P A N D A S E A

A Sovereign Blockchain for Manufacturing Markets

Protocol-level market microstructure for value that has never been an asset

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"*We must look at the price system as such a mechanism for communicating information.*"
— F. A. Hayek, The Use of Knowledge in Society (1945)

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Abstract

Bitcoin demonstrated that mathematics could mint an asset: a fixed supply enforced by consensus rather than by an institution gave digital scarcity its first existence proof. Ethereum demonstrated that assets could be programmed: arbitrary contractual logic, executed identically by every node, turned the ledger into a general computer. Neither made *markets* manufacturable. A market — continuous price discovery joined to standing liquidity, anchored to something real — has remained an application: assembled from order books and external market makers, renting blockspace from a general-purpose fee auction, consuming oracle data as a second-class user, and enforcing its economics through contracts that sit beneath the consensus layer rather than within it. For assets that already trade, this is an inconvenience. For value that has never been an asset at all — competitive performance, verified contribution, the measured output of infrastructure — it is disqualifying, because genuinely new value inherits no liquidity and no natural counterparty. The market must be manufactured, and the machinery that manufactures it must be as trustworthy as the asset it creates.

PandaSea is a sovereign blockchain in which that machinery is the protocol. Markets are the first-class primitive: each market is an isolated, parallel state partition (a *Market Zone*) with its own hard-capped supply, deterministic bonding-curve liquidity, and protocol-owned reserves; externally attested performance data enters through a native transaction class verified in consensus; a liquidity-monotonicity invariant is enforced as a block-validity rule rather than a contract convention; and a fixed share of every qualified transaction is routed by the state machine itself into open-market acquisition of the chain's fixed-supply native asset, PANDA (888,000,000 units), with settlement in a closed-loop, over-collateralised unit, USDp. The first application, TheSportExchange, is live on real money. This paper specifies the architecture, states its formal properties, and argues that a chain built this way constitutes a third primitive in the lineage that began with engineered scarcity and continued with programmable contracts: the manufactured market.

1 Introduction: The Third Primitive

Every era of this technology has been defined by the arrival of one primitive that did not previously exist. In 2008, the primitive was *scarcity*: Bitcoin proved that a purely digital object could be made finite by mathematics, and that finiteness alone — twenty-one million units, a schedule no one could amend — was sufficient foundation for a new asset. In 2014, the primitive was *programmability*: Ethereum proved that the ledger could execute arbitrary agreements, and that assets could therefore carry logic — vesting, collateralisation, exchange — without an intermediary. Each primitive absorbed the previous one. Ethereum contains engineered scarcity as a special case; every ERC-20 with a capped supply is a small Bitcoin.

What neither primitive delivers is the market itself. A market is not a token and not a contract. It is a standing institution with two inseparable functions: it discovers price continuously, and it supplies liquidity — the ability to transact at scale, in both directions, without the price collapsing under the transaction. On general-purpose chains, this institution is assembled at

the application layer from parts the protocol does not understand: order books that gap when makers withdraw, automated market makers that treat all pairs as interchangeable, oracles that pay retail gas to whisper facts to contracts, and fee flows that leak into a blockspace auction indifferent to what is being traded. The chain executes markets the way a spreadsheet executes a business plan — faithfully, and without the slightest comprehension.

This paper introduces the third primitive: the **manufactured market** — a market brought into existence, complete with deterministic liquidity, anchored price formation, and self-reinforcing economics, by the protocol of a chain purpose-built to produce it. The claim is architectural, not rhetorical. Sections 2 and 3 establish why the primitive cannot be simulated at the application layer of a rented chain. Section 4 specifies the chain that enshrines it. Section 5 states the properties that enshrinement makes provable. Sections 6 through 8 develop what the primitive is for, what governs it, and where it sits in the lineage.

Primitive	**System**	**What it made possible**	**What it left unsolved**
Scarcity	Bitcoin (2008)	A digital object that is finite by consensus	One asset; no programmability; liquidity entirely exogenous
Programmability	Ethereum (2014)	Assets that carry arbitrary contractual logic	Markets remain applications; liquidity, ordering, oracles, and fee economics are not protocol concerns
Manufactured markets	PandaSea (2026)	Markets — scarcity, curve liquidity, oracle anchoring, value recycling — as the chain's first-class primitive	Scope: markets in independently verifiable performance; see Section 9 for explicit non-claims

2 The Problem: Markets Must Be Manufactured

2.1 Value without a price

The deepest account of what markets do comes from the Austrian tradition. Menger established that value is subjective — it exists in the valuations of individuals, not in the cost structure of production. Mises established that without exchange there is no calculation: an economy that cannot price a category of value cannot reason about it. Hayek completed the argument: prices are the mechanism by which knowledge dispersed across millions of minds, held nowhere in aggregate, is compressed into a signal anyone can act on. The corollary is stark. *Value that cannot be exchanged in a functioning market is, economically, dark matter.* It exerts force — people demonstrably care about performance, contribution, reputation, and achievement — but it cannot be measured, allocated, or capitalised, because no microstructure

exists through which its price signal can form.

The quantity of dark matter is not small. Mainstream institutions place more than $400 trillion of existing global assets in the illiquid category — value that is an asset in name but trades rarely, expensively, or not at all. Beyond that boundary lies a larger frontier with no incumbent whatsoever: value that has never been an asset in any form. Competitive performance is the proving case. The verified delivery of critical infrastructure is the institutional case — a category in which Europe's own assessment machinery has certified billions in net present value it possesses no mechanism to price continuously. The pattern repeats wherever the value is real, measurable, and unpriced.

2.2 A representation is not a market

The standard response — tokenization — mistakes representation for market-making. Anything can be issued on a ledger. Issuance produces a certificate; it does not produce a counterparty. Assets that already trade inherit liquidity from existing order books, which is why tokenized treasuries work on arrival. Genuinely new value inherits nothing. There is no standing pool of buyers and sellers, no natural other side to the first trade, and no reason for either to appear spontaneously. A performance-linked asset with no liquidity mechanism is a certificate nobody can sell. This is the load-bearing observation of the entire design: **without the microstructure, the new asset class is not less efficient — it is infeasible.**

2.3 Four requirements

A microstructure that manufactures a market where none exists must satisfy four requirements simultaneously — requirements that legacy exchange design, built for inherited liquidity, simply assumes away:

1. **Deterministic liquidity from the first trade.** The mechanism itself must be the counterparty, at a published price, in both directions, from unit one — a formula, not a promise.
2. **Anchored price formation.** For the price to carry Hayekian information rather than pure reflexivity, it must be tethered to verifiable, exogenous reality: attested performance data, audited reserves, settled outcomes.
3. **Value recycling.** A durable market must capture a share of its own activity and return it — to reserves, to participants, to the system's base asset — so that liquidity deepens with use instead of bleeding out through extraction.
4. **Transparency by construction.** A market minting novel value cannot inherit centuries of institutional trust. Trust must be engineered: deterministic rules, public formulas, verifiable reserves, and invariants that hold by code rather than by conduct.

These four requirements — R1 through R4 hereafter — are implementable as smart contracts, and PandaSea's first deployments implemented them exactly that way, with results docu-

mented in the TheSportExchange white paper: hard-capped Key supplies, a convex bonding curve $P(S) = S^{5.75}$ providing protocol-owned exit liquidity, oracle-driven Performance Pools, and formally stated monotonicity and dominance properties. What contract-level implementation cannot deliver is the subject of the next section — and the reason this paper describes a chain rather than a contract suite.

3 Why General-Purpose Chains Cannot Host Manufactured Markets

A manufactured market implemented as an application on a rented chain is a guest in a house built for someone else. Five constraints follow from tenancy itself. None is parametric; none can be configured away.

3.1 Blockspace contention and the burst problem

Global sport produces the most violently bursty demand profile in commerce: billions of people attending to the same event in the same minute, then dispersing. A World Cup final is a synchronized, planetary spike. On a general-purpose chain, that spike arrives as a fee auction — market operations compete for inclusion against every unrelated transaction on the network, precisely when inclusion matters most. A liquidity guarantee that becomes probabilistic under load is not a guarantee; it is a fair-weather promise. R1 cannot be satisfied by a mechanism whose access to execution is auctioned to strangers.

3.2 Adversarial ordering

Bonding-curve markets on public mempools are canonical sandwich targets: the curve's determinism, their virtue, is also a map for extraction. Application-layer mitigations — the first application's VRF-scheduled execution in three to ten randomised tranches, implemented and executed entirely in protocol contract logic — treat the symptom, and treat it well. But maximal extractable value is a property of who orders transactions. Only the protocol orders transactions. A chain whose consensus enforces fair, deterministic sequencing for market operations removes the attack class rather than raising its cost.

3.3 Oracles as second-class citizens

On a general-purpose chain, the data that anchors a manufactured market (R2) enters as ordinary user traffic: an externally owned account pays gas to call a contract that stores a number. The chain cannot distinguish a performance attestation from a meme transfer. Verification of provider signatures, aggregation across providers, staleness accounting, and degradation policy all live in application code, subject to application-level failure. For a chain whose entire purpose is to anchor prices to attested reality, the attestation path is not an application concern. It is the chain's sensory system, and it belongs in consensus.

3.4 Value recycling: contract versus constitution

R3 — the recycling of a fixed share of activity into the system's reserves and base asset — can be written as a contract on anyone's chain. Written that way, it is a policy: upgradeable, routable-around, and external to the environment's own economics, which continue to leak into a foreign fee market. Enshrined in a sovereign chain's state-transition function, it is a constitution: the routing is not something the system does but something the system is. The distinction has an existence proof. Hyperliquid, the first venue of consequence to own its chain outright, routes 97% of protocol fees into automated buybacks of its native asset — over $1.3 billion cumulatively, on the order of $1 million per day, an Assistance Fund exceeding $2 billion, roughly 7% of market capitalisation annually. That result settled the argument that enshrined value recycling functions at scale. Its architecture also exposes the limitation PandaSea generalizes past: a single product feeding a single sink rises and falls with one volume stream. PandaSea routes *many* manufactured markets, across many verticals, into one sink — diversifying the very cyclicality that is the single-venue model's principal risk.

3.5 The sovereignty lesson

PandaSea's first production deployments ran as an application on rented infrastructure — most recently an Avalanche-family subnet. The migration to a sovereign chain was not a verdict on any host platform; every constraint named above is a property of tenancy as such, and no tenant configuration removes it. The lesson generalizes and is worth stating as a principle: *an institution whose product is a guarantee must own the machinery that makes the guarantee.* Exchanges learned this over four centuries; Hyperliquid re-learned it in four years; PandaSea builds on the settled conclusion. Sovereignty is not an optimisation. It is the difference between promising the four requirements and constituting them.

4 The PandaSea Chain

4.1 Design philosophy

The chain does few things, and markets are one of them. PandaSea is not a maximalist re-imagining of the world computer; it is a minimal sovereign environment — fast-finality consensus, a familiar execution layer — into which exactly four pieces of machinery are enshrined, one per requirement of Section 2.3: parallel Market Zones and the Curve Engine (R1), oracle citizenship (R2), the Value Router (R3), and validity-rule invariants (R4). Everything else, including the applications themselves, remains ordinary deployable code. The design bet is that a small number of protocol-level guarantees, chosen correctly, is worth more than any quantity of application-level features.

4.2 Consensus and execution

Consensus is a pipelined BFT protocol of the HotStuff family, operated by a permissioned-at-genesis, progressively opened validator set, with deterministic sub-second finality as the design target: a market operation is final in less time than a goal takes to replay. Execution is EVM-compatible by deliberate conservatism — the audited PandaSea contract suite (the Key market families, competition engines, fee routers, buyback executors, and collateral monitors that have run in production) deploys on the sovereign chain as-is, with protocol enshrinement arriving as an optimisation and hardening path rather than a rewrite. On benchmarks, this paper takes the position its lineage took: Bitcoin's paper contained no throughput marketing, and neither does this one. The architectural claim — throughput that scales with the number of Market Zones — is stated and defended below; measured figures will be published with the network, not before it.

4.3 Market Zones: parallelism by construction

The chain's unit of state is the **Market Zone**: an isolated partition containing one market's complete machinery — its supply register and hard cap, its bonding-curve anchors, its protocol-owned Liquidity Reserve, its Performance Pool accounts and standing weights, its oracle subscription, and its allocation vector. Zones share no mutable state. The only channels between them are the settlement asset and the Value Router, both of which are protocol-level and conflict-free by construction. The consequence is that the chain is embarrassingly parallel: transactions touching different zones execute concurrently on independent lanes; transactions within a zone execute sequentially, preserving the determinism the curve requires. Aggregate throughput therefore scales with the number of live markets — which is the correct scaling law for a venue whose ambition is thousands of simultaneous markets rather than one deep one — and the load profile of Section 3.1 is answered structurally: a planetary spike in one competition saturates that competition's lanes and touches nothing else.

Isolation is also the failure-containment story. A zone halted by its own safe-mode ladder (Section 4.6), a mispriced parameter, or an application defect is a contained event: its reserves are its own, its supply is its own, and no execution path exists by which its state can contaminate a neighbour. Contagion requires shared state; the architecture declines to provide any.

4.4 The Curve Engine

Requirement R1 is met by enshrining deterministic curve liquidity as the zone's native market mechanism. Each zone prices issuance and redemption along a convex power curve,

$$P(S) = S^k, \quad 0 < S \leq S_{\max},$$

with the exponent k and the hard cap $S_{\max}$ fixed per market at instantiation and immutable thereafter. Units are minted only by purchase from the curve and burned permanently on redemption to it; the protocol is always the counterparty at the published price, so exit is a structural property of the state machine rather than a service performed by an intermediary.

In the first application $k = 5.75$ and $S_{\max} = 21{,}000$ per team, giving the documented $(k + 1)$ amplification of approximately 6.75 between marginal capital and notional market capitalisation. The engine computes the curve in $O(1)$ fixed-point arithmetic via the decomposition

$$S^{5.75} = S^5 \times S^{1/2} \times S^{1/4},$$

and implements split-anchor pricing — the Anchored Buy Curve — in which acquisition-direction pricing climbs the pure power curve from the last settled reference state while redemption-direction pricing incorporates liquidity-responsive scaling that protects the reserve during drawdowns. Reflexive discovery is thereby permitted to run ahead of the anchor; the anchor itself is required to remain real. As a native engine rather than a contract library, the curve executes at protocol speed, prices identically in every zone that adopts it, and cannot be shadowed by a counterfeit implementation claiming its guarantees.

4.5 Enshrined invariants

Requirement R4 is met by promoting the system's economic invariants from contract conventions to validity rules. Every purchase of notional value V in a zone is split by the zone's immutable allocation vector — in the first application,

$$V = 0.67V \text{ (Liquidity Reserve)} + 0.25V \text{ (Performance Pool)} + 0.05V \text{ (Utility)} + 0.03V \text{ (Protocol)},$$

and every zone carries the liquidity function $\Lambda(S, R, L) = \alpha D + \beta L + \gamma R$ over its supply, reserves, and depth ratio, exactly as specified at the application layer today. The elevation is this: on the sovereign chain, a state transition that decreases any zone's Λ is not a transaction that reverts — it is a transition that cannot appear in a valid block. The Transactional Monotonicity property, enforced in production today by a contract modifier, becomes a consensus rule, indifferent to contract bugs, proxy upgrades, or application error: the network will not extend a history in which the invariant fails. The same promotion applies to supply caps, mint-and-burn behaviour, curve form, and allocation ratios. What governance may and may not touch is specified in Section 7; the short version is that the economic constitution is outside its reach by construction.

4.6 Oracle citizenship

Requirement R2 is met by making attested reality a native transaction class. A performance attestation on PandaSea is not a contract call; it is a first-class message type — *attest(market, index, value, epoch, signatures)* — whose validity conditions are evaluated in consensus: M-of-N threshold signatures from the zone's registered provider set, computed over a canonical serialization of the payload (canonical JSON with a committed hash, eliminating encoding ambiguity as a dispute surface), with median aggregation applied on threshold achievement. Conflicting signed attestations from a provider are attributable evidence against it. Freshness is a protocol state per zone: data age beyond thirty minutes places the zone in Warning, beyond one hour in Restricted, beyond two hours in Emergency — each state progressively

limiting the operations that depend on the stale feed until freshness is restored. The safe-mode ladder that today lives on the application roadmap becomes, on the sovereign chain, part of the definition of a well-formed zone. The current production trust model — a single authorised operator submitting off-chain-computed settlements through a role-gated path that cannot touch user balances — is documented plainly in the application literature and remains in effect until the consensus-verified path ships; the migration upgrades settlement integrity and modifies no economic mechanism.

4.7 The Value Router and PANDA

Requirement R3 is met at the constitutional level described in Section 3.4. A fixed share of every qualified transaction, in every zone, is routed by the state-transition function itself — not by an application contract — through the protocol's routing modules (the fee router, the buyback vault, the buyback executor) into rule-based, open-market acquisition of the chain's native asset. PANDA has a fixed supply of 888,000,000 units, functions as the network's gas, and is the single sink into which the activity of every manufactured market drains. Buyback execution inherits the MEV protections of Section 4.4's environment and the randomised tranching discipline proven at the application layer. The first application already routes a 0.56% share of qualified transaction flow to systematic PANDA market operations as application policy; on the sovereign chain the routing is not policy but physics — a path in the state machine with no alternative branch. The diversification argument of Section 3.4 completes the design: because zones are many and verticals heterogeneous, the sink's inflow is the sum of uncorrelated streams rather than the fortunes of one product.

One boundary deserves the same precision as the routing itself. PANDA sits on the fee side of the machine, not the user side. It does not form part of the acquisition, holding, redemption, reward, or settlement mechanics applicable to any market's units: it is never the consideration a user pays or receives in a market transaction, it confers no rights in respect of any market's units or pools, and the routing that acquires it operates on already-collected protocol fee flow after the user's transaction has completed at the curve's published price. A participant in any market can use the system in full without ever holding, touching, or knowing about PANDA.

4.8 Settlement: USDp

Zones settle in USDp, a closed-loop settlement unit native to the chain. Two properties define it. First, solvency is legible: an on-chain collateral monitor enforces an aggregate over-collateralisation invariant — total collateral of no less than 160% of outstanding supply — continuously and publicly, so the settlement layer's backing is a verifiable state variable rather than a quarterly disclosure. Second, the loop is closed: USDp exists to denominate acquisition, redemption, reserves, and pool operations within the chain's markets, a deliberately bounded role that keeps the settlement instrument's function — and its regulatory perimeter — as clean as the markets it serves. USDp is not presented as a general means of payment, a store of value, or a medium of exchange outside protocol functionality; any movement of settlement assets into or out of the ecosystem occurs through user-controlled wallets interacting directly

with protocol functionality, not through any intermediary receiving, holding, or transmitting assets on a user's behalf. Staging is stated plainly: in current production, user-facing funding and withdrawal are denominated in established third-party stablecoins transacted from user-controlled wallets, and USDp functions solely as an internal protocol unit of account for market operations — an accounting entry within protocol functionality, not an instrument offered to, held out to, or circulating among the public. Its role as the chain-native settlement unit described in this section ships with the sovereign chain, and no circulation beyond the closed loop is contemplated. The settlement layer is infrastructure in the strictest sense: it is the unit in which the machine counts.

5 Formal Properties of the Chain

The application-layer literature states and proves three structural results for curve markets of this family: Transactional Monotonicity (the liquidity function Λ strictly increases on every market event), PPI Monotonicity (no market event reduces a passive holder's per-unit pool impact), and the Dominant Strategy property (holding strictly dominates for any positive pool balance, with the dominance margin increasing under selling pressure). Those results are properties of the curve, the allocation invariants, and the pool mechanics; they are independent of where settlement data originates and they transfer to the sovereign chain unchanged. Sovereignty adds two properties that no application layer can supply, and upgrades the enforcement locus of the first:

- **P1 — Consensus-level Monotonicity.** $d\Lambda/dt \geq 0$ per zone is a block-validity rule. A Λ-decreasing transition is not reverted; it is unincludable. The invariant survives contract defects, upgrades, and operator error, because histories violating it are not histories of this chain.
- **P2 — Routing Conservation.** For every qualified transaction, the identity fees-in = reserves + pools + routed-buyback holds exactly, as an accounting invariant of the state machine. No execution path exists in which a qualified fee share fails to reach its destination; the sink is auditable from state alone.
- **P3 — Zone Isolation.** Zones share no mutable state; therefore no sequence of transactions in zone A can alter supply, reserves, anchors, or pool balances in zone B. Congestion, halting, and failure are locally contained by construction.

Property	Level	Enforcement locus	Stated in
Transactional Monotonicity	System liquidity	Block validity (chain); contract modifier (application)	This paper; TSE WP §9.1
PPI Monotonicity	Passive holder	Pool + burn mechanics	TSE WP §9.2
Dominant Strategy	Strategic choice	Curve + pool payoff structure	TSE WP §9.3
Routing Conservation	Value flow	State-transition function	This paper, §5
Zone Isolation	Fault containment	State partitioning	This paper, §4.3

Each property is a claim about protocol behaviour under correct execution of the specified state machine. None is a claim about prices, returns, or the outcome of any participant's position. Section 9 states the non-claims exhaustively.

6 The Market Factory

6.1 The market specification

Because the machinery is enshrined, creating a market reduces to declaring one. A market on PandaSea is a specification tuple

$$M = (\, I,\ k,\ S_{\max},\ A,\ \sigma,\ \Pi \,)$$

— an oracle index and provider set I; a curve exponent k; a hard cap $S_{\max}$; an allocation vector A over reserve, pool, utility, and protocol; a settlement asset σ; and a participant policy Π ranging from open to professionally gated. Instantiating M instantiates a zone: supply register, reserves, anchors, oracle subscription, and router wiring come into existence together, inheriting every property of Section 5 on arrival. This is the Market Factory — the generalisation of what today requires a bespoke deployment into what tomorrow requires a declaration. The factory is the chain's answer to the frontier of Section 2.1: the marginal cost of extending the price system's reach to one more category of unpriced value falls toward the cost of specifying it.

6.2 The first application: TheSportExchange — market mechanics and function allocation

The chain's first live market family runs under TheSportExchange (TSE), and the division of labour between protocol and interface is a design fact worth stating precisely, because it is the architecture of Section 4 in miniature.

The market machinery is the protocol's. Each team in an official competition has its own market with units ("Keys") priced along the curve of Section 4.4 — $k = 5.75$, hard cap 21,000 Keys per team. Keys are acquired from, and redeemed to, the curve itself: the protocol is the automatic counterparty at the published price in both directions, from the first unit to the last. There is no order book, no matching engine, and no peer-to-peer or secondary market of any kind: Keys are not transferable between users, are not admitted to trading on any external venue, and exist in exactly two states — held by the user who acquired them from the curve, or burned on redemption to it. Every acquisition is split by the immutable allocation vector of Section 4.5 (67% Liquidity Reserve, 25% Performance Pool, 5% utility, 3% protocol); the split is embedded in protocol rules, and no operator role has discretion to alter it or to redirect protocol funds outside it. Performance Pools accrue on externally attested team performance and are distributed by protocol rules; any outcome available within the ecosystem is a consequence of coded protocol mechanics, not a discretionary payment, a guaranteed distribution, or a contractual entitlement owed by any company.

The interface is the operator's — and only the interface. TSE operates the user-facing website and application through which users reach that protocol functionality, and that is the extent of its function. Users transact from self-custodied wallets; every ordinary acquisition and redemption is initiated and authorised by the user whose assets move, is sender-bound at the contract level, and executes against the protocol rather than against the operator. The interface holds no user assets and no private keys, executes no transactions on any user's behalf, quotes no prices (the curve does), brings together no third-party buying and selling interests, and exercises no discretion over the curve, the fee split, or any user's position. The audited contract suite contains no ordinary user-facing function by which any administrative role can sell a user's Keys. What the operator retains is a bounded set of role-gated operational functions — country registration, permission management, competition accounting, payout batching, competition buyback execution, and fee-routing configuration within the fixed split — none of which can touch user balances.

Keys confer access and participation, and nothing else. A Key carries no share or ownership interest in the operator, the protocol, or any sporting team; no voting, governance, or management rights; no right to profits, revenues, or assets; no dividend, interest, repayment, liquidation, or debt claim; no fixed or guaranteed return; and no contractual exposure to any underlying financial instrument. It is the digital means through which a holder accesses and participates in a team's market, and its price is whatever the curve computes from supply. Platform competition features (fantasy competitions and similar engagement mechanics) read the same attested performance data; they are not separate crypto-assets and confer no independently transferable right.

This function allocation is not an arrangement retrofitted to the design; it is the design. The four requirements of Section 2.3 are requirements on machinery, and the machinery is the protocol's. The interface can be rebuilt, rebranded, or replaced without touching a single market invariant — which is precisely the property Section 3 argues no rented chain can offer.

6.3 The generalisation gradient

Sport is the proving ground, chosen because its demand is authentic, generational, and violently measurable. The first application's live results — a March Madness 2026 competition reaching a $1.0 million market capitalisation with $201,000 of first-day volume, an ICC T20 World Cup 2026 competition in which the curve price of the best-performing team's Keys moved roughly thirty-fold along its verified tournament trajectory (a mechanical consequence of demand on a fixed curve, and a movement the same mechanics permit in either direction) — establish the only fact a proving ground must establish: that value with no prior market can be minted into a liquid, continuously priced instrument, and that participants transact in it at scale.

The engine is general, and the gradient beyond sport is ordered by institutional weight. **Infrastructure performance** is the first institutional-grade extension: Performance Pools referencing oracle-attested delivery indices for critical assets — energy storage foremost — in a domain where Europe's own methodology has certified multi-billion-euro value it cannot price continuously, and where the empirically modelled system-value curve for storage is downward-sloping and convex: the physics of the asset class and the shape of the chain's pricing function are, remarkably, the same curve. **Producer-linked commodities** extend continuous price discovery to primary producers currently excluded from it. **Business participation** offers liquid, performance-linked engagement without equity, debt, or a profit claim. **Verified impact** converts episodic charitable giving into durable participation anchored to attested outcomes. In every vertical the constant is the redirection: value flows toward the participants who create it rather than the intermediaries who currently capture or destroy it — and every vertical's activity drains into the same sink.

7 The Economic Constitution

PANDA is the constitutional instrument of the network, with three functions and a hard boundary. As *gas*, it meters every transaction in every zone, so its utility scales mechanically with adoption. As the *sink*, it is the fixed-supply asset — 888,000,000 units, capped — into which the Value Router's protocol-enforced share of all qualified activity flows through rule-based open-market operations. As *governance*, it directs the network within locked limits: holders may adjust oracle provider sets, verification methodology, operation scheduling, data weighting, and the admission of new markets to the factory; holders may not modify supply caps, curve forms, allocation vectors, mint-and-burn rules, or the routing identity of Section 5 — the economic constitution is beyond amendment by design, and the boundary is itself enforced in code. Governance operates on the network's infrastructure parameters; consistent with the boundary stated in Section 4.7, PANDA confers no rights in respect of any market's units and no claim on any market's reserves or pools. The single-sentence summary of the instrument's logic is the one the system's builders use internally: own one application and you own one market; own PANDA and you own the rails every market runs on. Consistent with the scope of this document, that sentence describes mechanism — fee metering, enshrined routing, bounded governance over a capped supply — and is not a representation of value or

return.

8 Related Work and Lineage

Bitcoin (Nakamoto, 2008) is the existence proof for the entire enterprise: it demonstrated that the boundary of what counts as a tradeable asset is not fixed by nature but by available architecture. It minted one asset and, by design, stopped. **Ethereum** (Buterin, 2014) generalised the ledger into a computer and made every subsequent design, this one included, expressible; its markets, however, are tenants of a machine that does not know what a market is. **Curve automated market makers** (Bancor, Uniswap and descendants) proved requirement R1 in isolation — deterministic, formulaic liquidity works — while remaining unanchored to exogenous reality (R2), extractive-neutral rather than recycling (R3), and application-layer throughout. **Prediction markets** achieve genuine anchored price discovery and then destroy it: positions resolve, capital extinguishes, and the discovered signal dies at settlement. **Fan tokens** (the Chiliz generation) supplied the demand-existence proof for sport at nine-figure scale and, in their documented structural failures — no performance linkage, no floor, no recycling — supplied the negative specification this architecture corrects. **Hyperliquid** is the nearest relative and the most instructive: the first consequential proof that a venue owning its chain can enshrine its economics, executed superbly for one product. PandaSea's departure is the primitive itself — not one sovereign market, but a sovereign factory of markets, with manufactured liquidity for value that has never traded anywhere.

9 What This Paper Does Not Claim

Papers that intend to last say plainly what they do not say. This one makes no representation about the price, value, or return of any asset it describes — not Keys, not USDp, not PANDA; the formal properties of Section 5 are claims about protocol behaviour, not about outcomes for any holder, and they presuppose correct execution of audited code, which no audit renders certain. Nor does it describe, propose, or facilitate any secondary market: Keys in the first application are closed-loop, non-transferable participation assets, and nothing in this paper should be read as contemplating their transferability, wrapping, bridging, listing, or admission to trading on any venue. The consensus-verified oracle path of Section 4.6 is specified here and shipping on the network roadmap; until it is live, the production settlement path remains the documented single-operator, role-gated model whose trust assumptions — upstream data integrity, backend calculation, operator key security — are stated in the application literature and inherited here without euphemism. USDp is, at this stage, an internal protocol unit of account as described in Section 4.8; its chain-native settlement role is roadmap, not a live instrument, and nothing here presents it as a stablecoin offered to the public. Performance figures for the chain will be published as measurements, not projections. Regulatory classification of every instrument named in this paper is jurisdiction-dependent and unsettled; the design principles that inform classification are stated in the application literature, they are positions rather than settled law, and this document — which describes infrastructure, offers

nothing, and solicits nothing — is not the instrument by which any such classification will be resolved.

10 Conclusion: The Standard

The argument of this paper compresses to four sentences. Value that cannot find a price is economically dark, and most of the value humans now create is dark. A market is the only instrument that lights it, and for genuinely new value the market must be manufactured. Manufacture has four requirements, and none of them survives tenancy on a general-purpose chain. Therefore the machinery must be sovereign — and once sovereign, the market itself becomes what scarcity became in 2008 and programmability became in 2014: a primitive.

Primitives set standards, and standards, once liquid, are extraordinarily difficult to dislodge — the incumbency of every reserve currency and every settlement rail demonstrates it. The window in which the standard for manufactured markets is set is open now and will not reopen. PandaSea's claim on that window is not a forecast; it is a shipped system: the engine live on real money through the largest sporting event on earth, the contract suite audited and running, the sovereign chain specified in this paper carrying it into constitution. Bitcoin's genesis block carried a newspaper headline about failing banks — a note on the world it was leaving. PandaSea's genesis is timed to a World Cup: a note on the world it is entering, in which the things billions of people care about most are, for the first time, things a market can see.

The first markets were places. Then they were institutions. The next markets are protocols — and the first of them is already trading.

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Scope, Risk, and Legal Notice

This document is informational and describes the design of blockchain infrastructure and open protocol mechanisms. It is not a crypto-asset white paper within the meaning of Regulation (EU) 2023/1114 (MiCA), is not a prospectus, is not an offer, solicitation, or recommendation to acquire or dispose of any instrument in any jurisdiction, and is not investment, legal, tax, or financial advice. Digital assets are speculative; prices may decline; participation involves risk of loss, including total loss. The structural properties stated herein (Sections 4–5) are properties of protocol mechanics under correct execution of the specified state machine; they are not representations regarding prices, returns, liquidity levels, or the outcome of any participant's position, and they do not apply in degenerate states (for example, a zero pool balance). Units in the first application ("Keys") are closed-loop participation assets: they are not transferable between users, are not admitted to trading on any external venue, function neither as a means of payment nor as a store of value, and are acquired and redeemed solely through predetermined protocol functionality initiated and authorised by the holder from a self-custodied wallet. They confer no ownership, governance, profit, dividend, repayment, or guaranteed-return rights and no contractual claim against any company. PANDA is the network's metering and governance asset and USDp its closed-loop settlement unit — at this stage an internal protocol unit of account, with user-facing funding and withdrawal in current production denominated in established third-party stablecoins from user-controlled wallets; neither is presented as an investment, a store of value, or a source of return; PANDA forms no part of the user-facing acquisition, holding, redemption, reward, or settlement mechanics of any market's units; and PandaSea makes no representation as to the value of either. The settlement-data trust model in production, and the planned migration to consensus-verified multi-provider attestation, are described in Section 4.6 and in the TSE WP; participants should evaluate those assumptions independently. As with all blockchain systems, undiscovered vulnerabilities in contracts, consensus, or oracle infrastructure could affect behaviour in ways not captured by the properties stated here. Regulatory classification of digital assets is jurisdiction-dependent and subject to change; nothing herein constitutes a legal conclusion. Forward-looking statements, including third-party market projections cited in Section 2, are inherently uncertain. Independent legal and financial advice should be sought before any participation decision.