including those specialising in vegetables). Others have used rental incomes to establish B&B hostels or restaurants to capitalise on inflows of Han migrants and tourists. These new business ventures also provide opportunities for waged work. In contrast to Yeh (2007), our study does not support a trope of indolence for Tibetans – resisting clock time is not equivalent to resisting work in general. According to our observations, a typical Tibetan household can earn about 70–80% of a vegetable-planting Han household's average net profit, the latter being about 150,000–200,000 RMB per annum. This even excludes non-cash incomes such as barley, milk and butter.

6 | ENGINEERING PARTICIPATION, BUT WITH A LIMIT

Established in 2013, the Health Industrial Park in Tshalne Township was an initiative of the municipal government of Lhasa, which sought to capitalise on Tibet's idealised image as a pristine land, uncontaminated by industrial modernity (Zhu & Qian, 2015), and to promote the planting of eco-branded cash crops such as fruit, medicinal herbs and fresh flowers. This initiative was aimed at poverty alleviation and to make Tibetan agricultural products market-oriented and competitive (interview with a local official, Tibetan, 4 July 2018). Operated by LPL, the Park's business model comprises three stages: (1) the experimental stage, in which selected crops are planted on an experimental basis, and data on their lifecycles are collected and codified into a sophisticated system of knowledge, to be applied beyond the laboratory conditions; (2) the mass plantation stage, in which crops whose experiments have generated promising results are promoted to Tibetan peasants across Chusur County, while interested locals can sign up on a voluntary basis; and (3) the marketing stage, in which the produce are absorbed by a few retailing companies that have established partnerships with the Park.

The local officials interviewed, all of whom were ethnic Tibetans, stated that one of the main missions of the Park is to challenge Han farmers' monopoly of knowledge and, through in-situ experiments, to create knowledge that is more systematic and scientific than that applied by Han farmers and yet easily accessible to local Tibetans (interview with Mr L, 14 October 2019). To this end, state-of-the-art technologies have been installed throughout the Park to ensure that all knowledge produced is clearly defined and measured. For example, sensors installed in the fields produce quantified simulations of lifecycles of plants by closely monitoring many variables. Live data are fed into a big-data platform accessible via smartphones and computers, which can produce statistical models derived from myriad data feeds and visualised by curve graphs. Additionally, advanced sensors are installed to generate data on environmental conditions, such as soils, humidity, temperature, ultraviolet radiation, rainfalls, wind speed, etc. Based on these two sets of data, correlations between environmental conditions and the growth of plants are thus modelled. All analyses are uploaded to the big-data platform, so that planters would know how to adjust environmental parameters to optimise the growth of plants. To enhance the market appeal of products, the Park forbids pesticides and chemical fertilisers, allowing only occasional use of organic fertilisers. Different from the first scenario in which the maximisation of output is prioritised, in the Park, qualculation is based on two logics: first, 'scientific management', i.e., technical interventions with high levels of precision, and the brand of being organic (interview with Mr L, 14 October 2019). In sum, in this scenario, the STA is a hybrid collective made of material infrastructures (e.g., greenhouses), technologies (e.g., sensors and big-data modelling), the knowledge experimented in vitro and to be applied in vivo, and finally human practices and labour.

In such a marketsite where heterogenous elements are neatly aligned to perform market logics, market subjects are also in the making (Kear, 2018). Indeed, a major achievement of the Park touted by the interviewed officials is that it concurrently serves as an educational programme and has trained more than 400 'professional peasants' of Tibetan ethnicity, including about 100 Tibetan vocational school/college graduates and 300 local peasants. This group is usually tutored by Han experts, except in the case of planting maca, in which Tibetan experts from Diqing, Yunnan Province,

play a leading role. 'Professional peasants' have three major duties. First, they learn from Han and Tibetan experts refined skills and techniques of looking after crops. Intensive interactions with the experts are required, so that Tibetan workers learn about a wide spectrum of skills, ranging from soil ploughing and plant breeding, to watering, fertiliser application and weed control, and finally, to pest control. The specific ways in which these techniques are applied throughout different stages of plants' lifecycles are also carefully imparted. Second, they utilise the big-data platform to monitor the crop fields and ensure that environmental conditions are adjusted to what the statistical models recommend as optimal. Third, when a crop enters the mass plantation stage, they are responsible for transmitting the knowledge and skills to local Tibetan farmers.

In contrast to the first scenario, in which Tibetans straddle the boundary between framing and overflowing, it appears that in the Park Tibetan workers are unambivalently incorporated into the framing underlying market integration. However, this is not to say that this marketsite, with its relatively clear-cut boundaries, does not have a fuzzy margin (Berndt & Boeckler, 2023). In order to turn Tibetans into part of the framing, notable investments and adjustments are needed to pacify and circumvent the factors alienating Tibetans from intensive agriculture in the first scenario (Callon, 1998b). This ironically testifies to the persistent relevance of non-market, place-based contingencies. First, many professional peasants are vocational school or college graduates; even for local recruits, the threshold criteria include junior high school education and relative fluency in Chinese. Second, given Tibetans' lack of access to retailing networks, professional farmers are paid a stable monthly salary of 4000–5000 RMB, which exempts them from directly negotiating market vicissitudes. Third, because installed sensors can provide 24-hour monitoring, professional farmers do not need to maintain constant vigilance over crops, thereby significantly reducing their workloads. The farmers do not need to comply with rigid working hours, and are even allowed time to take care of livestock and barley fields and 'take a break to drink butter tea and eat tsampa, once in the morning and once in the afternoon' (interview with a professional peasant, male, 17 October 2019). Fourth, Tibetan professional peasants merely need to absorb knowledge from the experts rather than to improvise or innovate, once again attesting to their marginalised position. In fact, the sensors and big-data platform were developed by Phoenix Tea – a high-tech incubator based in Wuzhen, Jiangsu Province. Besides, Han experts usually have a monopoly in interpreting data and models. Tibetan farmers, in contrast, merely assume the role of implementers rather than producers of knowledge. In fact, during our observation, Tibetan workers suggest that their work often feels mechanical, without reflexive thinking about scientific knowledge underlying their practices.

Although subject-making is still encoded by structural inequality, the Park is more or less akin to a scientific laboratory where knowledge models are formulated and trialled in a contained and confined environment. While it is socially and materially more heterogeneous and porous than a real laboratory, the Park adheres to the same faith in the transformative role played by knowledge (Boeckler & Berndt, 2012). In addition to a miscellany of sensors, data, models and graphs, the performativity of knowledge is evident in the standardisation of agricultural work consistent with agro-science.

However, when the agronomic science trialled in the Park is promoted to ordinary Tibetans, it works to create marketsites in the lived world that are more hybrid and contested. In this circumstance, it is mainly professional peasants who act as 'mediators' (Latour, 2005) that translate between laboratory conditions and actual places. During this stage, the socio-cultural inertia, as discussed in the last section, comes back to haunt the realisation of scientific models, giving rise to oscillations between framing and overflowing. Intriguingly, among the broad diversity of plants experimented in the Park, only maca, costus roots and a limited number of herbs and edible fungi have been widely adopted by local peasants and reached a satisfactory level of marketisation. Many other plants heavily branded by the Park, such as flowers and fruits, have never made it beyond the Park's spatial boundaries and are planted exclusively by professional peasants and waged workers within the Park, without an economy of scale. This is because to incorporate local farmers into the market framing, the Park needs to maintain a delicate balance between engineering of Tibetans' behaviours and respect for their conventions of work. Hence, we highlight the tortuous, recursive processes in which knowledge encodes the ways in which market integration is activated, but is itself revised and re-calibrated when it encounters potential externalities drawing on everyday norms and conventions.

Firstly, the local state and LPL are keen on encouraging Tibetans to adopt intensive farming. The Park offers instruction and technical guidance throughout the lifecycles of plants. Plant breeding and seedling are conducted in the Park, after which the seedlings are transplanted to the villagers' fields and followed up by experts and professional peasants, usually once a week, to monitor growth and provide detailed demonstrations of recommended planting methods. In contrast to knowledge transfer in the previous case, which is loosely implemented, the Park practises a $1+3+10$ mode; namely, one expert and three professional peasants are responsible for only 10 local households, significantly increasing the frequencies of direct contact. Local farmers are thus required to devote more time to commercial crops than staple crops such as barley and winter wheat, and acquire basic skills in using machinery and executing the above-mentioned

interventions (e.g., interview with a female Tibetan, 15 October 2019). The quantity of outputs must fall within a range predicated by the statistic modelling; otherwise, the Park will refuse to purchase them. Meanwhile, the state has initiated a series of competitions among Tibetans, which grade 'field management' activities such as weed control, temperature and humidity control, pest control, etc. Furthermore, to maintain a sense of economic security in Tibetans, a direct subsidy is provided on top of incomes from the sale of products (interview with Ms. C, manager at the Park, Tibetan, 15 October 2019).

Despite this, traditional conventions of work, as well as the structural inequality between Han and Tibetans, are persistent and cannot be totally bypassed. Similar to the previous case, the market framing in this case is a re-negotiated one. Indeed, many interviewed experts and professional peasants suggest that maca, herbs and fungi have been popularised in mass plantation precisely because they do *not* demand a lot of skills, techniques or time, thus not requiring disciplined routines of work and around-the-clock labour. An interesting vignette is noteworthy: The Park once promoted 'snow chrysanthemum' (*Coreopsis tinctoria*), a highly lucrative herbal plant, since scientific models predicted environmental conditions in Lhasa to be conducive. However, planting this crop was labour-intensive. While Tibetan peasants were initially tempted by its economic prospect, they quickly withdrew due to tediousness and exhaustion. The Park was therefore compelled to switch to plants more resistant to weeds and pests, thus demanding less intervention. During the interviews, there was a general consensus among Tibetan peasants that cultivating maca, herbs and fungi is more difficult than winter wheat and barley, but a lot easier than vegetables.

Besides, apart from maca that must be planted in fields, herbs and fungi can be planted in tubs or small soil mounds in Tibetans' courtyards, sheltered by a small greenhouse. Local officials dub this as the 'courtyard economy'. The purpose of promoting plants accommodated within courtyards is to blur the distinction between work and leisure, so that cash crop planting is more compatible with Tibetan norms of work – Tibetans can spend leisure time in courtyards, only intermittently looking after crops. The installation of technical devices such as meters for temperature and humidity also reduces the need for vigilance. In this sense, the framing of the Tibetan work ethic into market formation helps expand the market frontier to mundane spaces like the courtyard:

> Many Tibetan houses have big courtyards, so we thought, 'why not encourage economic production in these spaces?' Courtyards are suitable for the cultivation of medicinal herbs because they can be planted in small tubs, pots or mounds, or even under beds! It is not time-consuming, either … People can even treat it as a leisure pursuit, equivalent to planting flowers in courtyards.
>
> (interview, Mr L, local official, Tibetan, 14 October 2019)

Besides, cognisant of Tibetans' unease with the risks associated with the market economy, the Park has prioritised crops yielding quick return, even though other species are more profitable in the long run. For example, the Park once promoted *hua jiao* (*Zanthoxylum*), a crop favoured in Chinese cuisine as a food seasoning. But because it took more than a year to mature, it was met with disinterest by Tibetans. In contrast, the widely adopted crops usually need just a few weeks or months to complete a lifecycle.

Finally, Tibetans are prevented from negotiating market volatility by themselves, as the Park is proactive in building partnerships with firms that place pre-orders before peasants begin to plant, which reduces the risk of overproduction. This business model, while sparing Tibetan peasants from exploring the market, has nonetheless reinforced Han dominance in supply chains and market networks. Indeed, aside from one Lhasa-based company run by Tibetans and specialising in medicinal herbs, customers are predominantly companies that have origins in *neidi*, are run by Han and supported by Han capital.

7 | CONCLUSION

We begin this concluding section by reiterating some key theoretical points that have informed our take on the hybrid, contested and tortuous processes of market making. First, this study argues for the usefulness of the marketisation approach for understanding market transition. As our case studies show, the market transition of land and agriculture, and the enactment of specific frameworks for evaluating the market value of agricultural products, happen within particular socio-technical agencements (Callon, 2007b; Ouma, 2015). Cultural conceptions of different kinds of agricultural work are not pre-given, but makes sense only in such complex socio-technical alignments. However, second, while for Callon (2007a) the construction of a market is a matter of agencement, without an outside, we are interested in the

ways that market and non-market logics articulate in contingent and dynamic ways, and suggest that a miscellany of structural and instituted factors define the divide between market framing and overflowing. Finally, this study unpacks how the murky contact zone between framing and overflowing contributes to the possibility of reframing. Overflows represent the 'aberrations' from a market order, which, however, eventually give rise to the re-bordering of markets and re-definition of legitimate economic practices (Berndt & Boeckler, 2020, 2023).

In this vein, this study echoes Peck's (2020) appeal and can be seen an endeavour to unpack the spatial differentiation of the market. Approaching marketsites (Kear, 2018) as everyday spaces with high densities of material and social negotiations, this study, on the one hand, approaches a real market as an encounter between universal market visions and place-based contingencies that inevitably produce an externality to the market framing. On the other hand, the global/local tension ushers in the demarcation of spatial boundaries around microscopic spaces at the level of everyday life, later to be renegotiated and redrawn. In sum, it is through the reconstitution of spaces and places that an everyday and hybrid market transition takes shape.

In concluding this paper, we put forward a few remarks about the question of power, exclusion and marginality in Tibetan development, the primary concern in the literatures on economic development in Tibet. On the one hand, this study shows that structural power relations are looped into socio-technical relations to reproduce themselves. In the first scenario, Tibetans' non-participation is shaped by but also reproduces several decades of Han dominance in Lhasa's development and their monopoly in defining calculative capacities and the criteria of evaluation through Han language, knowledge, work norms and social networks. In the second, the socio-technical networks enacted in the Park enable active participation of Tibetans, but in selective and partial ways, contesting Han dominance to an extent but not totally decoupled from uneven power relations between Han and Tibetans. On the other hand, however, thanks to the widely distributed agencies in socio-technical agencements, disempowerment does not foreclose the constant renewal of life's possibilities. In this study, this point is affirmed by the socio-technical relations that support alternative livelihood strategies (the first scenario), and Tibetans' ability in recalibrating the state's cash crop programme in tandem with their own rationalities and preferences (the second scenario). Seemingly, the possibility for Tibetans to improvise relations with the socio-technical networks and avoid being reduced to a state of economic destitution has eased discontent with prevalent social and economic relations, and disincentivised Tibetans from contesting unequal power in overt or confrontational ways, thus making the dialectic between framing and overflowing operable. In sum, while our findings echo extant critiques against state-led development in Tibet as a disempowering mechanism for Tibetans (Fischer, 2014, 2015; Yeh, 2013; Zhu & Qian, 2015), they also suggest that the binary of power/powerlessness is revealed to be inadequate by the widely distributed, always generative possibilities amidst emerging markets. The materially mediated and translated nature of power thus points to the challenging task of navigating through social and material complexities to address the fraught issues of hierarchy, inequality and exclusion in Tibetan regions.

ACKNOWLEDGEMENTS

This research receives financial support from the National Natural Science Foundation of China (Grant Nos. 41661032 and 41871124) and Hong Kong Research Grants Council General Research Fund (17601021).

DATA AVAILABILITY STATEMENT

The data for this study are not shared.

ORCID

Junxi Qian https://orcid.org/0000-0001-9638-3808

ENDNOTES

[1] Source: https://nyncj.lasa.gov.cn; http://nynct.xizang.gov.cn.

[2] 'Unity family' is a state term to describe families involving a Chinese husband and a Tibetan wife, but the term has been absorbed by Han and Tibetan people and used colloquially.

[3] Research Report on the Industrialisation of Vegetables in Tibet, compiled by the Tibet Academy of Agricultural and Animal Husbandry Sciences, 2008.

REFERENCES

Bamford, A. & MacKenzie, D. (2018) Counterperformativity. *New Left Review*, 113, 97–121. Available from: https://newleftreview.org/II/113/donald-mackenzie-alice-bamford-counterperformativity

Berg, B.L. (2001) *Qualitative research methods for the social sciences*. Boston, MA: Allyn & Bacon.

Berndt, C. & Boeckler, M. (2009) Geographies of circulation and exchange: Constructions of markets. *Progress in Human Geography*, 33, 535–551. Available from: https://doi.org/10.1177/0309132509104805

Berndt, C. & Boeckler, M. (2011) Geographies of markets: Materials, morals and monsters in motion. *Progress in Human Geography*, 35, 559–567. Available from: https://doi.org/10.1177/0309132510384498

Berndt, C. & Boeckler, M. (2020) Geographies of marketisation: Performation struggles, incomplete commodification and the 'problem of labour'. In: Berndt, C., Peck, J. & Rantisi, N.M. (Eds.) *Market/place: Exploring spaces of exchange*. Newcastle, UK: Agenda Publishing, pp. 69–88.

Berndt, C. & Boeckler, M. (2023) Geographies of marketization: Studying markets in postneoliberal times. *Progress in Human Geography*, 47, 124–140. Available from: https://doi.org/10.1177/03091325221144456

Berndt, C., Rantisi, N.M. & Peck, J. (2020) M/market frontiers. *Environment and Planning A: Economy and Space*, 52, 14–26. Available from: https://doi.org/10.1177/0308518X19891833

Berndt, C. & Wirth, M. (2019) Struggling for the moral market: Economic knowledge, diverse markets, and market borders. *Economic Geography*, 95, 288–309. Available from: https://doi.org/10.1080/00130095.2018.1521699

Boeckler, M. & Berndt, C. (2012) Geographies of circulation and exchange III: The great crisis and marketization 'after markets'. *Progress in Human Geography*, 37, 424–432. Available from: https://doi.org/10.1177/0309132512453515

Brenner, N., Madden, D.J. & Wachsmuth, D. (2011) Assemblage urbanism and the challenges of critical urban theory. *City*, 15, 225–240. Available from: https://doi.org/10.1080/13604813.2011.568717

Çalışkan, K. & Callon, M. (2010) Economization, part 2: A research programme for the study of markets. *Economy and Society*, 39, 1–32. Available from: https://doi.org/10.1080/03085140903424519

Callon, M. (1984) Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. *The Sociological Review*, 32, 196–233. Available from: https://doi.org/10.1111/j.1467-954X.1984.tb00113.x

Callon, M. (1998a) Introduction: The embeddedness of economic markets in economics. *The Sociological Review*, 46, 1–57. Available from: https://doi.org/10.1111/j.1467-954X.1998.tb03468.x

Callon, M. (1998b) An essay on framing and overflowing: Economic externalities revisited by sociology. *The Sociological Review*, 46, 244–269. Available from: https://doi.org/10.1111/j.1467-954X.1998.tb03477.x

Callon, M. (2007a) What does it mean to say that economics is performative. In: MacKenzie, D., Muniesa, F. & Siu, L. (Eds.) *Do economists make markets? On the performativity of economics*. Princeton, NJ: Princeton University Press, pp. 311–357.

Callon, M. (2007b) An essay on the growing contribution of economic markets to the proliferation of the social. *Theory, Culture and Society*, 24, 139–163. Available from: https://doi.org/10.1177/0263276407084701

Callon, M. (2010) Performativity, misfires and politics. *Journal of Cultural Economy*, 3, 163–169. Available from: https://doi.org/10.1080/17530350.2010.494119

Callon, M. & Law, J. (2005) On qualculation, agency, and otherness. *Environment and Planning D: Society and Space*, 23, 717–733. Available from: https://doi.org/10.1068/d343t

Callon, M. & Muniesa, F. (2005) Economic markets as calculative collective devices. *Organization Studies*, 26, 1129–1250. Available from: https://doi.org/10.1177/0170840605056393

Christophers, B. (2014) From Marx to market and back again: Performing the economy. *Geoforum*, 57, 12–20. Available from: https://doi.org/10.1016/j.geoforum.2014.08.007

Deleuze, G. & Guattari, F. (2004) *A thousand plateaus: Capitalism and schizophrenia*. London, UK: Continuum.

Fischer, A. (2014) *The disempowered development of Tibet in China: A study in the economics of marginalization*. Lanham, MD: Lexington Books.

Fischer, A. (2015) Subsidizing Tibet: An interprovincial comparison of Western China up to the end of the Hu–wen administration. *The China Quarterly*, 221, 73–99. Available from: https://doi.org/10.1017/S0305741014001581

Geertz, C. (1963) *Agricultural involution: The process of ecological change in Indonesia*. Berkeley, CA: University of California Press.

Green, W.N. (2019) From rice fields to financial assets: Valuing land for microfinance in Cambodia. *Transactions of the Institute of British Geographers*, 44, 749–762. Available from: https://doi.org/10.1111/tran.12310

Hall, S. (2007) Knowledge makes the money go round: Conflicts of interest and corporate finance in London's financial district. *Geoforum*, 38, 710–719. Available from: https://doi.org/10.1016/j.geoforum.2006.11.023

Huang, P.C.C. (2002) Development or involution in eighteenth-century Britain and China? *The Journal of Asian Studies*, 61, 501–538. Available from: https://doi.org/10.2307/2700299

Kear, M. (2018) The marketsite: A new conceptualization of market spatiality. *Economic Geography*, 94, 299–320. Available from: https://doi.org/10.1080/00130095.2017.1312337

Lafitte, G. (2013) *Spoiling Tibet: China and resource nationalism on the roof of the world*. New York, NY: Zed Books.

Langley, P. (2016) Crowdfunding in the United Kingdom: A cultural economy. *Economic Geography*, 92, 301–321. Available from: https://doi.org/10.1080/00130095.2015.1133233

Langley, P. (2020) The folds of social finance: Making markets, remaking the social. *Environment and Planning A: Economy and Space*, 52(1), 130–147. Available from: https://doi.org/10.1177/0308518X17752682

Latour, B. (1999) On recalling ANT. *The Sociological Review*, 47, 15–25. Available from: https://doi.org/10.1111/j.1467-954X.2007.00682.x

Latour, B. (2005) *Reassembling the social: An introduction to actor-network-theory*. Oxford, UK: Oxford University Press.

Law, J. (1999) After ANT: Complexity, naming and topology. *The Sociological Review*, 47, 1–14. Available from: https://doi.org/10.1111/j.1467-954X.1999.tb03479.x

MacKenzie, D. (2007) Is economics performative? Option theory and the construction of derivatives markets. In: MacKenzie, D., Muniesa, F. & Siu, L. (Eds.) *Do economists make markets?: On the performativity of economics*. Princeton, NJ: Princeton University Press, pp. 54–86.

Mahanty, S. (2019) A tale of two networks: Market formation on the Cambodia–Vietnam frontier. *Transactions of the Institute of British Geographers*, 44, 315–330. Available from: https://doi.org/10.1111/tran.12286

McFarlane, C. (2009) Translocal assemblages: Space, power and social movements. *Geoforum*, 40, 561–567. Available from: https://doi.org/10.1016/j.geoforum.2009.05.003

McFarlane, C. (2011) On context: Assemblage, political economy and structure. *City*, 15, 375–388. Available from: https://doi.org/10.1080/13604813.2011.595111

Miller, E. (2014) Economization and beyond: (re)composing livelihoods in Maine, USA. *Environment and Planning A*, 46, 2735–2751. Available from: https://doi.org/10.1068/a130172p

Mitchell, T. (2005) The work of economics: How a discipline makes its world. *European Journal of Sociology*, 46, 297–320. Available from: https://doi.org/10.1017/S000397560500010X

Mitchell, T. (2007) The properties of markets. In: MacKenzie, D., Muniesa, F. & Siu, L. (Eds.) *Do economists make markets?: On the performativity of economics*. Princeton, NJ: Princeton University Press, pp. 244–275.

Muellerleile, C. (2013) Turning financial markets inside out: Polanyi, performativity and disembeddedness. *Environment and Planning A*, 45, 1625–1642. Available from: https://doi.org/10.1068/a45610

Ouma, S. (2010) Global standards, local realities: Private agrifood governance and the restructuring of the Kenyan horticulture industry. *Economic Geography*, 86, 197–222. Available from: https://doi.org/10.1111/j.1944-8287.2009.01065.x

Ouma, S. (2015) *Assembling export markets: The making and unmaking of global food connections in West Africa*. London, UK: Routledge.

Ouma, S., Boeckler, M. & Lindner, P. (2013) Extending the margins of marketization frontier regions and the making of agro-export markets in northern Ghana. *Geoforum*, 48, 225–235. Available from: https://doi.org/10.1016/j.geoforum.2012.01.011

Peck, J. (2012) Economic geography: Island life. *Dialogues in Human Geography*, 2, 113–133. Available from: https://doi.org/10.1177/2043820612443779

Peck, J. (2013) For Polanyian economic geographies. *Environment and Planning A*, 45, 1545–1568. Available from: https://doi.org/10.1068/a45236

Peck, J. (2020) Where are markets. In: Berndt, C., Peck, J. & Rantisi, N.M. (Eds.) *Market/place: Exploring spaces of exchange*. Newcastle, UK: Agenda Publishing, pp. 49–68.

Peck, J., Berndt, C. & Rantisi, N.M. (2020) Introduction: Exploring markets. In: Berndt, C., Peck, J. & Rantisi, N.M. (Eds.) *Market/place: Exploring spaces of exchange*. Newcastle, UK: Agenda Publishing, pp. 1–26.

Polanyi, K. (1957) The economy as instituted process. In: Polanyi, K., Arensberg, C.M. & Pearson, H.W. (Eds.) *Trade and market in early empires: Economies in history and theory*. Glencoe, IL: The Free Press, pp. 243–270.

Qiang, G. (2021) Market opportunities and rational choice: How Tibetan peasants participate in the market economy. *Beijing Cultural Review*, 2, 138–147 (in Chinese).

Werner, M., Berndt, C. & Mansfield, B. (2022) The glyphosate assemblage: Herbicides, uneven development, and chemical geographies of ubiquity. *Annals of the American Association of Geographers*, 112, 19–35. Available from: https://doi.org/10.1080/24694452.2021.1898322

Yeh, E. (2007) Tropes of indolence and the cultural politics of development in Lhasa, Tibet. *Annals of the Association of American Geographers*, 97, 593–612. Available from: https://doi.org/10.1111/j.1467-8306.2007.00565.x

Yeh, E. (2013) *Taming Tibet: Landscape transformation and the gift of Chinese development*. Ithaca, NY: Cornell University Press.

Zhang, T.Y. (2012) The making of 'valuable' carpets in Lhasa. *Journal of Material Culture*, 17, 83–101. Available from: https://doi.org/10.1177/1359183511433258

Zhu, H. & Qian, J. (2015) 'Drifting' in Lhasa: Cultural encounter, contested modernity, and the negotiation of Tibetanness. *Annals of the Association of American Geographers*, 105, 144–161. Available from: https://doi.org/10.1080/00045608.2014.962975

How to cite this article: Qian, J., Zhang, H., Liu, Y., (2023) Everyday geographies of market transition: Agro-science, socio-technical relations, and the contingencies of market making in peri-urban Lhasa, Tibet. *Transactions of the Institute of British Geographers*, 00, 1–16. Available from: https://doi.org/10.1111/tran.12612