

Towards Generative Relational Economics

A Preliminary Research Programme

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Abstract

This article introduces Generative Relational Economics (GRE) as a preliminary research programme rather than a completed economic theory. Its starting point is historical. Modern economics developed under conditions in which scarce resources were commonly allocated among comparatively stable entities such as persons, households, firms, and states. Those abstractions remain indispensable, but contemporary transformations increasingly expose their limits. Globalized production, digital platforms, and artificial intelligence alter the scarcity of symbolic production, knowledge, and productive intelligence while many mechanisms of livelihood, recognition, and resource access remain tied to employment and comparative capability. AI also destabilizes inherited assumptions about the economic subject and makes persistent capability asymmetry difficult to ignore: human and artificial subjects may coexist under differences of knowledge, prediction, coordination, and productive capacity that are neither easily eliminable nor necessarily desirable to eliminate. The resulting problem is not asymmetry alone, but how it is converted through economic relations into dependency, exclusion, authority, resource concentration, or generative opportunity.

GRE responds by shifting attention from allocation outcomes alone to the evolving relational structures through which resources and plural forms of value are generated, propagated, converted, recirculated, dissipated, and made capable of generating further possibilities. It does not reject entities, allocation, markets, or existing economics. It asks what becomes visible when entity-level interventions are also treated as relational interventions and when evaluation includes effects on future generative capacities. GRE draws on ontology and epistemology, aesthetics and epistemic orientation, relational and process thought, historical materialism, capability and care approaches, generative justice, and formal traditions in dynamical systems, complexity, networks, and fields. These traditions are treated as resources rather than collapsed into a single lineage.

The article states GRE's disciplinary identity: its problem domain, characteristic questions, modes of inquiry, practical orientation, normative constraints, boundaries, and cumulative research programme. Its central proposal is that economics should ask not only who receives resources or what output follows, but what relational world an intervention helps generate, how value changes as it moves through that world, and how the intervention changes the conditions of subsequent generation. This statement remains deliberately programmatic and does not provide a complete formal model, a universal metric of generativity, or a final ontology of economic subjects and relations.

Keywords: generative relational economics; political economy; historical materialism; relational economics; generative justice; artificial intelligence; economic subject; value; allocation; generativity

Author’s Note, Circulation, and Use

This manuscript is circulated as a preliminary research programme. Its primary purpose is to make a developing set of questions, distinctions, and research directions available for discussion, criticism, comparison, and collaborative refinement. It should not be read as a claim that Generative Relational Economics is already a completed theory or institutionally established discipline. Comments, counterexamples, related literatures, alternative formulations, and proposals for collaboration are highly welcome and may be sent to huangwanhong@serendip.ngo.

This manuscript does not assert priority, first coinage, exclusive conceptual ownership, or first discovery for the concepts and formulations discussed here. Many of its components have antecedents or parallels in political economy, historical materialism, relational and process philosophy, capability and care approaches, ecological and commons traditions, generative justice, systems and complexity research, network and field approaches, and other literatures. Terms introduced or assembled here are used to organize a research programme and facilitate circulation of ideas rather than to establish proprietary claims over concepts. Appropriate scholarly attribution to relevant prior and parallel work remains essential.

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AI Assistance Statement

The author is responsible for the research questions, theoretical commitments, selection and interpretation of intellectual lineages, substantive arguments, revisions, and final text. Generative AI systems were used as dialogic and editorial aids during the development of the manuscript, including brainstorming, testing distinctions, reorganizing outlines, drafting and revising prose, and assisting with the location and checking of references. AI-generated suggestions were treated as provisional material for review rather than as independent scholarly authority. No AI system is presented as an author, and responsibility for errors, omissions, interpretations, and claims remains with the human author.

Status of the Manuscript

The manuscript is intentionally programmatic. It foregrounds the historical conditions, philosophical and theoretical foundations, and disciplinary constitution of GRE. Detailed methodologies for relational and generative-relational inquiry, a formal model, theories of generative value and generative spacetime, domain-specific empirical tests, and institutional design are reserved for subsequent work. The present text is therefore best read as an invitation to a research programme rather than as a closed doctrinal statement.

1. Introduction

Economic analysis has long been concerned with production, exchange, allocation, distribution, coordination, and welfare. These concerns emerged in changing historical settings, and

the abstractions used to address them were never independent of those settings. Modern economic institutions made persons, households, firms, property owners, corporations, and states comparatively legible as units of action, responsibility, ownership, taxation, and allocation. Accounting systems made resources attributable to organizations; labor contracts made productive contribution administratively visible; property and corporate law stabilized recipients and bearers of claims; statistical systems rendered populations into measurable categories. Economic analysis could therefore often begin with entities that were treated as already sufficiently given and ask how resources, prices, incentives, and outputs were distributed among them.

That strategy remains powerful. Generative Relational Economics (GRE) does not begin from the claim that entities are illusions, that allocation is unimportant, or that conventional economics should be discarded. It begins from a narrower observation: an allocation to an entity is never only a change in that entity’s resource holding. An organization contains internal relations and participates in external ones; an individual is embedded in families, institutions, communities, knowledge systems, legal orders, infrastructures, and ecological relations; a grant, wage, loan, tax, subsidy, dataset, or computational resource can change those relations and the possibilities that subsequently arise from them. The administrative recipient is therefore not necessarily the complete economic object of an intervention.

This incompleteness becomes more consequential under contemporary conditions. Artificial intelligence can automate or transform cognitive tasks, generate symbolic outputs at extremely low marginal cost, and increasingly participate in activities previously organized around scarce human expertise. The International Labour Organization’s 2025 global assessment emphasizes widespread occupational exposure to generative AI while also stressing that transformation rather than wholesale replacement is the more plausible near-term outcome [9]. Task-based economics has likewise emphasized that automation can displace labor from some tasks while productivity and new-task effects operate in the opposite direction [1]. GRE does not assume a particular technological destiny. Its concern is structural: when productive capability changes faster than the institutions linking employment, income, social participation, and resource access, inherited allocation mechanisms can generate new asymmetries even if aggregate productive capacity rises.

AI also reopens a philosophical question that economic practice could often bracket: what counts as an economic subject? A human employee, a corporation, a government agency, an algorithmic platform, and an AI system do not share an obvious ontology, yet all may produce stable causal effects inside economic relations. When human and artificial systems can display overlapping forms of performance while remaining radically different or contested in ontological status, the convenience of beginning with self-evident entities weakens. This does not require concluding that humans and AI are ontologically equivalent. It requires a framework capable of distinguishing ontological claims from relationally effective and institutionally represented realities.

AI also sharpens a second problem that is not reducible to subject classification. Some capability differences may become persistent, very large, and constitutive of the value of the technology itself. If an AI system is useful because it can search, remember, calculate, predict, coordinate, or generate at scales unavailable to an individual human, then eliminating the capability difference would defeat part of the reason for developing the system. The economic problem is therefore not necessarily to equalize capability. It is to understand the mappings through which capability asymmetry becomes economic power. Knowledge can become

epistemic authority; authority can influence decisions; decision power can structure access to resources; resource control can deepen dependence and reinforce the original asymmetry. Under such conditions, the relation between unequal subjects becomes an economically significant object in its own right. GRE offers relation and generative relational structure as possible objects of inquiry here, without claiming that relations constitute the only or ultimately correct ontology of economic life.

A second disruption concerns knowledge. Knowledge has historically functioned as a scarce productive resource and a source of authority. If advanced AI makes many forms of symbolic production and knowledge generation abundant, the scarcity does not simply disappear; it can migrate. Attention, trust, interpretive legitimacy, institutional access, question selection, aesthetic and epistemic orientation, and the capacity to shape what will be generated next may become more consequential. A system that can produce millions of plausible answers intensifies rather than abolishes the question of what deserves attention. In that environment, curiosity and aesthetic judgment are not peripheral to political economy. They participate in orienting generation before formal allocation or utility calculation begins.

GRE is proposed as a research programme for studying such problems through the joint lenses of relation and generation. It asks how resources and forms of value enter relational structures; how they propagate, convert, recirculate, or dissipate; how relations themselves are formed, stabilized, transformed, or foreclosed; and how these processes alter the conditions under which subsequent value and relations can be generated. The word *generative* is therefore not decorative. A process is economically significant not only because it changes a current state but because it may change future capacities, future relations, and sometimes the effective rules by which later transformations occur.

This article provides a preliminary statement of the field. It has three tasks. First, it reconstructs historical conditions that make GRE both increasingly necessary and increasingly feasible. Second, it identifies philosophical, social, economic, normative, and formal lineages from which the programme draws. Third, it defines GRE as a field of inquiry by specifying its problem domain, characteristic questions, research orientation, practical ambitions, normative limits, boundaries, and cumulative research programme. The article does not yet supply the full epistemology of relations, a complete methodology for identifying generative relations, a formal theory of generative spacetime, or a universal evaluative measure. Those are separate tasks precisely because a new field should not hide major unresolved problems inside its opening definitions.

2. Historical Conditions of Emergence

2.1. Economic categories as historical formations

The emergence of GRE is best understood historically rather than as the discovery of a timeless mistake in earlier economics. Economic categories are formed within material and institutional conditions. Historical materialism is especially important here because it directs attention to the relation between productive forces, relations of production, institutional forms, and the categories through which social life becomes intelligible. Marx's well-known claim that the human essence is not an abstraction inherent in an isolated individual but an ensemble of social relations is relevant not as a proposition that GRE simply adopts, but as an early refusal of an atomistic starting point [12]. More broadly, Marxian analysis treats

capital, labor, class, commodity forms, and social reproduction as historically constituted rather than natural categories.

The history of economic thought can therefore be read partly as a history of changing problem fields. Questions of wealth and trade, production and division of labor, industrial capital, distribution and class, marginal choice and allocation, welfare, information, institutions, and coordination became salient under different configurations of economic life. Classical and neoclassical economics did not focus on allocation because economists failed to notice social relations. Scarcity, ownership, prices, administrative recipients, and measurable quantities posed urgent and tractable problems. A theory of allocation among comparatively stable agents corresponded to institutions that themselves organized property, labor, contracts, and responsibility in entity-centered ways.

Modern law and administration reinforced that orientation. Property belongs to recognized holders; firms have organizational boundaries; corporations acquire legal personality; taxes and benefits are assigned to administratively recognized units; accounts attribute assets and liabilities to organizations. The resulting economic ontology is partly institutional achievement. An entity-centered analytical method is easier to sustain where legal and administrative infrastructures repeatedly stabilize entities as bearers of claims and obligations.

GRE therefore does not present relational analysis as the correction of an obvious historical error. It asks instead whether changing productive and epistemic conditions now make the costs of those abstractions more visible. The key historical question is not whether relations mattered before the digital era. They plainly did. The question is why relational and generative processes now become simultaneously more economically decisive, more observable, more governable, and more dangerous to ignore.

2.2. Genealogy of allocation-centered economic reasoning

The historical importance of allocation deserves a more sympathetic reconstruction than a simple contrast between “old entity economics” and “new relational economics.” Allocation became central because modern economic life repeatedly posed problems in which scarce and administratively distinguishable goods had to be assigned among recognized claimants. Land, food, wages, credit, public revenue, industrial machinery, housing, medical care, and educational opportunities can all become scarce relative to competing claims. Once scarcity is combined with legal personality, property, contract, accounting, taxation, and public administration, a recurrent practical problem appears: which recognized entity receives which resource, under which rule, and with what entitlement? Modern economics developed powerful abstractions for precisely this problem.

The allocation-centered viewpoint also benefited from a particular kind of observability. A payment can be recorded; a price can be compared; a property title can be identified; a wage can be attributed to an employee; a firm’s accounts can be consolidated; a tax can be assigned to a taxpayer. Relational consequences are often slower, more diffuse, and more difficult to attribute. The same grant that can be recorded immediately as a transfer may alter trust, hierarchy, dependency, learning, membership, reputation, or community organization over years. Earlier institutions did not entirely ignore such effects, but they lacked many of the conceptual and evidential infrastructures now available for following them systematically.

The historical dominance of allocation can therefore be understood through a conjunction of material scarcity, administrative legibility, legal form, and analytical tractability. The

economic subject appears as a bearer of preferences, claims, property, labor power, rights, or liabilities because institutions repeatedly make it function in that way. The entity is not simply assumed by theory; it is also produced and stabilized by law, administration, accounting, and social practice. This observation is important for GRE because it shifts the criticism away from a caricature of earlier economics. The relevant claim is not that allocation was an irrational object of attention. It is that the historical conditions that made allocation-centered abstraction especially powerful are changing, and that the relations hidden by the abstraction can become economically decisive under new conditions.

The development of economic thought itself reflects changing centers of concern. Mercantile and early political-economic debates often emphasized trade, money, state power, and national wealth. Classical political economy foregrounded production, division of labor, value, distribution, and class. Marxian political economy historicized the relations through which production and reproduction occur. Marginalism and neoclassical analysis sharpened questions of scarcity, choice, price, equilibrium, and allocation. Welfare economics asked how allocations could be compared under explicit criteria. Institutional and information economics complicated the image of frictionless allocation by examining transaction structures, incomplete information, rules, incentives, and organizations. Economic sociology challenged atomized actors by emphasizing embeddedness. Capability approaches questioned the sufficiency of resource possession by asking what people can actually do and become. Ecological, care, commons, evolutionary, complexity, and other traditions have further widened the object of economic analysis.

GRE belongs to this long history of changing problematization. It does not propose that allocation cease to be an economic problem. It proposes that allocation be located inside a broader generative trajectory. The question “who receives what?” remains necessary, but becomes one stage in a sequence that also asks what relations are changed, what capacities are generated, what value forms appear, how effects propagate, and how the conditions of later generation are transformed. In this sense GRE is better understood as an extension of the economic problem-space than as a replacement of allocation theory.

2.3. Institutional production of the modern economic subject

The modern economic subject is similarly historical. A worker, consumer, taxpayer, shareholder, debtor, corporation, household, beneficiary, or property owner is not only a naturally given person or group described by economic theory. Each is also an institutional position. Legal and administrative systems specify who can contract, own, inherit, vote in a corporation, incur debt, receive benefits, or be held liable. Statistical systems aggregate people into households, occupations, sectors, income classes, and demographic categories. Organizations define membership, hierarchy, responsibility, and authority. Markets presuppose recognized parties to exchange. The economic entity is therefore partly a product of social recognition and symbolic stabilization.

This does not imply that persons or organizations are unreal. It means that the economically relevant form in which an entity appears is relationally and institutionally constituted. A corporation can be treated as one recipient of a grant at one scale, yet internally it contains employees, departments, authority relations, ownership claims, professional cultures, informal networks, and conflicting interests. A household can be treated as one statistical unit while containing relations of care, dependence, gendered labor, intergenerational transfer, and un-

equal control over resources. A state can act as a unit in international finance while containing ministries, jurisdictions, publics, firms, local governments, and legal orders. Entityhood is therefore analytically useful but scale-sensitive.

Historical materialism gives GRE an important clue here. Marx’s formulation that the human essence is, in its reality, an ensemble of social relations rejects the isolated individual as a sufficient starting point for social analysis [12]. GRE does not turn that formulation into a complete ontology. Instead, it takes seriously the methodological implication that the economic subject cannot be understood independently of the relations through which it is reproduced, recognized, enabled, constrained, and transformed. The question of subjecthood is therefore not external to economics. It affects what counts as a claimant, producer, beneficiary, owner, participant, or generator of value.

The AI era makes this implicit problem unusually visible. An AI system may produce text, code, predictions, designs, recommendations, or strategic decisions that have effects similar to outputs historically associated with human workers or organizations. Yet performance similarity does not settle ontology, consciousness, responsibility, moral status, or legal personality. Conversely, ontological uncertainty does not make the system economically irrelevant. Institutions must still decide how its outputs are owned, how liabilities are allocated, how decisions are reviewed, how access is priced, and how the system alters relations among humans and organizations. The apparent convenience of beginning economics with obvious subjects becomes harder to sustain.

GRE therefore separates at least three levels. The first concerns ultimate ontological status, which may remain disputed or suspended. The second concerns relationally effective reality: whether a configuration has sufficiently stable causal effects within a system to matter economically. The third concerns symbolic and institutional representation: whether law, accounting, administration, or social practice recognizes the configuration as an actor, asset, tool, subject, organization, or relation. These levels can diverge. An informal community may be relationally real without legal personality. A corporation may possess strong legal personality while its internal coherence is weak. An AI agent may be represented as a tool while increasingly shaping decisions as if it were an actor. Such divergences are not philosophical curiosities; they affect allocation and power.

This reconstruction leads to a broader contemporary question. If the modern economic order linked livelihood and recognition to productive roles performed by socially recognized subjects, what happens when productive systems increasingly rely on non-human cognitive capacities? The answer cannot be supplied by changing the label on the productive entity alone. The relations among capability, ownership, income, participation, and recognition must be reconsidered. GRE’s relational turn therefore begins partly as a response to the destabilization of the economic subject itself.

2.4. From embedded production to extended relational production

Industrial economies were always relational: factories coordinated workers and machinery; finance linked creditors and debtors; supply chains connected distant regions; households reproduced labor; states constructed infrastructures and legal orders. Economic sociology later made this explicit by challenging atomized accounts of action. Granovetter’s formulation of embeddedness argued that economic action is situated in ongoing structures of social relations rather than exhausted by isolated preference and transaction [6]. Polanyi’s historical

analysis similarly emphasized the transformation of the relation between economy and society under modern market institutions [14].

Contemporary production extends these relational structures. Digital platforms coordinate users, developers, advertisers, contractors, data suppliers, and infrastructures across jurisdictions. Scientific production depends on shared databases, computing facilities, citation systems, standards, journals, and international collaborations. Global supply chains distribute production through networks whose consequences cannot be understood from the balance sheet of a single firm. Data-intensive systems continuously mediate relations among people, organizations, and machines. What appears administratively as an entity often functions economically as a dense condensation of internal and external relations.

This matters for intervention. Consider a grant to an organization. A recipient-centered evaluation may record the transfer, expenditure, outputs, and perhaps beneficiary counts. A relational evaluation additionally asks how the grant changes relations among members, between managers and workers, between the organization and communities, between the organization and donors, and between the organization and knowledge or ecological systems. Two organizations receiving identical resources may generate radically different downstream structures. The nominal equality of allocation therefore does not imply equality of generative consequences.

The same point can be stated more generally. Let an intervention be represented provisionally as

$$u \longrightarrow E, \quad (1)$$

where u is a resource and E an administrative recipient. GRE treats this as only the first layer of description. The economically relevant trajectory may instead involve

$$(E, \mathcal{R}_t, u) \longrightarrow (E', \mathcal{R}_{t+1}, C_{t+1}, V_{t+1}), \quad (2)$$

where $\mathcal{R}$ represents a relational structure, C capacities, and V one or more forms of value. The notation is intentionally schematic. The conceptual point is that the intervention can change the relations through which later economic processes occur.

2.5. Artificial intelligence and the transformation of productive capability

AI intensifies these issues because it changes the distribution of productive capability without automatically changing the institutions through which people obtain resources. Task-based analyses of automation show why simple predictions of total replacement are inadequate: technologies displace some tasks, increase productivity, and can create or expand others [1]. The 2025 ILO assessment similarly treats exposure as heterogeneous and stresses transformation [9]. Yet even without assuming mass technological unemployment, a deeper institutional problem remains. If access to livelihood is substantially mediated through employment, and employment through comparative productive capability, then large changes in the distribution of capability can change access to resources and bargaining power.

The relevant structure is not merely

$$C_{AI} > C_H, \quad (3)$$

but the institutional mapping

$$C \longrightarrow \text{competitive position} \longrightarrow \text{resource access} \longrightarrow \text{power}. \quad (4)$$

Capability asymmetry is not itself injustice. A physician may know more medicine than a patient; a teacher may know more of a subject than a novice; an AI may outperform a human at a particular task. The political-economic question is how those asymmetries are converted into authority, ownership, livelihood, dependency, and control over future possibilities.

This distinction is important because it prevents a misleading policy conclusion. GRE does not begin from the norm that AI capability should be reduced until humans are competitive. The more interesting question is how radically asymmetric subjects can coexist without allowing capability asymmetry to become an automatic claim over scarce resources or unilateral control over another subject's future. The object of governance is therefore not asymmetry in the abstract but the relational transformation of asymmetry into durable power.

2.6. Transformation of scarcity and the symbolic crisis

AI also changes the economics of symbols. Text, images, code, summaries, designs, and other symbolic outputs can increasingly be produced at scale. The result is not the end of scarcity but a change in its location. Material resources, ecological capacity, time, attention, trusted institutions, and embodied care remain limited. Meanwhile, the abundance of symbols can create new scarcities in verification, interpretation, credibility, provenance, and attention.

The symbolic problem is deeper than misinformation. Modern governance relies on symbols that stand for persons, relations, events, risks, rights, and values. Employment status, credit scores, organizational categories, eligibility classes, metrics, models, and legal classifications are symbolic representations with causal force. When symbolic production becomes cheap and adaptive, the relationship among representation, referent, and institutional action becomes more unstable. More symbols need not mean more knowledge. A system can become informationally dense while becoming less capable of distinguishing which representations deserve trust.

This is one reason GRE cannot identify the symbolized relation $\hat{R}$ with the relation it purports to represent. Administrative categories are necessary for action, but they can stabilize, reshape, or erase the relations they classify. A funding regime that recognizes only certain family structures, organizational forms, or employment categories can make those symbolic distinctions economically consequential. The epistemology of relations therefore becomes inseparable from the economics of allocation.

2.7. Subjecthood after productive necessity

AI also exposes a less discussed problem: the relation between economic production and modern subjecthood. Work has never been the sole source of identity, meaning, or recognition, but modern institutions frequently connect productive role, income, social contribution, and status. The chain

$$\text{work} \longrightarrow \text{contribution} \longrightarrow \text{income} \longrightarrow \text{social position} \quad (5)$$

helps stabilize a particular kind of economic subject. When productive systems require less human labor in some domains, the issue is not exhausted by replacing wages with transfers. Material security can be preserved while meaningful participation, institutional membership, learning relations, and the experience of being needed deteriorate.

This is not an argument for preserving unnecessary labor for its own sake. It is a reason to separate human value from comparative productivity and to investigate economic structures that sustain participation beyond employment. A person studying astronomy, caring for a neighbor, maintaining a language, participating in a local commons, or exploring a mathematical question may generate value through relations even when an AI could produce more measurable output. The existence of a superior knower does not abolish the value of knowing because knowing is also a relation through which subjects are transformed.

The subject problem becomes sharper when AI itself is considered. GRE does not need to decide in advance whether an AI is a person, conscious being, moral patient, or legal subject. It needs a vocabulary capable of distinguishing at least three questions: what an entity ultimately is; what stable causal and relational effects it produces; and how institutions represent and govern it. Ontological suspension permits analysis without pretending that contested metaphysical questions have been solved.

A deeper issue appears when productive necessity has served not only as a mechanism of income but also as a practical witness of existence. Modern subjects are not reducible to workers, yet participation in production has often offered a concrete answer to questions of social presence: someone needs my labor, my knowledge enters a shared project, my action changes an institution, and other people organize their expectations partly around what I do. The loss of productive necessity can therefore generate an existential-economic problem even where material deprivation is avoided. A transfer can preserve consumption while leaving unanswered whether the recipient remains able to form consequential relations, initiate projects, be recognized as a participant, and experience that their actions alter a shared world.

GRE should not romanticize employment or infer that people require subordination to markets in order to possess meaning. The point is almost the reverse. If modernity has allowed productive roles to monopolize too much of the institutional recognition of contribution, then productive abundance creates an opportunity to separate existence from comparative productivity. Care, inquiry, artistic practice, learning, friendship, civic participation, ecological stewardship, contemplation, and the maintenance of communities can all create relations through which subjects and worlds are transformed even when those activities are not competitively necessary to production. The economic question becomes whether institutions make such relations materially and temporally possible rather than whether they can be defended as second-best substitutes for employment.

This also gives a more precise sense to the problem of subjective emptiness. GRE does not posit a fixed metaphysical essence whose loss must be repaired. It can instead suspend the ultimate ontology of the subject and ask how subjecthood becomes manifest and relatively stable through relations of recognition, action, memory, inquiry, care, conflict, commitment, and participation. The absence of an economically guaranteed essence need not entail nihilism; it can also reveal that subjecthood is continually generated and witnessed through relations. Under this view, the challenge of an AI-rich economy is not to manufacture artificial scarcity so that humans remain indispensable, but to sustain conditions in which persons can continue to encounter the world, form questions, enter consequential relations, and generate trajectories

that are not pre-empted by superior productive systems.

The distinction is significant for economic policy. A society may succeed in preventing poverty while failing to preserve generative participation. Conversely, an institution may create modest measurable output while sustaining relations through which people learn, care, discover, deliberate, and become capable of new action. GRE therefore treats the preservation and formation of meaningful generative relations as a possible economic concern without claiming that economics should define the meaning of life. Its narrower claim is that economic arrangements condition which forms of participation and self-transformation are materially available.

2.8. Persistent asymmetry and heterogeneous subjects

A further historical pressure comes from capability asymmetry. Economic theory has always confronted unequal resources, bargaining power, information, and productive capacity. Contemporary AI, however, makes visible a particularly difficult form of asymmetry: a difference that can be extremely large, can persist across time, and can be undesirable to eliminate. An advanced artificial system may know more than any individual human in many domains, search vastly larger spaces, operate continuously, coordinate across many interactions, and reproduce some capabilities at very low marginal cost. If those properties are among the reasons for building the system, then a governance programme based on reducing the system until capability symmetry is restored would be self-defeating.

The existence of asymmetry is not itself equivalent to injustice or domination. A patient and a physician, a novice and an expert, a small organization and a large infrastructure provider, or a child and an adult may possess very unequal capabilities while participating in relations that are valuable to both parties. The more precise problem concerns conversion. A schematic chain is

$$\Delta C \longrightarrow \Delta K \longrightarrow \Delta D \longrightarrow \Delta R \longrightarrow \Delta P, \quad (6)$$

where capability differences can become epistemic authority, decision asymmetry, unequal resource control, and eventually durable power. The mappings are institutional and relational rather than automatic. The same capability difference can support assistance in one institutional arrangement and dependency or exclusion in another.

This complicates a familiar strategy in political and economic governance: countering power with counter-power. Competition, collective organization, legal checks, institutional pluralism, bargaining, antitrust, and democratic contestation remain indispensable. Yet some forms of capability asymmetry may be so large, fast-changing, or technically concentrated that simply constructing an equal opposing capability is implausible. A human individual cannot become a counter-model containing the same knowledge as a frontier AI system merely in order to negotiate with it on equal cognitive terms. Nor would equality of cognitive capability necessarily be the appropriate objective. The governance question therefore shifts toward the relational and institutional conditions under which unequal capabilities are exercised.

This shift has direct implications for allocation. If a distributional regime implicitly maps comparative productive capability into claims over jobs, income, institutional attention, or ownership, then persistent capability asymmetry can become persistent exclusion even when aggregate abundance increases. An entity-centered description may record that one actor is more productive than another and allocate accordingly. A relational analysis can additionally

ask how the allocation changes dependence, bargaining position, participation, access to alternatives, and the future capacity of the less capable party to generate value or revise the relation. Relation is proposed here as an additional object of economic inquiry, not as a declaration that entities cease to matter or that every distributive problem should be reformulated relationally.

The AI case also points toward a more general problem of heterogeneous subjects. Economic analysis often becomes tractable by assuming agents whose preferences, resources, actions, and welfare can be represented within a shared formal language. Real economic life already contains substantial heterogeneity among persons, organizations, communities, states, generations, and ecological systems. Future human–AI relations may intensify the problem because subjects can differ not only in preferences but in embodiment, temporal scale, communicative capacity, vulnerability, memory, epistemic access, and modes of valuation. A sufficiently distant thought experiment involving contact with extraterrestrial intelligence makes the methodological point vivid: coexistence and exchange could have to be organized before either side fully understands the other’s ontology, value structure, or epistemic world. GRE does not require such a scenario to be likely. Its relevance is to expose assumptions of commensurability that are already fragile in present economic relations.

Heterogeneity creates an epistemological problem as well as a distributive one. If two subjects organize significance differently, an analyst cannot assume that a common utility scale captures what each has reason to preserve or generate. Evidence about another subject’s values may be incomplete, strategically mediated, historically changing, or expressed through categories that do not map cleanly into one’s own. Economic practice under such conditions requires procedures for partial understanding, translation, contestation, revisability, and protection against irreversible foreclosure. GRE therefore includes the epistemology and praxis of heterogeneous subjects among its prospective research domains.

The resulting question is broader than how humans should control AI. It is how subjects with persistent differences of capability, knowledge, vulnerability, and value orientation can participate in economic relations without requiring the weaker party to become capable in the same way as the stronger one and without allowing superior capability to become an unrestricted claim to resources or normative authority. The relation itself becomes analytically interesting because it is one site at which asymmetry is converted, constrained, amplified, or made mutually generative. This is a proposal for investigation rather than a completed solution.

2.9. Historical availability of relational and generative analysis

A historical account of GRE must explain not only why contemporary economic problems require renewed attention to relation and generation, but also why such attention is more feasible now than in earlier periods. Relations and generative processes are not inventions of the digital age. Communities, markets, institutions, ecological systems, and forms of knowledge have always depended on relations that unfold through time. What has changed is the availability of concepts, evidence, computation, and institutional practices through which some of those processes can be studied more directly.

The first enabling condition is theoretical. Twentieth- and twenty-first-century developments in dynamical systems, cybernetics, complexity research, network science, evolutionary approaches, agent-based modeling, and higher-order interaction models provide languages for

representing change that is not reducible to static equilibrium or isolated bilateral exchange. A state can be represented as evolving through time; a network can change its topology; local interactions can generate emergent structures; feedback can alter subsequent behavior; a system can pass through thresholds or reorganize after perturbation. None of these tools by itself supplies a social ontology, but together they expand the formal vocabulary available for asking generative questions.

Field-based thinking provides a complementary possibility. Some social and economic effects are difficult to attribute to a single pairwise relation. A student is influenced not only by identifiable teacher-student edges but by an educational field composed of norms, expectations, peers, institutional resources, disciplinary practices, symbolic categories, and access to knowledge. An organization's behavior can be shaped by a regulatory field, a market field, a professional field, an epistemic field, and an ecological field that condition local action without being reducible to one edge. GRE uses field language cautiously, as a modeling resource rather than an assertion that social reality is literally a physical field. Its importance lies in allowing distributed conditions to become objects of analysis.

The second enabling condition is evidential. Many relations that were previously visible only through episodic records can now be observed through longitudinal administrative data, digital traces, transaction records, communication logs, remote sensing, collaborative platforms, and distributed sensors. Evidence can be updated repeatedly rather than gathered only at isolated survey moments. This does not eliminate missingness, bias, strategic behavior, or privacy concerns. It does, however, make it increasingly possible to follow trajectories rather than compare only before-and-after snapshots. The empirical object can shift from a state to a process.

The third enabling condition is computational. Larger relational structures, heterogeneous agents, nonlinear dynamics, and long trajectories impose computational burdens. Contemporary computing allows simulations and analyses that would previously have been impractical at comparable scale. Dynamic network analysis, agent-based modeling, large-scale optimization, machine-assisted qualitative coding, and probabilistic inference can now be combined with substantive domain knowledge. Emerging computational paradigms may alter tractability further. Yet GRE should distinguish computational availability from epistemic warrant. A process that can be simulated is not thereby known; a model that can be optimized is not thereby normatively legitimate.

The fourth enabling condition is institutional and political. The expansion of human-rights discourse, participatory governance, capability approaches, environmental law, commons institutions, fiduciary arrangements, cooperative forms, and evidence-based public administration has broadened the set of consequences that institutions are prepared to recognize. Economic policy is increasingly asked to consider participation, ecological sustainability, distributional effects, accessibility, resilience, inclusion, long-run capacity, and procedural legitimacy alongside aggregate output. These developments are uneven and contested, but they create a richer *nomos* within which relational and generative consequences can become governable objects.

The development of law is particularly ambivalent. Law supplies stable categories that make collective action possible. Property, contract, trust, corporate personality, fiduciary duty, public authority, and legal rights can bind resources to purposes and relations over time. A trust or commons arrangement, for example, can prevent a resource from being treated as freely alienable property of one immediate recipient. At the same time, legal action

depends on symbolic categories and thresholds. Fluid relations must often be translated into administratively recognizable forms. The very act of making relations governable can therefore reify them. GRE's practical promise depends partly on whether institutions can recognize relational conditions without treating their representations as final ontological truths.

A fifth enabling condition is reflexive. Contemporary social science has accumulated extensive experience with the limits of measurement, classification, intervention, and prediction. The fact that models can shape the systems they describe is no longer exotic. Categories can change behavior; rankings can redirect effort; metrics can become targets; predictions can alter decisions; classifications can stabilize identities. This reflexivity is essential for GRE because the programme explicitly studies interventions that transform relational structures. The observer and governor may become participants in the process being modeled.

These developments help explain why GRE is historically available now. The claim is not that present-day theory or technology finally reveals social reality as it truly is. The claim is more modest: the contemporary period provides a broader toolkit for investigating relations, trajectories, and endogenous transformation, while economic changes make those objects more difficult to ignore. Necessity and possibility therefore arise together.

2.10. Opportunity, danger, and incompleteness in contemporary modernity

The same developments that enable relational analysis also create reasons for caution. A relational economy can be analyzed in order to support autonomy, mutual capacity, public infrastructure, or ecological stewardship. The same analytical techniques can be used to identify leverage points for manipulation, optimize surveillance, price social dependence, or concentrate control. A detailed map of relations is both a research resource and a potential instrument of power. The ethical problem is not added after methodology; it accompanies the production of relational knowledge itself.

Data abundance is similarly double-edged. Continuous evidence can make policies more adaptive, but it can also privilege what is easily captured. Relations of trust, informal care, tacit knowledge, cultural meaning, aesthetic significance, and latent possibility may remain poorly represented even in data-rich systems. The danger is therefore not only lack of information. It is the replacement of the unmeasured by the measurable and the subsequent treatment of the representation as complete reality. GRE's interest in symbolized relations follows directly from this danger.

Formal sophistication can create another illusion. A dynamic model with many variables can appear more realistic than a simpler model, yet complexity of representation does not guarantee adequacy. Boundary choices remain consequential. A model can internalize some relations and externalize others. Time horizons can make an intervention appear beneficial or harmful depending on where evaluation stops. Value forms can be omitted because they resist quantification. Causal mechanisms can remain underdetermined even when predictive performance is high. GRE therefore needs a methodological norm of minimum sufficient commitment: formalize what is necessary for the problem, while keeping explicit what has been excluded or suspended.

The distinction among computational, epistemological, and normative difficulty is central. A computational problem asks whether a result can be calculated under specified assumptions. An epistemological problem asks whether those assumptions and variables adequately represent

the relevant system. A normative problem asks whether the objective being calculated should guide action. Improvements in hardware, algorithms, or even future quantum computation may affect the first problem without resolving the second or third. A powerful optimizer can make an ill-posed social objective more dangerous rather than more correct.

AI intensifies this double character because it can operate on both sides of the process. It can be an object of economic analysis and a tool for conducting that analysis. It can generate symbolic representations while also evaluating them; recommend allocations while also changing the labor and knowledge structures being allocated; help map relations while becoming a new relation within the mapped system. The analytical instrument is therefore potentially endogenous to the phenomenon. A GRE adequate to the AI era must treat that reflexivity as part of its object rather than as a technical inconvenience.

Modernity consequently opens a space for GRE without guaranteeing its success. Relations become more observable but not fully observable; generative trajectories become more traceable but not fully attributable; institutions become more adaptive but remain dependent on categories; computation becomes more powerful but does not eliminate uncertainty; normative vocabularies broaden but remain plural and contested. GRE emerges within this tension. Its ambition is possible only if accompanied by an explicit account of its own limits.

2.11. Historical possibility and contemporary limits

The present moment does not merely create new problems; it also expands the means available for studying them. Dynamical systems, complex systems, network science, higher-order interaction models, computational social science, agent-based simulation, and field-based approaches provide languages for studying processes that are not well represented by static allocations. Computational social science has demonstrated the growing capacity to collect and analyze social data at scales that were previously difficult to reach [11]. Complexity economics has likewise developed traditions for treating economies as evolving systems with nonlinear dynamics, incomplete information, feedback, and adaptive paths [2].

Political and normative development matters as much as computation. Capability theory shifted evaluation from resources alone toward what people are actually able to do and become [15]. Commons research demonstrated the diversity of institutional arrangements through which groups govern shared resources beyond a simple state-market dichotomy [13]. Relational-value scholarship has argued that value can be located in relationships and responsibilities rather than only in intrinsic or instrumental properties [3]. These developments broaden the kinds of economic consequences that can be discussed institutionally.

Yet the same modernity that makes GRE more feasible also limits it. More data do not yield complete observation. Computation does not solve underdetermination. Network representations do not reveal relations without interpretive choices. Field models do not tell us what the relevant field is. Administrative action still depends on categories that can reify fluid realities. AI can improve analysis while concentrating the capacity to classify, predict, and intervene. Quantum or other emerging computational paradigms may change tractability for some problems, but computational difficulty, epistemological difficulty, and normative difficulty remain distinct.

GRE therefore emerges under a double condition: relational and generative analysis is increasingly possible and increasingly necessary, but any claim to comprehensive relational knowledge would be especially dangerous. The appropriate response is not to abandon

formalization or intervention but to build revisability and epistemic humility into the field from the beginning.

3. Intellectual and Philosophical Foundations

3.1. Architecture of the intellectual genealogy

The theoretical foundations of GRE are intentionally heterogeneous. The programme draws from philosophy, political economy, sociology, economics, justice theory, and formal sciences, but it does not place these traditions side by side as an encyclopedic literature review. Their order follows a movement from abstract conditions of intelligibility toward increasingly operational analytical resources. The sequence matters because formal methods already presuppose answers, often implicit, to questions about what counts as an entity, relation, state, value, or observation.

The genealogy therefore begins with ontology and epistemology. Before an economic model can represent a relation, the analyst must decide what kind of object is being represented and what evidence licenses the representation. It then moves to appearance, aesthetics, curiosity, phenomenology, and interpretation because economic generation is oriented before it is optimized: something must become salient, meaningful, beautiful, troubling, useful, or worthy of attention before resources are committed to producing or knowing it. Philosophy of relation and process then provides conceptual resources for treating subjects and structures as relationally constituted and historically transformable.

Only after these philosophical layers does the genealogy move into historical materialism and political economy. This movement anchors abstract relational language in production, property, labor, institutions, and historical transformation. Capability, care, commons, ecological, relational-value, and generative-justice traditions then broaden the economic and normative objects under consideration. Finally, systems theory, dynamical systems, complexity, networks, higher-order structures, field approaches, and computation appear as representational resources. They are placed last because they are among the most practically usable components of the genealogy and because GRE seeks to prevent mathematical convenience from silently becoming metaphysical commitment.

This organization can be summarized as a progressive concretization. Philosophy clarifies which questions can be asked; social and historical theories show how those questions become materially and institutionally situated; economic and justice traditions identify practically consequential forms of value and organization; formal sciences provide partial tools for representing and investigating selected processes. GRE emerges not by collapsing these lineages into one doctrine but by identifying an unresolved object at their intersection: how heterogeneous resources and forms of value move through evolving relational structures, how those movements generate new capacities and relations, and how the conditions of later generation are changed in the process.

3.2. Epistemology of relations and generative claims

The epistemological problem becomes especially demanding once relations themselves become possible targets of economic analysis or intervention. It is comparatively straightforward to record that a recognized entity received a monetary transfer. It is harder to establish which

relations constitute that entity, which surrounding relations are economically relevant, where the boundary of the relational system should be drawn, and whether an observed relation has the causal role attributed to it. The move from entity accounting to relational analysis therefore increases epistemic responsibility rather than merely adding variables.

GRE distinguishes a relation from evidence of a relation and from a symbolized representation of a relation. Let R denote a relational object used in an analysis and $\hat{R}$ an institutional or analytical representation. The distinction

$$R \neq \hat{R} \tag{7}$$

is not a metaphysical theorem. It is an epistemic warning. A legal marriage, an employment contract, an organizational chart, a database link, a social-network edge, and a self-reported relationship each provide different evidence and encode different aspects of relational reality. Formal recognition can exist where causal interaction is weak; causal interaction can exist where formal recognition is absent.

This problem extends to boundaries. Whether a relation counts as internal or external depends on the analytical scale. A department is internal to a university but may act as an entity relative to another department. A supplier is external to a firm in accounting terms yet can be deeply integrated into its productive process. A community may be treated as an environment by a project while the project is experienced by the community as part of its own institutional ecology. GRE therefore treats boundary selection as an explicit analytical act rather than a neutral discovery.

Temporal windows create another source of uncertainty. A relation may be weak in immediate measurable output yet decisive over a long horizon. Education, mentorship, ecological restoration, trust formation, and research collaboration can have delayed consequences. Conversely, a relation can appear productive in the short run while eroding future capacity. Generative claims therefore require attention to trajectory and timing. The statement that R generated X is stronger than the observation that R and X co-occurred.

A useful methodological distinction separates association, mechanism, counterfactual support, and generative reconstruction. Association establishes patterned co-variation. Mechanism analysis proposes the sequence through which one configuration produces another. Counterfactual methods ask what would plausibly have occurred under an alternative intervention or absence of the relation. Generative reconstruction examines how a process altered states, relations, constraints, or future possibilities over time. No single method automatically dominates the others. Different questions may require several forms of evidence.

Generativity introduces a final difficulty: the object of inference may change while it is being studied. If an intervention modifies relational topology or institutional rules, evidence from the pre-intervention system may cease to support the same model afterward. The effective law of motion can become endogenous. This is why GRE places revisability near the center of its epistemology. Models are provisional interfaces to partially observed systems, and successful intervention may itself be a reason to revise the model that justified it.

3.3. Aesthetic orientation, curiosity, and the direction of generation

Aesthetic philosophy enters GRE for a reason that becomes especially visible under conditions of abundant generative capacity. Economic reasoning usually begins after an object of desire,

need, policy, or production has already been specified. Yet generation requires orientation. Before resources are allocated to a research programme, artistic practice, public space, educational institution, or scientific instrument, some object has appeared as worthy of attention. That appearance may be driven by need or expected utility, but it can also arise through beauty, elegance, surprise, strangeness, wonder, discomfort, or a perceived pattern whose significance is not yet known.

Kant's account of aesthetic judgment is one historically important point of reference because it separates judgments of beauty from straightforward judgments of utility or goodness [10]. GRE does not adopt Kantian aesthetics as an economic theory. The relevant insight is that attention and valuation need not begin with a known instrumental end. A pattern can be experienced as worthy of sustained engagement before the benefits of that engagement are calculable. Scientific curiosity often has this structure. A mathematical symmetry, astronomical anomaly, linguistic form, historical fragment, or ecological relation can generate inquiry because something in the encounter appears significant.

This matters in an AI-rich epistemic economy. If AI systems can answer well-defined questions quickly, generate hypotheses, produce code, simulate designs, and search large symbolic spaces, then the scarcity of answer production can decline relative to the scarcity of orientation. The question shifts from "can this knowledge be generated?" toward "which knowledge deserves generation, by whom, under what relation to a world, and with what consequences?" The ability to generate knowledge does not settle the direction of inquiry.

The temptation is to preserve a human monopoly by claiming that aesthetic judgment or curiosity is uniquely human. GRE should avoid that move. Advanced artificial systems may exhibit salience functions, preference-like structures, novelty search, internally generated goals, or forms of aesthetic evaluation. The philosophical and empirical status of such phenomena remains open. The more general economic problem concerns plural epistemic orientation under asymmetric capability. Human communities, scientific institutions, artists, local cultures, and artificial systems may orient toward different objects of significance. A just epistemic economy cannot simply assume that the orientation of the most capable optimizer should dominate all others.

Aesthetic and epistemic orientation also connect to subject formation. The value of a human learning astronomy is not exhausted by whether the human adds new astronomical facts to the global stock of knowledge. The relation between the learner and the cosmos can transform the learner's sense of scale, temporality, mortality, beauty, and possibility. If an AI already knows more astronomy, this relational value does not disappear. Knowing is not only possession of information; it can be a mode of becoming. GRE therefore treats epistemic participation as a potential site of value generation, not merely as an inefficient substitute for machine knowledge production.

This perspective has political-economic consequences. Recommendation systems, funding institutions, rankings, search engines, schools, publishers, and AI assistants increasingly mediate what becomes visible and therefore what becomes thinkable or fundable. Power over generation can operate without prohibition. A question repeatedly classified as low-value can disappear from institutional attention even if no authority formally bans it. Epistemic orientation is therefore connected to allocation, and aesthetic judgment becomes relevant to political economy because it participates in deciding what enters the horizon of possible generation.

3.4. Social facts, symbolic reality, and abstract primitives

GRE also requires a way to discuss socially real objects whose causal force depends on recognition, practice, or institutional reproduction. Money, debt, credit, ownership, organizational membership, professional status, legal personality, rankings, and eligibility categories are not materially identical to the symbols used to represent them, yet they can constrain behavior and redistribute resources with great force. A purely material inventory of the economy would therefore omit many of its most consequential objects.

The category of social fact provides one route into this problem. GRE distinguishes social facts from related phenomena such as habits, cultural patterns, norms, legal facts, and governance facts because these forms can have different modes of stabilization and enforcement. A habit can persist through repeated practice without formal sanction. A norm can generate expectations and social consequences. A legal fact is stabilized through recognized legal procedures. A governance fact can structure decisions through administrative or institutional authority. Culture can supply interpretive and affective backgrounds across all of these. The categories are not necessarily disjoint, but distinguishing them helps trace how symbolic and relational structures acquire causal force.

This layered view is particularly important for economic entities. A corporation has documents, offices, accounts, assets, employees, and contracts, but its organizational identity cannot be located in any single material component. Credit depends on expectations and institutional practices; money depends on systems of recognition and exchange; property depends on enforceable relations; labor status depends on legal and organizational classifications. Such objects can be treated as relationally real insofar as they persist and produce causal effects, while their ultimate ontology remains open.

For cross-domain analysis, GRE draws on a very abstract metamodel organized around four primitives: change, difference, structure, and constraint. These are not intended as the only possible philosophical categories. Their purpose is to provide a minimally committal language capable of accommodating heterogeneous social ontologies. Change concerns transformation; difference concerns distinctions that make transformation or classification possible; structure concerns relatively stable configurations among differences; constraint concerns conditions that limit, channel, or enable change. More familiar categories such as state, relation, entity, property, process, and event can then be introduced at a secondary level where required by a particular domain.

This abstraction matters for economics because different objects may require different ontological vocabularies. A market price, a legal right, a community practice, an ecological capacity, an AI model, and a relation of trust should not be forced into one homogeneous substance merely for formal convenience. Yet economic analysis still needs ways to compare how interventions alter them. The primitive layer provides a possible interface: an intervention can produce change, create or erase differences, reorganize structure, or modify constraints even when the concrete objects belong to different ontological domains.

The same strategy supports ontological suspension. A model need not decide whether a social category is ultimately “real” in the same manner as a physical object before studying whether the category structures access to resources. It can ask what stable differences the category produces, what structures reproduce it, what constraints it creates, and how those relations change through intervention. In this way the metamodel is not a replacement for domain ontology but a bridge among heterogeneous domains.

3.5. Value, ethics, justice, and nomos

A generative economics requires a plural theory of value before it can develop a theory of generative value. Economic value in the narrow sense of price or exchange cannot by itself capture the phenomena GRE seeks to study. A resource can generate knowledge, trust, ecological resilience, legal capacity, social recognition, artistic meaning, future options, or dependency. These outcomes need not share a common metric, and attempts to force them into one scalar can erase precisely the relations the theory is designed to preserve.

GRE therefore distinguishes value from valuation and recognizes several possible value domains: material, economic, capability, relational, epistemic, aesthetic, ethical, institutional, ecological, symbolic, and option value. These categories are provisional and can overlap. Their importance lies in making conversion visible. Monetary resources can be converted into time; time into learning; learning into capability; capability into new relations; relations into institutional access; institutional access into further material or epistemic resources. The trajectory can also reverse or dissipate. Economic analysis should be able to trace such transformations without presuming perfect commensurability.

Aesthetic significance and ethical value must likewise remain distinct. That something appears beautiful or compelling does not make its generation just. That an institution is efficient does not make its relations legitimate. That a process is generative does not make its products desirable. GRE therefore treats normativity as a separate layer of evaluation rather than building moral approval into the concept of generation itself.

Justice traditions provide several complementary lenses. Distributive justice asks how benefits and burdens are allocated. Procedural justice asks how decisions are made. Relational justice asks whether social relations place subjects in positions of domination, marginalization, or recognition. Capability approaches ask what substantive possibilities people possess. Ecological and intergenerational perspectives widen the set of affected subjects and timescales. Generative justice asks whether value generators can participate in and benefit from the circulation of value they help create. GRE needs these perspectives because the same allocation can look acceptable in one dimension and damaging in another.

Nomos adds another layer. Norms, law, institutional rules, classifications, and interpretive practices stabilize expectations about what may be generated, transferred, owned, recognized, or protected. Nomos is not merely an external constraint on an otherwise natural economy. It helps constitute the economic objects themselves. Employment, ownership, corporate personality, fiduciary obligation, eligibility, currency, and many forms of risk exist economically through normative-symbolic orders. Those orders are historically revisable and can coevolve with the relations they regulate.

The relationship between aesthetics, epistemology, ethics, and nomos is therefore recursive rather than linear. Aesthetic salience can orient inquiry; inquiry can generate knowledge; knowledge can alter valuation; valuation can enter norms and institutions; institutions can reshape perception and attention. GRE is interested in these cycles where they become economically consequential. It does not assume that one domain can be reduced to another.

3.6. Ontology, epistemology, and ontological suspension

A relational economics cannot begin by treating its central vocabulary as self-evident. What is an entity? What is a relation? What does it mean for a social object to be real? What

distinguishes a state, property, process, and event? How can a relation be known, and what is the status of a symbolic representation of it? These questions are not preliminary decoration. They determine what economic models are allowed to claim.

GRE adopts ontological suspension as a methodological discipline. Suspension does not mean that ontology is unreal or irrelevant. It means that economic analysis need not settle the ultimate ontology of every object before studying its stable causal and relational effects. Money, corporations, legal roles, credit, status, and AI systems may differ profoundly in ontological kind, yet each can acquire sufficient relational reality to alter behavior and constrain future possibilities. The relevant analytical question can therefore be weaker than metaphysical identity: under which relations and conditions does a configuration exhibit stable causal effects that justify treating it as an economic object at a given scale?

This position is compatible with a layered account. One can distinguish an ontological layer whose final status remains open, a relationally effective layer at which configurations exhibit stable causal consequences, and a representational layer through which institutions and observers symbolize those configurations. The distinction prevents a common modeling error: identifying the representation with what is represented. A node is not an entity itself; an edge is not the relation itself; a field variable is not proof that society is literally constituted by a physical field.

The same caution applies to epistemology. Relations are often partially observed, inferred from traces, interpreted through institutional categories, or reconstructed historically. Generative claims are still harder because they involve downstream effects and counterfactuals. The field must therefore distinguish observation, inference, mechanism, representation, and normative judgment. Mechanism-based social explanation is useful precisely because it occupies a middle level between mere description and universal laws [7]; GRE will require analogous care when attributing generation to relations.

3.7. Aesthetics, curiosity, and epistemic orientation

One of the less conventional foundations of GRE is aesthetic philosophy. The relevance is not that economics should become a theory of art. It is that generativity always confronts an orientational problem: why generate this rather than that? Before a project is funded, a law enacted, a dataset collected, or a research question formalized, something must become perceptible as significant enough to deserve attention.

Aesthetic judgment provides one language for that pre-allocation orientation. Kant’s analysis of aesthetic judgment remains an important reference for thinking about judgments that are not reducible to ordinary instrumental utility [10]. GRE need not adopt Kant’s system to recognize a broader economic fact: elegance, harmony, strangeness, sublimity, surprise, and beauty can orient inquiry before expected benefit is known. Scientists often pursue anomalies, mathematicians pursue structures, and communities preserve practices because something appears meaningful or beautiful before a calculable payoff exists.

This becomes politically important in an AI-rich epistemic environment. If AI can generate answers, hypotheses, designs, and even methods of generating knowledge, then the capacity to generate knowledge may become less scarce than the capacity to determine what is worth generating. The locus of epistemic power can shift from possession of answers toward control over attention, ranking, legitimacy, funding, and question selection. An AI system need not prohibit a line of inquiry to suppress it; a sufficiently influential infrastructure can classify it

as low-value, low-probability, or irrelevant until it disappears from institutional attention.

GRE therefore treats aesthetic and epistemic orientation as potential economic variables in a broad sense. They affect what projects attract time, resources, institutions, and sustained relations. This does not imply that aesthetic judgment should govern public allocation directly. Aesthetic judgment is historically formed, culturally mediated, and manipulable. The point is prior: economic accounts of generation are incomplete if they begin only after the object of generation has already been selected.

3.8. Phenomenology, interpretation, relation, and process

The subject who perceives significance is itself relationally situated. Phenomenological and hermeneutic traditions matter because they direct attention to the way a world is encountered and interpreted rather than assuming that economic objects arrive already classified. Language, institutional categories, history, embodiment, and social position shape what appears salient and what a relation means. Interpretation is not merely an after-the-fact description; interpretations can alter subsequent relations.

Relational sociology makes a parallel move at the social level. Economic actors are not merely isolated units connected by optional links. Their identities, opportunities, obligations, and powers are partly constituted within relations. Giddens’s structuration theory, for example, emphasizes the recursive relation of agency and structure and the temporal-spatial organization of social practices [5]. GRE does not adopt structuration theory wholesale, but it shares the concern that structures both condition action and are reproduced or transformed through action.

Process philosophy adds a further step. A relational account can still be static if it merely replaces isolated nodes with a fixed network. GRE instead requires a language of becoming. Whitehead’s process philosophy is one important historical source for taking process rather than substance as a primary philosophical concern [16]. The economic importance of this move is straightforward: if relations, capacities, institutions, and classifications change through the very processes being studied, then the rules of transformation cannot always be assumed constant.

A provisional dynamic expression is

$$(x_t, \mathcal{R}_t, f_t) \longrightarrow (x_{t+1}, \mathcal{R}_{t+1}, f_{t+1}), \quad (8)$$

where the effective transformation rule f_t may itself change. This expression is not yet a formal theory. It indicates the problem that the word *generative* is intended to preserve: economic processes can transform not only outcomes but the structures and rules that shape subsequent outcomes.

3.9. Historical materialism and political economy

Among GRE’s social-theoretical lineages, historical materialism is particularly central. The importance lies less in importing a complete Marxian ontology than in retaining several methodological commitments: economic forms are historical; productive forces and relations of production interact; social subjects are constituted within social relations; material reproduction matters; and theory itself arises inside history rather than above it.

These commitments discipline GRE in two directions. First, they prevent relational language from becoming a timeless metaphysics detached from material conditions. The significance of a relation depends partly on technologies, institutions, property structures, legal forms, and historical trajectories. Second, they prevent contemporary AI discourse from presenting technological capability as an exogenous force acting on an otherwise fixed society. AI is developed, owned, trained, deployed, and governed inside relations of production. Its economic consequences therefore depend not only on technical performance but on institutions that mediate ownership, labor, resource access, and authority.

Marxian theories of circulation and reproduction are also relevant because they move beyond one-time exchange. Value and social forms reproduce through cycles; capital seeks conditions for its continuation; labor power and social institutions require reproduction. GRE extends this temporal concern from reproduction toward generativity. Reproduction asks how conditions are renewed; generativity additionally asks how new capacities, relations, and possible trajectories arise, and how current processes modify the space of future generation.

3.10. Capabilities, care, commons, ecology, and relational value

Several more recent traditions already loosen the assumption that economic evaluation can be reduced to resource quantities or market exchange. Sen’s capability approach is especially important because it distinguishes resources from the real opportunities they enable [15]. The same resource can be converted differently under different personal, social, and environmental conditions. GRE generalizes this insight relationally: the effect of a resource depends on the structures through which it moves, and the relevant consequence may be a change in capacity, relation, or future option rather than an immediate output.

Care and social-reproduction approaches expose another limitation of narrow market valuation. Relationships of care sustain persons and future social capacities even when the market registers them incompletely. Commons and cooperative traditions show that collective governance can organize resource relations without reducing them to individualized ownership [13]. Ecological economics and relational-value approaches extend the field beyond human-to-human exchange and emphasize interdependence with ecological systems. Chan and colleagues’ account of relational values is particularly relevant because it identifies values grounded in relationships and responsibilities rather than only in instrumental benefits or intrinsic properties [3].

These traditions do not converge automatically. Capability theory may remain individual-centered in ways that commons theory does not; ecological relations raise questions that cannot be translated directly into human capabilities; care relations contain asymmetries that cannot be evaluated by reciprocity alone. GRE treats these tensions as productive. Its aim is not to force all value into a common scalar but to develop ways of tracing how heterogeneous value forms are generated and converted without assuming full commensurability.

3.11. Generative justice and the circulation of value

Generative justice is among the closest direct predecessors of GRE. Eglash defines generative justice around the rights of value generators to participate in the benefits of value creation, to shape conditions of production, and to sustain bottom-up circulations of unalienated value [4]. This perspective is especially important because it moves beyond redistribution

after extraction. The question is not only how much value should be transferred back after production but how systems can be organized so that value circulates in ways that sustain the communities and relations from which it arises.

GRE inherits this concern but broadens the analytical object. It is interested in return and recirculation, but also in the earlier and later stages of the trajectory:

$$\begin{aligned} &\text{generation} \longrightarrow \text{allocation} \longrightarrow \text{propagation} \longrightarrow \text{conversion} \\ &\quad \longrightarrow \text{recirculation} \longrightarrow \text{structural transformation.} \end{aligned} \tag{9}$$

The sequence is not a universal temporal law. It is a research heuristic. A resource can enter at multiple points; value forms can be converted several times; circulation can branch; extraction can coexist with regeneration. The purpose of GRE is to make those trajectories available for analysis rather than to define justice by a single pattern.

This is also where the distinction between allocation and generativity becomes clear. Allocation is a method or intervention. It specifies an initial distribution or commitment of resources. Generative analysis begins after that moment and asks what the allocation causes to become possible, what relations it strengthens or weakens, and whether value subsequently circulates in self-sustaining or extractive ways.

3.12. Formal sciences as representational resources

GRE also draws on systems theory, dynamical systems, complexity science, network analysis, higher-order structures, field approaches, and computation. These are deliberately placed after the philosophical and social foundations because formal tools should not silently determine the ontology of the field. A graph can represent a relational structure, but choosing nodes and edges already requires interpretive decisions. A field can represent distributed conditions, but field language should not be mistaken for proof that social reality is physically field-like.

Complexity economics provides an especially relevant precedent for treating economies as evolving systems with nonlinear interactions and feedback [2]. Network science offers tools for studying topology, centrality, diffusion, and evolving connectivity. Higher-order structures such as hypergraphs become useful when a collective relation cannot be reduced to pairwise edges. Field-based methods may be preferable when the behavior of an entity or relation depends on distributed institutional, cultural, ecological, or epistemic conditions rather than identifiable dyadic links.

GRE's use of formal science is therefore methodological and pluralistic. Different empirical questions may require different representations. Background-sensitive and gauge-inspired ideas can help distinguish representational variation from invariant relational content, while background-independent ideas can serve as conceptual provocations against taking a fixed social stage for granted. Yet such borrowing requires restraint. Physical formalisms carry assumptions that may fail in social systems. The appropriate criterion is not elegance alone but whether the formalism clarifies a well-specified relational-generative problem without erasing the heterogeneity it was introduced to study.

A related metamodeling effort has proposed change, structure, constraint, and difference as highly abstract primitives for ontologically heterogeneous social dynamics [8]. GRE is compatible with that layered strategy: formal structure should be introduced at the lowest level of commitment necessary for the question at hand. The field does not need to assume

in advance that normative orders, power structures, recognition networks, and value systems inhabit a single metrizable state space.

4. Generative Relational Economics as a Field of Inquiry

4.1. A research programme rather than a closed theory

To describe GRE as a field of inquiry is to make a stronger claim than proposing a single model and a weaker claim than announcing an established academic discipline. A theory can be summarized by a set of propositions. A field or research programme also requires recurring questions, recognizable objects, epistemic standards, research methods, practical procedures, evaluative criteria, boundaries, and mechanisms through which knowledge can accumulate. The preliminary task is therefore constitutional: to state what kind of inquiry GRE is intended to support before specifying one privileged mathematical representation.

This distinction is important because the phrase “generative relational” could otherwise remain a broad philosophical orientation. Many disciplines already study relations, emergence, networks, circulation, reproduction, institutions, and value. GRE becomes a distinctive economic research programme only if these concerns are organized around a recurring economic problem: resources and value do not merely arrive at recipients; they operate through relational structures that can generate, propagate, convert, recirculate, dissipate, and transform the conditions of subsequent economic activity. The programme asks when this broader trajectory changes the explanation, evaluation, or design of an economic process.

The field is therefore intentionally plural in method. A historical case study, ethnography, network analysis, legal analysis, field model, causal design, simulation, or dynamical model may all count as GRE research if the method is appropriate to a well-specified relational-generative question. Conversely, the use of network diagrams or relational vocabulary is not sufficient. Methodological identity follows from the research problem rather than from a mandatory technique.

GRE also remains open to internal disagreement. Researchers may differ over the best ontology of social relations, the appropriate measures of generativity, the status of AI as an economic subject, the degree to which value can be quantified, or the balance between causal identification and process reconstruction. A research programme can remain coherent despite such disagreement if it shares a problem-space and makes competing assumptions explicit. Premature doctrinal closure would be especially inconsistent with a theory that treats its own categories as historically revisable.

4.2. Disciplinary identity

GRE is proposed as a field of inquiry rather than a single model. The distinction matters. A formal theory can specify objects, axioms, and transformations; a field must additionally specify what kinds of questions it regards as important, how evidence is produced, how interventions are designed, what counts as a contribution, and how knowledge accumulates across studies. GRE should therefore be understood as a research programme with philosophical, empirical, formal, and practical components.

Its central object is not simply the relation and not simply the entity. It is the economic phenomenon situated within an evolving generative relational system. Entities remain

necessary because institutions act through recipients, contracts, persons, organizations, and accounts. Relations become first-class because economic effects are frequently carried by connections, dependencies, memberships, obligations, fields, and higher-order configurations. Generativity adds the temporal question of what these structures make possible next.

A concise working definition is therefore:

Generative Relational Economics studies how resources and plural forms of value are generated, allocated, propagated, converted, recirculated, and dissipated through evolving relational structures, and how these processes transform the capacities, subjects, constraints, relations, and rules through which subsequent economic generation occurs.

This definition is intentionally broad but not unlimited. It identifies a family of processes and a distinctive temporal-relational perspective rather than claiming jurisdiction over every social phenomenon involving a relation.

4.3. Problem domain

GRE is motivated by several recurring classes of problems. The first concerns allocation beyond the recipient. If a resource is allocated to an organization, person, or institution, what happens to the internal and external relations associated with that recipient? Which relations are strengthened, displaced, or made dependent? What downstream relations form? The second concerns value trajectories. What forms of value are generated, where do they travel, into what are they converted, and where do they terminate or recirculate?

The third concerns generative capacity. An intervention can increase current output while reducing future autonomy, resilience, learning capacity, or relational diversity. Conversely, an intervention with modest immediate output may create relations that generate value for years. GRE therefore distinguishes immediate outcome from the transformation of future generative conditions.

The fourth concerns asymmetry and power. Economic systems contain asymmetries of resources, knowledge, institutional access, vulnerability, and capability. GRE asks how these differences are converted into durable dependencies or domination, and which relational structures allow unequal subjects to coexist without requiring equality of capability. This is especially relevant to AI, where reducing the capability of the more capable party is neither a sufficient nor necessarily desirable solution.

The fifth concerns subject formation. Economic subjects are not only recipients of allocation; economic structures participate in generating subject positions such as worker, consumer, debtor, owner, beneficiary, expert, and platform user. GRE asks how such positions are produced, stabilized, transformed, and sometimes dissolved, and how subjects retain meaningful participation when inherited productive roles change.

The sixth concerns orientation. When productive and symbolic generation become abundant, the decision about what to generate becomes economically consequential. Aesthetic judgment, curiosity, epistemic orientation, social meaning, and institutional attention can shape the direction of knowledge and value generation. GRE therefore treats the orientation of generation as a legitimate political-economic problem rather than assuming that goals are always given externally.

The seventh concerns coexistence among heterogeneous subjects under persistent asymmetry. GRE asks how differences of knowledge, capability, vulnerability, temporal scale, institutional status, and value orientation are converted into economic power; how relations can preserve participation without requiring capability equalization; and how allocation should be evaluated when subjects cannot be assumed to share one ontology or one commensurable value scale. AI makes this problem immediately salient, but the analytical domain is broader than AI and includes other human, institutional, ecological, and potentially future forms of heterogeneous coexistence.

4.4. Objects of inquiry and levels of analysis

GRE's objects of inquiry are deliberately broader than individual agents and commodities, but the field does not abandon those objects. It studies entities, relations, resources, capacities, values, constraints, fields, processes, events, trajectories, institutions, and symbolic representations when they participate in generative economic processes. The distinctive move is not to replace entities with relations, but to permit relations and relational configurations to become first-class economic objects alongside entities.

This allows the same object to appear differently at different scales. An organization may be represented as an entity when analyzing its relation with a donor, regulator, or supplier. The same organization becomes a relational system when analyzing relations among members, departments, managers, workers, technologies, and internal norms. A community may be an environment in one model and a structured economic actor in another. GRE therefore treats analytical scale as explicit and rejects the inference that because something is represented as a node at one level it must be ontologically simple.

Resources are similarly heterogeneous. Money, material inputs, time, attention, information, knowledge, computational capacity, legal permission, mobility, physical space, institutional access, and infrastructure can all function as resources. Their significance depends on conversion conditions. A dataset without interpretive capacity may have little local value; a legal right without institutional access may remain formally present but practically unusable; financial resources without trusted relations may fail to generate collective capacity. GRE therefore distinguishes resource possession from effective capacity.

Relations can be internal, external, higher-order, or field-like. An internal relation is analytically located within a composite entity at the chosen scale. An external relation links that entity to actors or structures outside its current boundary. Higher-order relations involve multiple actors or relations that cannot be reduced without loss to independent dyads. Field-like conditions describe distributed structures that influence local possibilities without being attributable to one direct relation. These distinctions are pragmatic and revisable rather than claims about final social ontology.

Value is treated as plural. GRE is interested in value that is material, monetary, epistemic, relational, capability-based, institutional, ecological, aesthetic, symbolic, or connected to future options. The list is not exhaustive. More important is the possibility of conversion among value forms. A scholarship can convert money into time, time into learning, learning into capability, capability into collaboration, collaboration into knowledge, and knowledge into future institutional possibility. A different trajectory can convert the same initial resource into dependency, credential inflation, administrative burden, or extraction. The resource amount alone therefore underdetermines the economic outcome.

The field also studies constraints and conditions because economic generativity depends on what actions and relations are possible. A constraint can block a relation, channel it, or stabilize it. Removing a constraint can create possibilities without directly allocating a resource to a recipient. Conversely, some constraints are enabling: property rules, safety standards, fiduciary duties, scientific norms, or ecological limits can sustain valuable relations by preventing destructive actions. GRE therefore avoids equating freedom with absence of constraint and asks instead how constraints reorganize generative possibility.

Finally, symbolic representations are economic objects because they can alter allocation and behavior. A category such as employee, refugee, beneficiary, creditworthy borrower, accredited institution, or high-risk user can determine access to resources. A metric or model can become performative when decisions are organized around it. GRE therefore studies both relational structures and the symbolic systems through which those structures are represented and governed.

4.5. Characteristic analytical movement

The distinctive GRE perspective can be summarized by extending the temporal horizon of economic analysis. A conventional question might ask who receives a resource, what incentives follow, or how welfare changes. GRE retains those questions but adds a sequence of relational ones:

$$\begin{aligned} \text{resource} &\longrightarrow \text{recipient and relations} \longrightarrow \text{generated effects} \\ &\longrightarrow \text{propagation} \longrightarrow \text{conversion} \longrightarrow \text{recirculation} \\ &\longrightarrow \text{future generativity.} \end{aligned} \tag{10}$$

This sequence changes the unit of evaluation. The recipient remains visible, but the relational neighborhood and downstream trajectory also become objects of analysis. The process may be multiscale: an organization can be an entity in one relation and a relational system at another scale. A public library, for example, can be represented administratively as one institution while simultaneously functioning as a field of relations among persons, knowledge, community histories, public space, and future educational possibilities.

The same perspective changes how resources are conceptualized. Money is only one resource form. Time, attention, information, legal permission, institutional access, computational capacity, physical space, mobility, and shared infrastructure can all enable or constrain relations. GRE therefore distinguishes resources from capacities. A resource is something available to a system; a capacity concerns what the system can subsequently do or become. The economic question is often how relational structures convert resources into capacities and how those capacities then generate further relations and value.

4.6. Characteristic research questions

A GRE study should be recognizable by the questions it asks. Typical questions include the following:

- How does an entity-level allocation transform internal, external, and higher-order relations associated with the recipient?
- Which relations or relational fields enable a resource to become a durable capability rather

than a temporary transfer?

- How are material, epistemic, relational, institutional, ecological, and option values converted into one another?
- Which value trajectories recirculate toward their generative sources, and which are extracted or dissipated?
- How do interventions alter the topology, constraints, or future transformation rules of an economic system?
- How are capability, knowledge, and resource asymmetries converted into dependence, authority, or exclusion?
- Under persistent capability asymmetry, which relational and institutional structures permit coexistence without requiring equalization of capability?
- How should economic inquiry proceed when heterogeneous subjects cannot be assumed to share one value scale, epistemic frame, or mode of agency?
- How are economic subjects generated and stabilized through relations of work, recognition, law, knowledge, and participation?
- How do aesthetic and epistemic orientations shape the selection of what is generated when generative capacity itself becomes abundant?
- Under which conditions does a relation expand future options, and under which conditions does it produce generative foreclosure?

These questions distinguish GRE from a generic assertion that “everything is relational.” The field is specifically concerned with relationally mediated generation and the transformation of future generative conditions.

4.7. Modes of inquiry

Because the field is plural in object and scale, it cannot be tied to a single research method. Relational inquiry and generative inquiry should nevertheless be distinguished. The first asks how relations are identified, bounded, observed, represented, and compared. It may use institutional analysis, documentary reconstruction, ethnography, network analysis, legal analysis, historical study, or mixed methods. The second asks what relations generate through time and under surrounding conditions. It may require process tracing, longitudinal evidence, dynamic networks, field reconstruction, causal-mechanism analysis, comparative trajectories, simulation, and counterfactual reasoning.

This distinction prevents a recurrent error: observing a relation is not the same as knowing its generative effect. A formal partnership can be inactive; an informal relation can be causally powerful. An observed association can coexist with several plausible generative mechanisms. A relation that generated capacity in one field may generate dependency in another. Generativity is therefore not an intrinsic scalar attached permanently to an edge.

A separate methodological programme will be required for generative-relational evidence. It should classify levels of support for claims, distinguish local effect from downstream generation, incorporate temporal delay, and make uncertainty explicit. GRE is therefore compatible with rigorous causal inference but does not assume that every relevant generative

process can be reduced to a single treatment effect. Some objects are trajectories, changing structures, or emergent fields whose evaluation requires complementary forms of evidence.

4.8. Research methodology, evidence, and cumulative knowledge

The field's methodology should develop in layers. The first layer concerns relational identification: what evidence supports the claim that a relation exists, what its direction and persistence are, which actors or processes it connects, and at what scale it is relevant. The second concerns generative inference: what changes the relation contributes to, through which mechanisms, over what time horizon, and under what surrounding conditions. The third concerns intervention: how deliberately changing resources, constraints, or relations modifies the system and whether the original model remains adequate after the intervention.

GRE therefore distinguishes a methodology of relations from a methodology of generative relations. The former may emphasize observation, mapping, institutional reconstruction, legal analysis, ethnography, network inference, or classification of relation types. The latter must additionally address process, trajectory, delay, mechanism, feedback, counterfactuals, field effects, and structural transformation. The distinction is foundational because a relation can be accurately identified while its generative consequences remain unknown.

Evidence should be triangulated where possible. Administrative records can identify formal relations; interviews can reveal interpretation and informal structure; longitudinal data can trace trajectories; network analysis can reveal topology; process tracing can reconstruct mechanisms; comparative cases can identify conditional variation; experiments and quasi-experiments can support causal claims; simulation can explore implications under explicit assumptions. GRE should not rank these methods in one universal hierarchy. The epistemic strength of a method depends on the question and the object.

Cumulative knowledge requires reusable research products. A case study contributes more to a field when its relational categories, causal mechanisms, temporal assumptions, and limits are stated in ways that permit comparison. A formal model contributes more when its mapping from concepts to variables is explicit. A dataset contributes more when its classification scheme and missing relations are documented. An intervention contributes more when downstream effects and revisions are recorded rather than only immediate outputs. GRE should therefore encourage transparent research objects: relation typologies, field descriptions, value-conversion maps, trajectory datasets, comparative institutional patterns, generative mechanisms, and formal models whose assumptions can be contested.

The cumulative programme should also preserve negative results. A relation expected to generate capability may fail; a field intervention may produce no durable change; a sophisticated relational model may add no explanatory value beyond a simpler entity-based analysis. Such results help define the boundary conditions of GRE. A new field becomes scientifically useful not by interpreting every case as confirmation, but by learning when its additional conceptual complexity is warranted.

4.9. Praxis and intervention

GRE is intended to be practical as well as descriptive. Its practical orientation can be summarized as a revisable intervention cycle:

$$\text{observe} \longrightarrow \text{map} \longrightarrow \text{interpret} \longrightarrow \text{intervene} \longrightarrow \text{trace} \longrightarrow \text{evaluate} \longrightarrow \text{revise}. \quad (11)$$

The cycle differs from a one-shot allocation logic because the intervention can change the relational structure and therefore invalidate the original model. Adaptive revision is not an optional implementation detail; it follows from the generative premise.

Relational allocation is one example. It can mean directly committing resources to a relation or commons, but the broader principle is more important: every entity-level allocation should be assessed as a relational intervention. A fund given to an organization should be evaluated not only by organizational output but by what happens to members, communities, dependencies, knowledge flows, ecological relations, and future capacity. Likewise, some resources can be institutionally indexed to relations without claiming that relations are ontological objects of ownership. A trust, shared infrastructure, fellowship, commons, or public facility can bind resources to the conditions under which a relation continues or becomes generative.

The practical objective is therefore not to maximize the number of relations. Relations can be coercive, extractive, exclusionary, or destructive. Nor is the objective to maximize generativity in the abstract. A highly generative monopoly can produce powerful new structures while foreclosing the possibilities of others. Praxis must therefore be linked to explicit normative evaluation.

4.10. Practice methodology and the transformation of economic relations

The practical ambition of GRE is not exhausted by recommending a different distribution. Its characteristic intervention problem is how to change relational conditions so that resources can generate durable capacities and valuable future possibilities. This requires a practice methodology that begins with diagnosis rather than immediate optimization.

A relational diagnosis identifies the administrative recipient but also maps the relations that constitute and surround it. For an organization, this can include member relations, authority, knowledge flows, dependencies, external partnerships, community relations, ecological relations, and institutional obligations. A generative diagnosis then asks which of these relations currently produce capacities, which reproduce dependency or extraction, which are fragile, and which latent relations could become important under changed conditions. The purpose is not to map everything. It is to identify relations plausibly relevant to the intervention's goals and risks.

Intervention design can then operate on several levels. Resources can be allocated to entities; they can be indexed to relations or shared infrastructures; constraints can be modified; information can be made available; access can be opened; institutional rules can be changed; a field condition can be altered. A public library illustrates the distinction. Its budget can be recorded as funding to an organization, but the practical objective may be to sustain relations among residents, knowledge, public space, language, community memory, and future learning. The legal recipient and the normative target need not be identical.

Tracing follows intervention because generative effects are not fully known in advance. The relevant question is not simply whether the intended output was achieved but how the intervention propagated. Did a training programme generate independent capacity or continuing dependence on the provider? Did a research grant deepen collaboration or centralize control? Did an AI system expand human option spaces or progressively replace opportunities to exercise judgment? Did an ecological intervention create local stewardship or displace existing knowledge relations? These questions require observation after allocation rather than only ex ante optimization.

Revision completes the cycle. If the system has changed, the intervention rule may also need to change. GRE therefore treats adaptive governance as a substantive consequence of generativity. The practical sequence can be summarized as observation, relational mapping, interpretation, intervention, tracing, evaluation, and revision, but the sequence should not be understood as rigidly linear. New observations can alter interpretation; evaluation can reveal missing relations; affected subjects can contest the representation itself. Praxis is recursive.

This emphasis also clarifies why “allocating to relations” should not be interpreted as converting every relation into a new legal entity. Resources can be committed to the conditions that sustain a relation without claiming that the relation is an object of ownership. Shared infrastructure, fiduciary arrangements, fellowships, commons, legal permissions, meeting spaces, interoperable standards, and public knowledge systems can all support relational capacity. The conceptual target is the relation; the administrative mechanism may still operate through entities.

4.11. Evaluation, justice, and generativity

Generativity is a descriptive and analytical concept before it is a normative endorsement. War, domination, financial extraction, and surveillance can all generate new institutions, technologies, and dependencies. GRE must therefore distinguish

$$\text{generativity} \neq \text{desirable generativity}. \quad (12)$$

Normative evaluation asks generation of what, for whom, at whose cost, under what conditions, and with what effects on the capacities of affected subjects to continue participating in future generation.

This is where GRE connects to distributive, procedural, relational, capability-based, ecological, and generative theories of justice. A resource allocation can be distributively equal while generating unequal dependencies. A process can be participatory while exhausting an ecological relation. A high-capability system can expand the option space of less capable subjects or collapse it. No single metric is likely to capture all of these dimensions.

A provisional normative orientation is therefore preservation and expansion of plural generative capacities under conditions that do not reduce affected subjects to objects of another actor’s optimization. This orientation remains intentionally incomplete. It requires later work in generative relational ethics and justice. The important disciplinary point is that GRE should not smuggle a moral conclusion into the word *generative*.

4.12. Boundaries and cumulative research programme

A new field needs boundaries if it is to avoid becoming a vocabulary for everything. GRE is not synonymous with relational sociology, complexity economics, ecological economics, capability theory, political economy, or generative justice. It intersects with each. A study belongs distinctively to GRE when its central analytical concern involves how resources or value operate through evolving relations and how those processes transform subsequent generative conditions.

This criterion also implies cases where GRE adds little. If the relevant question can be answered adequately by a stable entity-level model and downstream relational transformation is immaterial, adding GRE terminology would be unnecessary. The programme should earn its complexity by revealing consequences that simpler models miss.

The field should accumulate knowledge through reusable objects rather than through isolated essays. Contributions may include relational typologies, methods for identifying generative relations, empirical trajectory datasets, field representations, value-conversion taxonomies, measures of generative capacity, comparative institutional cases, intervention protocols, simulation models, and formal results. Disagreement among these contributions is expected. GRE should permit methodological pluralism while maintaining a shared problem structure.

A useful disciplinary schema is

$$\text{GRE} = \{Q, O, E, M, P, N, B, C\}, \quad (13)$$

where Q denotes characteristic questions, O objects of inquiry, E epistemic commitments, M research methodologies, P praxis and intervention, N normative and evaluative orientation, B disciplinary boundaries, and C cumulative research structure. The schema is not an axiom system. It expresses what is required for GRE to function as a field rather than merely as a slogan or formal model.

4.13. Continuity with existing economics and criteria of use

GRE is intended as an extension of economic inquiry rather than a declaration that standard economic concepts have become obsolete. Prices, incentives, budgets, property rights, opportunity costs, production functions, labor markets, welfare analysis, game-theoretic interaction, causal inference, and accounting remain indispensable in many settings. A relational-generative description should therefore be added only when it changes what can be explained, evaluated, or designed. The programme should resist the temptation to redescribe ordinary questions in new vocabulary without analytical gain.

One practical criterion is downstream sensitivity. If two interventions that are equivalent at the level of immediate allocation predictably generate different relational structures or future capacities, the difference is relevant to GRE. Another is structural endogeneity. If the intervention changes the relations or constraints that determine later behavior, a fixed-model evaluation may be incomplete. A third is value conversion. If the principal consequences occur through conversion among heterogeneous value forms, monetary or output measures alone may miss the process. A fourth is subject formation. If economic arrangements alter who can participate, how actors are recognized, or what capacities they acquire to form future relations, the constitution of the subject becomes part of the economic object.

These criteria also specify when GRE may be unnecessary. A short-horizon commodity purchase with negligible downstream relational effect may be adequately analyzed through conventional price and preference models. A policy whose primary question is an immediate, well-measured treatment effect may not require a theory of generative spacetime. Relational complexity should not be added merely because it is philosophically attractive. GRE earns its place when simpler abstractions systematically externalize consequences that matter to the research question.

The programme should therefore coexist with several levels of model resolution. An entity-level model may be the correct first approximation; a relational model may be required when interactions matter; a generative model may be required when those interactions transform later structures; a field model may be required when distributed conditions shape local effects. Moving to a richer level should be justified by the phenomenon rather than by disciplinary preference. This layered principle is consistent with ontological suspension: the choice of representation is a decision about analytical adequacy, not a claim that one formal layer alone reveals the final nature of economic reality.

4.14. Disciplinary boundaries, internal pluralism, and open problems

GRE needs boundaries precisely because relation and generation are ubiquitous. If every economic process is relational in some sense, the statement that “relations matter” cannot define a research field. GRE adds value when relational mediation and changes in future generative conditions materially alter explanation, evaluation, or intervention. When a stable entity-level model answers the relevant question adequately, invoking GRE may add unnecessary complexity.

The field should therefore be distinguished from neighboring programmes without claiming exclusivity. Relational sociology studies social constitution and networks of relations across domains broader than economics. Political economy studies production, power, institutions, class, and distribution. Capability theory evaluates substantive freedoms and conversion from resources to functionings. Ecological economics situates economies within biophysical systems. Complexity economics studies adaptive and nonlinear economic systems. Generative justice emphasizes circulation and the rights of value generators. GRE overlaps with all of these but centers a particular conjunction: the trajectories through which resources and heterogeneous value forms operate in evolving relational structures and alter later generative capacity.

Internal pluralism follows from the breadth of that object. Some researchers may prefer qualitative process analysis; others dynamic networks, formal fields, comparative institutional research, or simulation. Some may model generativity as option-space expansion; others as capacity formation, resilience, relation creation, or transformation of constraints. These differences should not be prematurely unified. A mature field may contain several partially compatible models adapted to different domains.

Several open problems are foundational. The epistemology of relations remains incomplete: relations are partially observed and representation-dependent. Generative causation is difficult to identify over long, branching trajectories. Value forms can be heterogeneous and incommensurable. The boundary between enabling and dominating relations is normative and context-sensitive. Field-based models risk becoming vague metaphors if their variables are not operationalized. Formal models risk reifying categories. Long-term evaluation faces missing counterfactuals and changing objectives. AI creates new problems of subject status,

capability asymmetry, and endogenous analytical tools. These are not embarrassments to be hidden from an introductory statement; they define the research agenda.

A final boundary concerns priority and ownership of concepts. GRE is presented as an integrative research programme, not as a claim that relation, generativity, circulation, capability, field, or relational value originate here. The programme gains legitimacy through careful attribution, explicit differentiation, empirical usefulness, and conceptual synthesis rather than through claims of first discovery. Its openness to revision is therefore both an epistemic principle and a social condition of the field's development.

5. Provisional Theses

The programme can be summarized through several provisional theses. They are working commitments intended to organize research, not final laws.

5.1. Entity-level allocation is also relational intervention

An allocation to a person, organization, household, firm, or state changes more than the recipient's resource vector. It can change internal relations, external relations, dependencies, access paths, institutional expectations, and future relational possibilities. Entity-level accounting is therefore necessary but insufficient whenever these relational effects materially shape outcomes.

5.2. Resources and value are analytically distinct

A resource transfer does not carry a fixed social value independent of trajectory. The same monetary amount can be consumed, extracted, converted into knowledge, used to create infrastructure, or generate durable relations. GRE therefore distinguishes the resource entering a system from the forms of value generated through its subsequent propagation.

5.3. Value can be relational and plural

Some value is attached to goods or capabilities; some emerges in relations themselves. Care, trust, scientific collaboration, cultural continuity, ecological stewardship, and community participation cannot always be represented adequately as quantities possessed by isolated actors. GRE therefore allows plural value forms without assuming universal commensurability.

5.4. Generativity concerns future conditions of possibility

An output is not generative merely because it is new. Generativity concerns the creation, preservation, or transformation of capacities, relations, structures, or conditions from which subsequent possibilities can arise. An intervention can therefore have positive immediate outcomes while reducing future generative capacity, or modest immediate outcomes while creating durable future possibilities.

5.5. Capability asymmetry does not entail normative sovereignty

Knowledge, intelligence, productivity, or predictive superiority does not by itself authorize control over other subjects. The relevant economic and governance problem is how capability asymmetries are translated through institutions into resource claims, dependencies, and power. GRE therefore focuses on transformations of asymmetry rather than capability equalization as an end in itself.

5.6. Relational support need not reify relations

Resources can be institutionally committed to the conditions of a relation without treating that relation as a metaphysical object. A shared infrastructure, commons, trust, fellowship, or legal arrangement may support relational continuity or formation while the underlying relation remains dynamically interpreted and revisable. Symbolic recognition should therefore be treated as a practical representation rather than ontological truth.

5.7. Abundant generation shifts importance toward orientation

When symbolic and epistemic generation becomes cheap, selection and orientation become more important. What deserves attention, what is considered beautiful or significant, which questions are asked, and which possibilities receive institutional support become central economic concerns. AI therefore intensifies the political economy of epistemic orientation.

5.8. Formal models are instruments rather than hidden ontologies

Networks, fields, state spaces, agent-based models, and dynamical systems are possible representations of partial aspects of generative relational systems. Their usefulness depends on the question and evidence. GRE should prefer the weakest sufficient formal commitments and make representational assumptions available for critique.

6. A Preliminary Research Programme

The preceding arguments define GRE less as a finished theory than as a coordinated set of research tasks. The tasks are sequential only in exposition. In practice they will develop together, and progress in one may require revision of another. A formal model may expose an ambiguity in the ontology of relations; an empirical study may show that a value category is too coarse; a legal intervention may reveal that a relational target cannot be represented without reification. The programme is therefore recursive by design.

6.1. Epistemology of relations

The first task is an epistemology of relations. Before resources can be allocated with reference to relational structures, the field must specify how relations are identified, what counts as evidence, how scale and boundaries are chosen, how symbolic representations relate to effective relations, and how uncertainty is communicated. This task includes difficult cases in which formal recognition and effective relation diverge. A contract may exist while substantive

collaboration is absent; an informal relation may organize resources without legal recognition; an algorithmic classification may create the very relation it claims merely to observe.

The epistemology must therefore be comparative and layered. Legal evidence, administrative records, self-report, ethnography, behavioral traces, network inference, historical documents, and causal evidence may each support different aspects of a relational claim. No one evidential form should be assumed to reveal the relation in itself. GRE needs explicit conventions for stating what is observed, what is inferred, what is institutionally symbolized, and what remains uncertain.

6.2. Methodology of generative relational inquiry

The second task is a methodology of generative relational inquiry. It must distinguish the existence of a relation from its generative effects and develop methods for studying trajectories, delayed effects, branching propagation, field dependence, path dependence, and changes in transformation rules. This programme will require cooperation among qualitative research, historical analysis, causal inference, longitudinal data, dynamic modeling, and simulation rather than a single privileged technique.

A central methodological problem is attribution. If a capability emerges after participation in a dense educational field, assigning the outcome to one dyadic relation may be misleading. If an intervention alters the field itself, the relevant causal object may be a configuration rather than one treatment variable. GRE therefore needs methods for causal contribution and generative reconstruction that can coexist with, but are not reducible to, conventional treatment-effect estimation. It must also develop standards for negative and ambiguous cases in which generativity cannot be confidently attributed.

6.3. Praxis and intervention

The third task is a theory of praxis. GRE needs practical methods for relational diagnosis, intervention design, monitoring, revision, and participatory interpretation. The central practical question is not simply where to allocate a resource but what relational world the allocation is likely to help generate and how that world should be observed as it evolves.

This task includes the design of relation-indexed institutions. Some resources may be legally held by entities while normatively committed to maintaining a relation or field: a community trust, research fellowship, public library, shared data infrastructure, ecological stewardship arrangement, or cooperative platform. Other interventions may operate by changing constraints rather than transferring assets. The design problem is therefore broader than redistribution. It concerns the conditions under which desirable relations can form, persist, transform, and remain contestable.

Praxis also requires a theory of revision. If an intervention succeeds in changing a system, the assumptions that justified the original intervention may no longer hold. A scholarship can create a new professional network; a technological platform can reorganize labor relations; an ecological programme can create new local institutions. GRE should therefore treat policy feedback not merely as monitoring but as evidence that the object of governance has changed.

6.4. Economic objects and relational layers

The fourth task is a conceptual architecture of economic objects. The field needs careful distinctions among entities, subjects, relations, higher-order relations, fields, resources, capacities, conditions, constraints, processes, events, social facts, symbolic representations, and value forms. These distinctions should remain compatible with ontological heterogeneity rather than forcing every domain into one common metric space.

A particularly important problem is the relation among ontological, relationally effective, and representational layers. GRE should be able to analyze a corporation, AI system, community, currency, or legal category without assuming that all belong to the same ontological kind. It should also explain when one analytical object can be treated as an entity at one scale and a relational system at another. This multiscale object architecture is a prerequisite for later formalization.

6.5. Allocation as relational intervention

The fifth task is a theory of allocation that retains the achievements of distributive analysis while extending the unit of evaluation. GRE must develop ways to represent allocations to entities, allocations indexed to relations, allocations to higher-order structures, and interventions into fields or constraints. The key distinction is between the administrative recipient and the relational target. A fund can be transferred to an organization while its intended purpose is to sustain relations among learners, knowledge, community, and future opportunities.

This research should also study how allocations alter power. Resources can strengthen internal hierarchy, create donor dependency, expand bargaining capacity, or reorganize relations with communities and states. Equal transfers can therefore produce unequal relational transformations. A theory of relational allocation should make these effects visible without assuming that every relation can or should become a legally owned object.

6.6. Generative value

The sixth task is a theory of generative value. It should analyze generation, propagation, conversion, recirculation, extraction, and dissipation across heterogeneous value forms. It should distinguish local from downstream value and make visible cases in which immediate efficiency conflicts with long-horizon generative capacity.

One difficult problem is conversion. Material resources can become knowledge; knowledge can become capability; capability can create relations; relations can create institutional access; institutional access can produce new material resources. These transformations may involve loss, delay, asymmetry, or branching. GRE therefore needs a language for value trajectories that does not presume that all value forms can be priced or summed. In some domains partial orders, vector-valued descriptions, qualitative classifications, or domain-specific measures may be more appropriate than scalar optimization.

A second problem is attribution of generated value. Value can arise from a relation whose contributors are distributed across time and institutions. The distinction between value generation and value capture is therefore central. GRE should study when value returns toward the relations and communities that helped generate it, when it is extracted, and when

recirculation creates self-sustaining capacity.

6.7. Generative spacetime

The seventh task is a theory of generative spacetime. Economic effects unfold through trajectories whose significance depends on sequence, delay, duration, relational distance, and historical path. The same relation can have different effects under different surrounding fields. GRE therefore requires temporal and spatial concepts capable of representing evolving conditions rather than only before-after comparisons.

The term spacetime is used programmatically rather than as a literal identification of social systems with physical spacetime. It draws attention to the fact that economic generation is situated. A resource enters at a time and place, moves through relations, encounters constraints, changes structures, and may produce effects far from the original intervention. The geometry relevant to one problem may be geographic; in another it may be institutional, network-based, informational, legal, or cultural. GRE should remain open to multiple metrics and to cases in which no single metric is appropriate.

6.8. Formal models

The eighth task is formalization. Formal models should be layered and plural. Network and hypergraph models may represent relational topology; field models may represent distributed conditions; dynamical systems may represent trajectories and regime changes; agent-based models may explore local interaction and emergence; algebraic or category-theoretic tools may eventually clarify composition and equivalence. No formalism should be treated as mandatory in advance.

A central formal challenge is endogenous transformation of the effective law of motion. Standard notation may write $\dot{x} = f(x, u, P)$ for state, intervention, and parameters. GRE asks how one intervention can alter not only x but the relations and constraints from which the next effective f emerges. Formalization must therefore distinguish exogenous parameter change from structural generation. This challenge is one reason field, network, and multiscale approaches may need to be combined rather than treated as competitors.

Formal models also need explicit representation of observation. The model used by a governor or researcher is itself a symbolized relation to the system. Future GRE work should therefore distinguish system dynamics from observation and decision dynamics, especially when AI tools participate in prediction, recommendation, or control.

6.9. Justice, governance, and asymmetric subjects

The ninth task concerns justice, governance, and asymmetric subjects. GRE should study how economic systems govern resource, capability, epistemic, and relational asymmetries; how value-generating communities retain participation in the benefits and conditions of generation; how dependency attractors form; and how institutions can preserve meaningful generative participation under radical differences of capability.

The programme does not assume that justice requires equal capability. In many relations capability will remain unequal and may productively remain so. The central problem is how asymmetry is converted. Knowledge asymmetry can become epistemic authority; authority

can become decision power; decision power can structure resource access; resource control can then reinforce the original asymmetry. Governance can intervene at these conversion points without suppressing the underlying knowledge or capability.

This is especially important for AI. An advanced AI system may possess far greater predictive or productive capability than an individual human. GRE does not therefore conclude that the AI must be made less capable. It asks how institutional relations can prevent capability from becoming unchecked normative sovereignty or the systematic foreclosure of human and other subjects' generative possibilities. The same analytical structure can apply to doctors and patients, experts and publics, large and small states, organizations and communities, or humans and ecological systems, though the normative content will differ by domain.

6.10. Epistemology and praxis of heterogeneous subjects

The tenth task develops an epistemology and praxis for economic relations among heterogeneous subjects. Much economic reasoning presumes that agents can be represented within a sufficiently common descriptive space: their resources can be compared, their actions classified, their preferences elicited, and their welfare evaluated with shared categories. GRE should study the cases in which this assumption is weak. Subjects may differ in embodiment, cognition, language, temporal horizon, vulnerability, institutional status, and modes of valuation, while the analyst has only partial evidence about what the differences mean.

The epistemological problem is therefore not simply to estimate a hidden preference more accurately. It is to determine which categories are legitimately shared, which require translation, which remain incommensurable, and how uncertainty about another subject should constrain intervention. A methodology for heterogeneous subjects should make room for asymmetric intelligibility: one party may model the other more accurately than the reverse. Such epistemic asymmetry is itself a source of power because prediction can shape negotiation, persuasion, pricing, surveillance, and the design of available choices.

The practical problem is how to act before complete understanding is available. GRE should investigate procedures that preserve reversibility, contestability, exit, translation, and future option formation where possible; identify interventions whose errors would produce irreversible relational foreclosure; and distinguish assistance that expands another subject's generative capacity from optimization that substitutes the stronger party's model for the weaker party's own evolving orientation. No single procedure will be appropriate across human–AI, intercultural, ecological, intergenerational, or hypothetical interspecies relations. The aim is to construct a comparative practice theory for acting under persistent heterogeneity and incomplete mutual knowledge.

AI provides the most immediate experimental domain because systems with very different epistemic capacities already participate in work, education, finance, information access, and organizational decision making. More distant cases, including possible future interaction with non-human intelligence, function as boundary tests rather than predictions. They help reveal which parts of present economic theory depend on unspoken assumptions of shared embodiment, cognition, temporality, and value.

6.11. Epistemic economy, beauty, and orientation

The eleventh task concerns the economics of epistemic orientation. If knowledge production becomes increasingly abundant, economic attention shifts toward selection: which questions are pursued, which anomalies are noticed, which projects receive time and infrastructure, and which forms of curiosity remain institutionally possible. GRE should therefore study the relation among aesthetic judgment, epistemic orientation, institutional attention, funding, and knowledge generation.

This task is not reducible to a theory of scientific productivity. It concerns the conditions under which subjects can form questions and relations to knowledge. An AI may generate answers more efficiently while a human inquiry remains valuable because of the relation through which the human becomes capable of understanding, imagining, or participating. A generative epistemic economy should therefore distinguish efficient answer production from the preservation of plural capacities to perceive significance and generate inquiry.

6.12. Domains, comparison, and empirical programmes

The twelfth task is empirical diversification. AI will provide an important but not exclusive domain because it simultaneously affects productive capacity, knowledge scarcity, symbolic abundance, subject categories, and power asymmetry. Yet GRE should also be tested in education, research funding, humanitarian assistance, organizational development, public infrastructure, commons governance, ecological stewardship, cultural institutions, and other settings in which resource flows change relational structures over time.

Cross-domain comparison will be especially important. A relation that is generative in one domain may be harmful in another. Reciprocity may be desirable in a cooperative but inappropriate in some care relations. Redundancy may look inefficient in a firm but create resilience in an ecological or humanitarian system. GRE should therefore seek transferable analytical questions rather than one universal substantive answer.

6.13. The cumulative and revisable character of the programme

The thirteenth task is institutional and reflexive: GRE must develop as a cumulative, revisable research programme. Its concepts should be open to empirical failure and conceptual correction. The programme should record cases where relational analysis adds little, where proposed generative mechanisms fail, where formal models misrepresent social categories, and where interventions generate unanticipated harm. Such results are part of the field's knowledge rather than exceptions to be excluded.

The programme should also remain open to intellectual traditions not adequately represented in this preliminary genealogy. Concepts of relation, interdependence, emptiness, reciprocity, land, community, obligation, and generation have long histories outside the Western traditions emphasized in much contemporary economic theory. Incorporating such traditions should not consist of decorative analogy. It should involve serious comparison capable of altering GRE's categories where necessary.

The research programme is therefore intentionally unfinished. Its success would not consist in making every economic problem relationally complex. It would consist in identifying those problems for which relational and generative structures are causally, normatively, or

practically decisive and developing reliable ways to understand and govern them.

7. Limitations and Non-Claims

This preliminary statement has several important limitations. First, it does not establish that GRE constitutes a separate discipline in the sociological sense of an institutionalized academic field. It proposes a research programme and a disciplinary architecture. Whether such a programme becomes useful depends on the quality of subsequent theoretical, empirical, and practical work.

Second, the article does not provide a universal definition or metric of generativity. Any scalar measure risks collapsing heterogeneous values or rewarding expansion without regard to justice. Later work may develop domain-specific measures, partial orders, vector-valued evaluations, or qualitative classifications rather than a single universal index.

Third, the argument does not imply that entity-centered methods should be replaced. Entities are indispensable for law, accounting, administration, causal analysis, and ordinary economic practice. The claim is conditional: where relational effects and downstream generation materially determine outcomes, analysis should not stop at the entity boundary.

Fourth, relational analysis can itself become a technology of power. Mapping social relations, predicting propagation, and identifying leverage points can support care and public coordination, but they can also support surveillance, manipulation, and control. GRE therefore requires governance of its own epistemic and technical capacities.

Fifth, the article does not settle the ontology or moral status of AI. AI appears here because it destabilizes existing assumptions about subjecthood and capability. The framework is deliberately compatible with multiple positions on consciousness, personhood, and moral status.

Sixth, the intellectual genealogy is selective. The traditions discussed here are chosen because they illuminate the specific architecture of GRE; they do not exhaust philosophy, economics, sociology, anthropology, law, or science and technology studies. Future work should broaden and correct this genealogy, including non-Western intellectual traditions whose concepts of relation, interdependence, value, and generation may challenge the categories used here.

Finally, the programme remains historically situated. GRE should not present itself as the final economics appropriate to all times and places. Its own categories arise from contemporary problems and contemporary capacities. Historical reflexivity therefore applies to GRE itself: if productive forces, institutions, scientific knowledge, or forms of subjecthood change, the field's conceptual architecture should remain revisable.

8. Conclusion

Generative Relational Economics begins from a change in emphasis. Economics has powerful tools for analyzing allocation among entities, incentives, markets, production, and welfare. GRE asks what becomes visible when those entities are also treated as relationally constituted and when economic evaluation follows resources and value beyond the moment of allocation into the structures they help generate.

The historical motivation is contemporary but not technologically deterministic. AI, digital

platforms, global networks, and computational infrastructures change productive capability, symbolic scarcity, and the visibility of relations. They also expose inherited assumptions about employment, subjecthood, expertise, and resource claims. AI adds a further pressure because some capability asymmetries may be both persistent and valuable: the problem cannot always be solved by making the more capable subject less capable or by assuming that an equally powerful counter-subject can be constructed. Economic analysis must therefore examine how asymmetry is converted through relations into authority, dependency, exclusion, resource concentration, or expanded possibility. At the same time, developments in philosophy, historical materialism, capability theory, commons research, ecological and relational value, generative justice, complexity science, network analysis, and computation provide conceptual and methodological resources for a more relational and generative economics.

The programme's central question can be stated simply: what relational world does an economic process generate? Answering it requires more than tracing who receives what. It requires studying how resources become capacities, how value changes form, how relations propagate effects, how asymmetries become power, how subjects are stabilized or displaced, and how present interventions alter the conditions of future generation.

GRE should therefore be judged not by the breadth of its vocabulary but by whether it produces explanations, evidence, interventions, and formal models that reveal economically consequential processes hidden by simpler descriptions. Its ambition is not to replace existing economics or to turn all social life into a relational model. It is to establish a disciplined research programme for those problems in which relation and generation are themselves economically decisive. Among those problems are the economic conditions of meaningful participation after productive necessity, the governance of persistent asymmetry without suppressing useful capability, and the epistemology and practice of coexistence among heterogeneous subjects whose values and modes of knowing may never be fully commensurable.

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