ECHOES OF THE SANKOFA

Balance Curve Modeling — v1 (Design Archive)

1. Purpose of Curve Modeling

Model and test progression pacing and resource tension across Ase, Ekwan, Relics, Crafting, Research, and Hero States. Ensure steady progress, meaningful risk, and healthy long-term engagement over 10–120 hours of play.

2. Key Curves to Model

Category	Variable	Goal of Curve
Economy	Ase (active/idle), Ekwan per Realm, Relic drop rates	Smooth progress; risk-reward scaling; rarity caps t
Crafting	Success chance vs. tier; Quality tier probabilities	50–85% early; cap 95%; diminishing returns for hi
Research	Duration per tier; Ase upkeep	8–30h bands; upkeep discourages spam; multiplic
Hero States	Burnout rate; Morale recovery	Burnout 5–10% base; logistic morale recovery (~1

3. Progression Time Targets

Phase	Hours (Casual)	Key Unlocks	Player Loop
Early (0–20h)	15–20	Shrine / Forge / Library	Learn crafting & research; first rituals
Mid (20–60h)	40	Caretaker / Tactical / Marketplace	Optimize economy; multi-path research
Late (60–120h)	60	Multi-Team / Forge Specialization / Ascension	Full Sanctum play; rare relic loop
Post-120h	—	Forbidden branches / Legacy focus	Endgame replay & mastery

4. Simulation Metrics to Track

- Ase: per-minute generation/spend; research upkeep; buff windows.
- Ekwan: inflow per Realm; outflow to research/rank-ups.
- Relics: drop rate by Realm tier; consumption by crafting/rank-ups/rituals.
- Crafting: attempts, success%, rarity distribution; Ase infusion usage.
- Research: active projects, duration, upkeep total; scholar trait impact.
- Hero States: burnout frequency, corruption rate, morale distribution.
- Events: Echo Shade fights, Redemption outcomes, Insight Visions.
- Throughput: crafts/day, research/day, Realms/day; bottleneck identification.

5. Modeling Tools (for MVP Simulation)

- JSON constants for tunables (HeroTraits.json, RecipeTier.json, ResearchTree.json, WorldProgression.json).

- Python simulation with deterministic seed; 10,000 cycles (~400 game-days).
- Outputs: CSV logs + quick plots (Ase over time, success%, event frequencies).
- What-if toggles to test elasticity (+/- Ase, +/- success, +/- drop rates).

6. Curve Prototypes (Initial Formulas)

Ase (Energy): Ase/min = Base × (1 + SanctumBonus) × ActivityMultiplier.

Active = 1.0–1.5×; Idle = 0.25× for up to 3 days, then 0 until Rekindling. Boosted by Shrine/Faith tree.

Relic Rarity: Common 55%, Rare 30%, Blessed 12%, Divine 3% (effective intervals scale by Realm).

Craft Success: Success% = Base + 2×Wis + 1.5×Faith + 0.05×AseInfusion; cap at 95%. Fail → partial refund and fatigue risks.

Research Time: Duration = Base × (1 + 0.25×Tier). Ase Upkeep/min = 0.2 + 0.05×Tier. Scholar speed stacks multiplicatively.

Burnout: Base 5–10% on fail; Ambition adds +10%. Logistic morale recovery to ~100% in ~12h with Shrine support.

7. Primary Balance Levers

- Ase: Base rate, SanctumBonus curve, Activity multipliers, Shrine/Faith buffs.
- Relics: Drop weights per Realm tier; pity timers; Forbidden branch access rate.
- Crafting: Base success per recipe tier; Ase infusion effectiveness; quality weights.
- Research: Cost/duration/upkeep per tier; scholar bonuses; tree unlock gates.
- Hero States: Burnout/corruption probabilities; morale drain/recovery magnitudes.

8. Outcome Goals (Success Criteria)

- Ase surplus averages +10%/day after typical play (progress always possible).
- Average craft success ≈ 70%; 1 Divine-quality item per ~50 hours of engaged play.
- Research cycle duration median 10–16h; aligns with daily check-in cadence.
- Relic throughput self-limits (consumption ≈ gain within ±15% in midgame).
- Burnout < 12%/day per active hero; morale baseline >70% outside defeat states.
- Progress milestones hit on schedule: Early 15–20h, Mid 40h, Late 60h (to 120h).

9. Roadmap for Simulation & Tuning

- Define constants JSONs and seed ranges.
- Implement daily cycle simulator (battle → collect → craft/research → rest).
- Run baseline; export metrics; identify bottlenecks.
- Iterate with what-if toggles; lock v1 curves; document deltas for GDD.

10. Key Validation Goals (Must Pass Before MVP Build)

- ■ No hard stalls: Ase, Ekwan, and Relics each maintain positive expected value over 3-day windows.
- ■ Emotional risk is real but fair: Burnout/Corruption/Crises occur, but average hero retention >85% per week.
- ■ Research cadence supports return loop: at least one project completes per real-world day in midgame.
- ■ Defeat hurts but recovers: full wipe → recovery to functional squad within 24–48h of casual play.
- ■ Unlock timing: first three major unlocks (Shrine/Forge/Library) within 15–20h; Multi-Team by ~90–100h.
- ■ Player agency grows: measurable benefit from Tactical Planning unlocks (≥10% improvement in success rate).
- ■ Economy elasticity: ±20% changes to Ase or success% do not collapse pacing (robustness test).