

14.1.4 Value and Generation

Generation shifts attention from the current location of value toward the processes through which later value-bearing conditions arise. Chapter 13 introduced this movement through allocation-mediated value trajectories. A grant can become training, data, infrastructure, organizational credibility, or further research capacity; a transport investment can alter accessibility and later land-use possibilities; a cooperative reserve can stabilize production and preserve future bargaining capacity. In each case the value question concerns more than the transferred resource. It concerns what the surrounding process is able to create, preserve, regenerate, or foreclose.

GRE's use of generative value is explicitly indebted to the generative-justice tradition. Eglash develops generative justice around value generation, participation by value generators, and circulation that returns value toward the people, communities, and conditions that produce it (Eglash 2016). Later work further emphasizes unalienated circular value flows and the restoration of generative conditions across human and non-human communities (Eglash et al. 2024). GRE draws on this lineage while broadening the analytical questions around heterogeneous value forms, conversion interfaces, propagation, dissipation, capture, multiscale incidence, and historical trajectories.

The generative perspective introduces several distinctions. *Produced output* and *generative capacity* are related but different. A process can yield a large current output while degrading the ecological, technical, relational, or institutional conditions needed for future production. Conversely, an investment can have modest immediate output while building skills, standards, trust, or infrastructure that supports later activity. *Novelty* and *generation* also differ. Maintaining a public health system, archive, irrigation network, or ecological condition can preserve the capacity for future action without producing an obviously novel object. Maintenance and regeneration therefore belong within the generative analysis when they materially sustain future valued possibilities.

Generation can also be recursively structured. Knowledge produced in one project can become an input into another; institutional credibility can attract new partners; infrastructure can support unforeseen downstream uses; learning can improve later learning. These processes motivate the later chapters' attention to recirculation, accumulation, and generative return. They also create risks of recursive disadvantage. Dependency, ecological depletion, exclusion, and capability loss can reproduce conditions that constrain subsequent generation. The analytical symmetry matters: generative processes can expand or contract later possibilities.

For this reason, GRE preserves the distinction between *generativity* and *generative value*. Generativity describes a capacity or process that materially affects what can be generated later. Generative value introduces an evaluative claim concerning which of those generated capacities, relations, or possibilities count as valuable under a specified standpoint. A highly productive surveillance system, for example, can generate information and institutional capacity while also generating harms, asymmetries, and constraints. Its generativity does not settle its value.

The generative perspective therefore changes the temporal unit of value analysis. Immediate outcomes remain important, but some value becomes visible only through

later trajectories, conversion opportunities, or sustained capacities. This does not authorize unlimited speculation about remote futures. Claims about generative value should identify the mechanism, horizon, affected subjects, and uncertainty that connect present conditions to later possibilities. Generativity earns analytical weight through a traceable process rather than through rhetorical appeal to the future.

14.1.5 Value and History

Value is historically situated because the conditions under which objects, relations, and capabilities become economically significant change. Scarcity changes; productive forces change; institutions change; technologies create new complements and dependencies; legal categories alter recognized claims; social meanings shift; infrastructures expand or decay; and the positions from which subjects can convert resources into opportunities are transformed. Historical variation therefore affects both what can be valued and how valuation becomes practically operative.

The historical point is stronger than the observation that prices fluctuate. A technological change can alter the value of previously specialized skills. A regulatory change can turn an informal practice into a licensed activity or make a formerly tradable asset nontransferable. A scientific discovery can create value in data collected for another purpose. A new transportation link can change the economic significance of location. A political or institutional transition can alter whose knowledge is recognized, which claims are enforceable, and which relations are considered legitimate. These are transformations of the conditions of valuation, not merely changes in a scalar amount attached to an otherwise fixed object.

Economic history and institutional analysis provide many precedents for treating economic categories as historically constituted. Polanyi's account of market society emphasizes historical reorganization in the relation between economy and society (Polanyi 1944). Marx's analysis of capital likewise situates value processes within historically specific relations of production, labor, and accumulation (Marx 1867). GRE does not collapse these traditions into one historical theory. It takes from them a methodological caution: value concepts can carry assumptions tied to particular institutional and productive arrangements.

Historical situatedness also affects retrospective evaluation. An allocation or institution may have been reasonable under information and constraints available at one time while later evidence reveals burdens or alternatives that were previously weakly visible. Conversely, retrospective analysts can mistakenly project current categories backward and treat past actors as if they possessed present knowledge or institutional possibilities. Chapter 13 distinguished allocation-time, implementation-time, and later-evaluation positions. Value analysis requires the same provenance discipline.

A further implication concerns historical generation of evaluative standards. Valuation does not occur only after economic processes have produced neutral objects. Institutions, professions, markets, scientific practices, political struggles, and cultural classifications can shape which properties become salient and which metrics gain authority. Dewey's pragmatist theory of valuation treats valuation as situated activity involving desires, ends, appraisal, and consequences rather than as the passive dis-

tual and mechanism-oriented. It asks what changes, through which mediating conditions, for whom or for what evaluative standpoint, and with what later consequences.

Value generation, as used here, is broader than production in the conventional sense and narrower than the claim that any change produces value. A manufacturing process can generate material and financial value; education can generate capability and epistemic value; a durable cooperative arrangement can generate relational and institutional value; an inclusive governance procedure can generate participatory value; a reversible technical architecture can generate option value; ecological restoration can generate or regenerate ecological value. In each case, the evaluative vocabulary becomes appropriate only after the relevant significance and standpoint have been specified. A process can be generative in the descriptive sense while producing value for some positions, burdens for others, and ambiguous or contested consequences at wider scales.

Three distinctions organize the section. First, *generation* differs from *recognition*. A value-bearing condition can exist before an accounting system, market, institution, or observer recognizes it. Recognition can itself alter value by changing access, legitimacy, price, or institutional response, but recognition and generation remain analytically distinct. Second, generation differs from *transfer*. A transfer changes the location, control, or incidence of something already represented as valuable, whereas generation changes the conditions through which economically relevant significance becomes newly realizable or expanded. Later sections will examine transmission and transfer directly. Third, generation differs from *capture*. A subject who captures part of a value flow need not be the subject, relation, institution, ecosystem, or collective process through which that value was generated. This distinction is central to the generative-justice lineage, which emphasizes relations between value generation, control over productive conditions, circulation, and extraction (Eglash 2016; Eglash et al. 2024).

Definition 14.8 fixes the term at the level needed for GRE.

Definition 14.8 (Value generation). Within GRE, *value generation* is a historically situated process through which material, capability, relational, epistemic, institutional, participatory, option, future, ecological, financial, or other specified conditions acquire, expand, regenerate, or make practically realizable an economically relevant significance under a stated evaluative standpoint. The concept identifies a generative pathway and its mediating conditions; it does not imply that every generated effect is beneficial, that value is created ex nihilo, or that the resulting value is fully commensurable across forms and affected positions.

Definition 14.8 places the analytical burden on the pathway. A claim that a programme “creates value” is incomplete unless the relevant transformation can be described with sufficient specificity. The source condition can be material, relational, institutional, epistemic, ecological, or mixed. The mediating process can involve labor, learning, coordination, organization, maintenance, experimentation, legal recognition, participation, technological transformation, or ecological regeneration. The resulting significance can take several forms, and its incidence can extend beyond the actor who receives the most visible output. This pathway orientation also permits failed generation to be identified: resources can be consumed without forming the expected capacity; knowledge can be produced without becoming usable; an institu-

next section, which turns to recirculation and asks how converted and transmitted value can return to, maintain, or transform the conditions of later generation.

14.7 Value Recirculation

Sections 14.4–14.6 distinguished value generation, transmission, propagation, and conversion. The present section examines a further process: *recirculation*, in which value-bearing conditions produced, transmitted, used, or converted in an earlier phase re-enter the conditions of later maintenance, regeneration, coordination, or generation. Its role in Chapter 14 is to explain how value trajectories can acquire recursive structure without assuming conservation, closed cycles, or a return to an unchanged origin. The objective is to distinguish return flows, reinvestment, recursive generation, self-sustaining cycles, institutional and community recirculation, cross-scale recirculation, and transformation through recirculation. The method is conceptual and mechanism-oriented. It preserves heterogeneous value forms and historical provenance while using the language of cycles only where the relevant return path and re-entry mechanism can be identified.

Recirculation is narrower than repetition and broader than literal return. Repetition occurs whenever a similar transaction, activity, or transfer happens again. A return flow moves a value-bearing condition, benefit, burden, claim, resource, or transformed output toward a prior source position, contributing relation, or generative setting. Recirculation requires a further relation: the returned or redirected condition must become materially relevant to a later process of maintenance, regeneration, coordination, or generation. Financial revenue that returns to a producer and finances later production is one familiar case. Knowledge produced through practice and returned through documentation or training can be another. Trust generated in successful collaboration can lower the coordination burden of later collaboration. Ecological nutrients can re-enter a regenerative process. The recurring structure can therefore involve different value forms and need not resemble a closed monetary circuit.

The generative-justice literature provides an important precedent for treating circular value flow and return to human and non-human communities of generation as a substantive analytical and normative concern (Eglash 2016; Eglash et al. 2024). GRE inherits this concern while separating several processes that can otherwise be merged under the image of circulation. Recirculation can maintain a productive arrangement, reproduce an unequal dependency, restore depleted conditions, generate new capabilities, amplify a concentration process, or redistribute value across scales. The existence of a recursive path therefore does not establish that the path is just, regenerative, self-sustaining, or normatively desirable.

Definition 14.15 fixes the term used throughout this section.

Definition 14.15 (Value recirculation). A *value recirculation* is a historically situated process in which a value-bearing condition, transformed output, realized benefit, burden, right, capability, relation, representation, ecological condition, or other economically significant result from an earlier phase re-enters the same or a related generative configuration as a materially relevant condition of later maintenance, regen-

Table 14.7: Analytical architecture of value recirculation in GRE

Mechanism	Characteristic re-entry	Typical enabling condition	Characteristic analytical risk
Return flow	Earlier output or benefit moves toward a contributing or prior position	Traceable pathway, entitlement, contract, reciprocity, governance rule	Treating physical return as evidence of regeneration
Reinvestment	Realized value is committed to future productive or generative conditions	Retained control, budgeting authority, time horizon, viable project	Equating expenditure with successful capacity formation
Recursive generation	Earlier generated conditions become inputs to further generation	Complementarity, learning, reuse, cumulative capability	Attributing later outcomes to one initiating episode
Self-sustaining cycle	A recurrent process reproduces materially relevant enabling conditions	Maintenance, replenishment, governance, bounded external dependence	Mistaking boundary-relative sustainability for autonomy
Institutional	Rules, revenues, knowledge, legitimacy, or capacity re-enter institutional reproduction or revision	Durable organization, procedures, memory, authority	Confusing institutional persistence with institutional value
Community	Benefits, capacities, knowledge, or resources re-enter a community of generation or use	Participation, local control, trust, commons governance, access	Romanticizing community or obscuring internal asymmetry
Cross-scale	Value generated or realized at one scale re-enters processes at another	Translation, fiscal links, infrastructure, multilevel institutions	Losing incidence or provenance across scale transitions
Transformative	Recirculation changes the rule, relation, or configuration through which later cycles occur	Learning, institutional revision, changed technology, collective action	Treating a changed cycle as simple reproduction

eration, coordination, conversion, or generation. Recirculation preserves the provenance of the earlier process while leaving open whether the returning condition has changed form, recipient, scale, meaning, or normative status.

Definition 14.15 makes re-entry the central criterion. A payment that returns to an originating account but is immediately removed from the relevant process can be a return flow without recirculation. Conversely, a capability generated in one organization can later re-enter a wider professional or community network without returning to the original institutional recipient. A cycle can therefore close functionally while remaining open geographically, institutionally, or formally. Recirculation should be traced through the generative configuration that the return helps maintain or transform, not solely through identity of sender and recipient.

Table 14.7 summarizes the principal analytical distinctions developed below. The rows are overlapping mechanisms. One empirical process can contain several forms of recirculation simultaneously.

14.7.1 Return Flows

A return flow is the most immediate building block of recirculation. It concerns a movement of resources, rights, information, benefits, responsibilities, recognition, or other economically significant conditions toward a position or configuration that contributed to an earlier process. The return can be contractual, customary, recip-

Table 14.13: Analytical dimensions of generative return in GRE

Return dimension	Primary object	Diagnostic question
Immediate	Near-term usable effect	What generated condition becomes practically available within the active episode or its immediate continuation?
Relational	Relation or coordination condition	Which ties, trust structures, reciprocal capacities, or governance relations later support action?
Capability	Effective ability to act	Which learned, embodied, technical, organizational, or collective capacities become usable later?
Epistemic	Knowledge and epistemic infrastructure	Which evidence, models, memory, interpretive resources, or inquiry capacities re-enter later decisions?
Institutional	Durable rule or organizational capacity	Which procedures, rights, routines, infrastructures, or legitimate authorities persist into later activity?
Option-space	Reachable future possibilities	Which alternatives, exit paths, reversible commitments, or branching possibilities become or remain practically reachable?
Long-horizon	Delayed or cumulative condition	Which returns mature through persistence, maintenance, accumulation, ecological regeneration, or intergenerational transmission?
Uncertain	Return under incomplete knowledge	What return pathways remain plausible, with what evidence, uncertainty, rival explanations, and revision conditions?

competing explanations, intervening conditions, and uncertainty become.

Definition 14.32 (Generative return). Within GRE, a *generative return* is a value-bearing effect attributable, with stated scope and evidential standing, to an earlier generative process and re-entering a later economic process as a materially relevant condition of further generation, maintenance, coordination, adaptation, participation, or transformation. A generative return is indexed to its value form, affected position, re-entry pathway, and time horizon; it need not be financial, accrue to the original contributor, preserve its original value form, or be commensurable with other returns.

Definition 14.32 makes return a relational and historical concept. It concerns a connection between episodes, positions, and conditions rather than a property of an isolated object. A training programme can return capability through later practice; a research process can return epistemic value through reusable knowledge; a cooperative relationship can return relational value through reduced coordination burdens; an institution can return durable procedural capacity; ecological restoration can return material and ecological conditions that later activity depends upon. These examples differ in form and normative significance, yet each can be analyzed through the same recursive question: what generated effect later becomes an input, enabling condition, or stabilizing condition for further activity?

Table 14.13 summarizes the section's analytical architecture.

14.13.1 Immediate Return

Immediate return concerns value-bearing effects that become usable within the active process or its near-term continuation. The word *immediate* is process-relative rather than tied to a universal clock duration. For a digital system, an immediate return may appear within minutes; for a training programme, it may appear within the next task cycle; for infrastructure repair, it may appear when service becomes available again. What matters is that the return becomes practically relevant before a substantial new historical layer separates the source episode from the re-entry episode.

Immediate return should not be identified with immediate output. An output is what an activity directly produces. A return exists when some produced effect re-enters later activity as a useful condition. A workshop can produce a report without producing a return if the report is never used. The same workshop can generate an immediate epistemic return if its findings alter the next design decision, or a relational return if newly established coordination routines improve the next joint task. The recursive link is therefore essential.

Near-term financial receipts are one possible immediate return, but the category is broader. Reduced downtime, newly accessible data, restored mobility, improved coordination, repaired trust, reusable software, or a clarified legal interpretation can all become immediate return when they feed into subsequent action. A narrow financial analysis can remain adequate when the research question concerns cash flow alone. GRE widens the frame when non-financial effects materially alter what later action becomes possible or costly.

Immediate return also needs incidence analysis. The position that experiences a near-term gain need not be the position that generated it. A platform can capture immediate financial return from user-generated data while users receive convenience or network access. A public research project can generate a tool that firms use before the original research organization realizes any direct benefit. A community may bear implementation burdens while a central institution receives administrative learning. The phrase *return to the process* therefore differs from *return to the original contributor*.

This distinction also protects against a common evaluative shortcut. A visible immediate return can coexist with later depletion, lock-in, relational erosion, or ecological cost. Conversely, modest immediate return can accompany substantial long-horizon capability or option-space return. Immediate return is one layer of the return profile, not a privileged proxy for total generative value.

14.13.2 Relational Return

Relational return concerns value-bearing changes in relations that later support coordination, access, reciprocity, trust, legitimacy, care, communication, bargaining, governance, or collective action. Its object is neither an isolated actor nor a generic claim that “relationships matter.” It is a materially relevant relational condition generated through an earlier process and subsequently re-entering economic activity.

A collaboration can generate shared expectations that reduce later coordination burdens. A repeated procurement relationship can generate knowledge of technical

versibility, diversification, and staged commitment. A process can be valuable partly because it generates information while preserving the ability to revise later action. In such cases, the return includes learning and maintained reachability rather than only the final material output. This connects generative return to adaptive allocation and to the option-space analysis developed earlier in the book.

Attribution becomes particularly difficult when many actors and histories contribute to a later return. Scientific knowledge can rest on cumulative public investment, prior research, infrastructure, education, and international collaboration. Institutional legitimacy can emerge from repeated interactions across many episodes. Ecological recovery can depend on several interventions plus favorable external conditions. A provenance-sensitive analysis should therefore permit distributed contribution and avoid assigning exclusive causal ownership merely because one actor can identify a visible final step.

The same discipline applies to failure. Absence of an expected return does not by itself prove that the originating process had no generative value. A capacity may have formed but encountered a later institutional barrier; ecological return may have been offset by an external shock; generated knowledge may remain unused because access is restricted. Evaluation should distinguish failure of generation, failure of transmission, failure of conversion, capture, dissipation, and adverse later conditions.

Proposition 14.33 summarizes the section's analytical requirement.

Proposition 14.33 (Provenance and horizon of generative return). *Within GRE, a claim of generative return is adequately specified when it identifies, at the level required by the inquiry, the originating generative process, the returned value-bearing condition, the affected position or positions, the re-entry pathway into later activity, and the relevant time horizon, while preserving material uncertainty and alternative explanations. A return claim does not by itself establish financial profitability, conservation of value, exclusive causal ownership, commensurability among heterogeneous returns, or overall normative desirability.*

Proposition 14.33 makes generative return a historically reconstructable relation rather than a retrospective label attached to favorable outcomes. Immediate, relational, capability, epistemic, institutional, option-space, and long-horizon returns can coexist and can accrue to different positions through different pathways. Their analysis therefore requires provenance without demanding a universal return metric. This architecture also prepares the next section's historical question: how scarcity, productive forces, institutions, subject positions, value forms, and valuation practices can change over time, thereby altering both the value generated in an earlier period and the meaning assigned to its later return.

14.14 Historical Transformation of Value

This section develops the historical transformation of value as a distinct problem within GRE. Its role is to explain how value-bearing conditions, value forms, valuation practices, and the epistemic means through which value is recognized can change across time. The objective is to distinguish transformation in what is materially, relationally, institutionally, or practically valuable from transformation in the categories,