SNAP-BASED OPEN ECOSYSTEM BANKING BUSINESS MODEL: AN IMRAD FRAMEWORK FOR SCALABILITY, FINTECH COLLABORATION, AND API MONETIZATION

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Abstract

Digital banks are increasingly transitioning from product-centric institutions to platform orchestrators that enable multi-actor financial ecosystems through standardized application programming interfaces (APIs). In Indonesia, Standar Nasional Open API Pembayaran (SNAP)—issued by Bank Indonesia—formalizes technical, data, security, governance, and risk requirements to support interoperability and safe collaboration in payment-related Open APIs Source. This study develops an IMRAD-based conceptual framework for a SNAP-based open ecosystem banking business model and explains how standardization can accelerate scaling, strengthen fintech partnerships, and unlock API monetization opportunities while maintaining regulatory alignment. Using a qualitative, document-driven approach, the research synthesizes SNAP regulatory materials with established literature on platform ecosystems, ecosystem governance, and API management capability. The analysis maps SNAP's regulatory scope (interconnection/interoperability, information security, governance, and risk management) into actionable design dimensions for digital banks, including API portfolio structuring, partner onboarding mechanisms, consent/authorization controls, and third-party risk governance Source. The resulting framework highlights three strategic outcomes. First, SNAP reduces bilateral integration complexity by encouraging standardized interfaces and shared implementation practices, improving ecosystem readiness and time-to-market. Second, it enables scalable collaboration by clarifying stakeholder roles and governance expectations across banks, payment service providers, and non-bank partners. Third, it supports new revenue logics—such as usage-based pricing, tiered access, and value-added API services—by treating APIs as managed products within a governed platform. The study concludes that SNAP can function as a national-level "rulebook" for ecosystem banking, helping digital banks shift from standalone service providers to trusted enablers of Indonesia's digital economy while balancing innovation, security, and compliance.

Keywords: *Open banking; Open API; SNAP; Digital banking platforms; Platform ecosystems; API governance; API monetization*

1. INTRODUCTION
1.1 Background

Digital banking is increasingly shifting from a product-centric model toward a platform- and ecosystem-based model in which banks enable third parties to build, embed, and scale financial services through standardized interfaces. This shift is strongly associated with open banking, defined as the sharing and leveraging of customer-permissioned data via APIs to create new applications and services, such as faster payments, greater transparency, and improved account services. However, open banking also expands banks' exposure to strategic, operational, cybersecurity, and third-party risks, and it raises governance questions regarding liability, data protection, and oversight of external partners. These dynamics make API standardization and governance central issues for digital banking transformation.

In Indonesia, the ecosystem shift is institutionally supported through Standar Nasional Open API Pembayaran (SNAP), a national standard issued by Bank Indonesia for payment-related Open APIs. SNAP is designed to foster a payment industry that is healthy, competitive, and innovative, while simultaneously promoting integration, interconnection, interoperability, and the security and reliability of national payment infrastructure. In practical terms, SNAP standardizes not only technical and data specifications but also governance-related dimensions—such as consumer protection, data protection, prudential requirements for providers/users, and contractual arrangements—thereby positioning standardization as a mechanism to accelerate collaboration without compromising compliance.

The implementing regulation further clarifies why such a standard matter for ecosystem banking. It frames SNAP as a policy instrument to ensure that Open API connectivity operates effectively and efficiently, establishes clearer roles and responsibilities among participating entities, and supports a more level playing field across banks, non-bank payment service providers, and non-PJP partners participating in Open API payment arrangements. Moreover, the regulation specifies SNAP's scope across four core domains—interconnection/interoperability, information security standards, governance, and risk management—and outlines standardized API categories (e.g., registration, balance information, transaction history, credit transfer, and debit transfer) that can be mapped into scalable ecosystem use cases and potential monetization logic.

At the industry level, SNAP's governance and technical references are also consolidated through the Asosiasi Sistem Pembayaran Indonesia (ASPI), which provides access points to SNAP governance documentation and the developer portal. This institutional arrangement indicates an ecosystem approach in which the regulator sets the national direction and baseline standard, while industry bodies support broader adoption, technical dissemination, and operational alignment—an important condition for achieving nationwide interoperability and accelerating partner onboarding across heterogeneous digital platforms.

1.2 Problem Statement

Digital banking is rapidly evolving toward platform-based ecosystems in which banks expose capabilities through Open APIs to collaborate with fintechs and digital platforms. While this ecosystem logic promises faster innovation and broader reach, global open banking experience shows that increased connectivity also amplifies third-party risk, cybersecurity exposure, data misuse concerns, and ambiguity in responsibility and liability, especially when multiple actors interact across the service delivery chain. These issues create a strategic tension for banks: how to open access for ecosystem growth while maintaining safety, soundness, and consumer protection.

In Indonesia, SNAP (Standar Nasional Open API Pembayaran) is intended to address this tension by establishing a national standard that supports a healthy and innovative payment ecosystem while strengthening integration, interconnection, interoperability, and security. However, despite SNAP's policy objectives and its implementing guidance (covering interoperability, security standards, governance, and risk management), there is still a practical gap in the literature and industry practice regarding how SNAP should be translated into an operational business model for digital banks—particularly one that connects: (1) platform strategy (bank as ecosystem orchestrator), (2) API portfolio design (what to expose and how), (3) governance and risk controls (partner onboarding, consent/authorization, auditability), and (4) value capture through sustainable API monetization mechanisms.

Accordingly, the core problem addressed in this study is the absence of a clear, research-grounded framework that integrates SNAP's regulatory requirements with information systems design choices and management strategy to explain how Indonesian digital banks can scale ecosystem collaboration and monetize APIs without weakening compliance and trust. This

problem is increasingly relevant as SNAP information and industry implementation references are disseminated through institutional channels such as ASPI and developer portals, yet banks and partners still require a coherent blueprint that links standard compliance to measurable ecosystem outcomes.

1.3 Research Objectives

This study aims to produce a measurable, implementation-oriented framework for a SNAP-based open ecosystem banking business model. Specifically, the research objectives are to:

1. Develop an "Open Ecosystem + SNAP" business model framework that explicitly links the digital bank's role as a platform orchestrator, Open APIs as collaboration gateways, and SNAP as the national standard (measurable output: a finalized framework with clearly defined dimensions and components grounded in SNAP documentation and prior research).
2. Operationalize a SNAP-aligned Open API portfolio into ecosystem use cases, based on standardized API categories (e.g., registration, balance information, transaction history, credit transfer, debit transfer) (measurable output: a structured mapping table of API category → use case → value proposition, plus a prioritized list of APIs/use cases).
3. Define measurable ecosystem performance and API monetization indicators for digital banks (measurable output: a KPI set such as partner onboarding time, number of integrated partners, API transaction volume, integration success rate, and monetization options such as usage-based pricing, tiered access, and value-added API services).
4. Specify a SNAP-consistent governance and third-party risk control blueprint to support secure and compliant ecosystem collaboration (measurable output: a minimum-control checklist covering consent/authorization flows, auditability, partner due diligence/verification readiness, and security-governance controls aligned with SNAP scope).

1.4 Contributions

This study provides contributions to both Information Systems and Digital Banking/Management research and practice by translating Indonesia's SNAP standard into an actionable ecosystem-banking logic.

1.4.1 Theoretical contributions

First, the study extends open banking and ecosystem scholarship by integrating open banking risk and supervisory concerns with a platform-ecosystem view, showing why standardization and governance are not merely technical choices but core determinants of value creation and capture in banking ecosystems. In doing so, it positions SNAP as a national-level mechanism to mitigate well-documented open banking challenges such as third-party risk, cybersecurity exposure, and fragmented standards.

Second, the study contributes a context-specific conceptualization of ecosystem formation in regulated financial services by mapping SNAP's policy intent (healthy, competitive, innovative payments; interoperability and security) into a structured ecosystem model suitable for platform strategy theorizing and further empirical testing.

1.4.2 Methodological contributions

Third, the study contributes an operational research blueprint by converting SNAP's regulatory scope—interconnection/interoperability, information security, governance, and risk management—into measurable constructs and implementation dimensions that can be used to build instruments (e.g., interview protocols, survey indicators, and maturity assessment items) for subsequent quantitative validation.

1.4.3 Practical contributions

Fourth, the study provides practitioners (digital banks, fintechs, and platform partners) with a practical framework to (i) design a SNAP-aligned API portfolio, (ii) accelerate partner onboarding through standardized interfaces, and (iii) identify monetization pathways while maintaining compliance and trust through standardized governance controls. This is especially relevant as SNAP implementation references and access points are increasingly consolidated through industry channels.

2. LITERATURE REVIEW
2.1 Open Banking and APIs as Ecosystem Infrastructure

Open banking represents a structural shift in financial services from vertically integrated banking toward networked value creation, where banks expose capabilities and/or customer-permissioned data to third parties through standardized interfaces. In this configuration, APIs become ecosystem infrastructure: they reduce coordination costs across organizational boundaries, enable modular service composition, and accelerate innovation by allowing fintechs and digital platforms to build on top of bank-enabled services rather than duplicating core banking capabilities. The Basel Committee on Banking Supervision (BCBS) frames open banking primarily as the sharing of customer-permissioned bank data with third-party developers to enable new applications and services that can improve efficiency and transparency in banking markets (Basel Committee on Banking Supervision [BCBS], 2018). However, BCBS also emphasizes that this increased interconnectivity expands the operational surface area of banking, reshaping competition and requiring stronger supervisory attention to data sharing and multi-party connectivity (BCBS, 2019).

From an ecosystem perspective, open banking APIs function as boundary resources that mediate interactions between a platform owner (e.g., a bank) and complementors (e.g., fintechs, merchants, payment service providers). In well-governed ecosystems, boundary resources—APIs, SDKs, documentation, testing environments, and certification processes—enable scalable participation while preserving platform integrity, an essential requirement in financial services where trust and compliance are core assets (Schreieck et al., 2017). This infrastructure logic is consistent with ecosystem theory that treats ecosystems as structured configurations of interdependent actors and complementarities requiring orchestration and governance mechanisms to coordinate value creation and value capture (Adner, 2017; Wareham et al., 2014).

Nevertheless, the same properties that make APIs powerful—openness, modularity, and connectivity—also create material risks. The BCBS highlights challenges that include business model disruption, reputational risk, data governance complexity, cybersecurity exposure, and heightened third-party risk management demands, as services are delivered through chains of interconnected entities rather than a single bank (BCBS, 2019). This implies that open banking infrastructure cannot be assessed only through a technology lens; it must be evaluated as a socio-technical system in which security controls, liability allocation, partner eligibility, and auditability are integral to design. In practice, jurisdictions vary in approach (e.g., prescriptive regulation versus market-driven regimes), but the common requirement is the ability to move from ad hoc integrations toward standardized, governable API-based connectivity that reduces fragmentation and operational ambiguity (BCBS, 2018; Boston Consulting Group, 2020).

A central pillar enabling ecosystem infrastructure is consumer consent and access control. Open Banking Limited (n.d.) underscores that participation requires explicit customer consent (not automatic opt-in), that customers can control what data is shared and for how long, and that consent can be withdrawn—reinforcing the idea that "open" must be conditional on strong identity, authentication, and authorization practices. This consent-centric design is directly relevant to ecosystem banking because customer trust becomes a scalable resource: without credible protection, openness can amplify harm faster than value creation (CGAP, 2020).

To operationalize open banking as ecosystem infrastructure, banks also require API governance and management capabilities that convert APIs from "integration artifacts" into "managed products." This includes lifecycle management, security, performance, observability, developer experience/community enablement, and commercial/monetization practices (Mobey Forum, 2022). A peer-reviewed maturity-model perspective—the API-m-FAMM—specifies focus areas that can be used as evaluative dimensions when assessing an organization's readiness to run APIs at ecosystem scale, particularly relevant for digital banks seeking to scale partner onboarding and service reuse across multiple fintech and platform collaborations (Overeem et al., 2022).

Finally, open banking infrastructure has strategic implications for digital banks: it enables a shift from "product provider" to ecosystem enabler, but only when combined with clear governance of participation, standardized technical/security profiles, and mechanisms for value capture such as tiered access, usage-based pricing, or value-added API services (Boston Consulting Group, 2020; Gawer, 2021). In emerging markets, this ecosystem lens is frequently linked to inclusion-oriented innovation, where standardized data access and interoperable rails can lower costs for new services—provided the regime's design choices around consent, liability, accreditation, and dispute handling protect end users (CGAP, 2020).

2.2 SNAP as Indonesia's National Open API Payment Standard

Indonesia institutionalizes payment-focused openness through SNAP (Standar Nasional Open API Pembayaran), a national standard initiated by Bank Indonesia (BI) and established via Governor Decree No. 23/10/KEP.GBI/2021 dated 16 August 2021 (Bank Indonesia, n.d.). SNAP is positioned as a policy instrument to support the Blueprint Sistem Pembayaran Indonesia 2025 (BSPI 2025), aiming to (1) foster a healthy, competitive, and innovative payments industry; (2) strengthen integration, interconnection, interoperability, and the security and reliability of payment infrastructure; and (3) promote fair and efficient market practices (Bank Indonesia, 2021a).

SNAP standardizes both the "technical stack" and the "governance stack" required for scalable interoperability. On the technical side, SNAP specifies communication protocols, API architecture types, data structures and formats, authentication, authorization, encryption, API access management, and request/response structures—reducing bespoke bilateral integration and enabling repeatable onboarding patterns across ecosystem partners (Asosiasi Sistem Pembayaran Indonesia [ASPI], 2021). On the governance side, SNAP includes a dedicated governance guideline covering consumer protection, data protection, prudential requirements for providers and users, and contractual standards—critical in a multi-actor ecosystem where responsibilities and liabilities must be explicitly managed (ASPI, 2021).

Operationally, BI's implementing regulation clarifies scope and roles in an open API payments ecosystem. It defines Open API Payments as APIs made openly available where connectivity access is granted based on agreements between service providers and service users for processing payment transactions (Bank Indonesia, 2021a). It also defines the ecosystem roles of Service Providers (payment service providers offering SNAP-based Open API services) and Service Users (payment service providers or non-PSP entities consuming SNAP-based Open APIs) (Bank Indonesia, 2021b). SNAP's scope covers four dimensions: interconnection/interoperability, information security standards, governance, and risk management—a design space that directly supports research operationalization in IS and management (Bank Indonesia, 2021a; ASPI, n.d.).

A further institutional change is the governance handover effective 1 September 2023, when SNAP's management was officially transferred from BI to the Indonesian Payment Systems Association (ASPI). This shift underscores SNAP's intended trajectory as a living industry standard supported by an ecosystem organization, while BI remains a policy authority

and continues to coordinate with ASPI for adoption acceleration and innovation (ASPI, n.d.; ASPI, 2021).

2.3 Management Perspective: Platform Strategy and Ecosystem Orchestration

From a management and information-systems perspective, open banking and standardized APIs enable banks—especially digital banks—to compete as platform organizations rather than as standalone product firms. Ecosystem theory frames competitive advantage as emerging from the configuration and governance of interdependent actors—banks, fintechs, merchants, PSPs, and digital platforms—that jointly deliver a customer-facing value proposition (Adner, 2017). A structural view emphasizes that an ecosystem is not merely a "network" but a coordinated structure of complementarities whose performance depends on alignment across roles, interfaces, and governance rules (Cennamo et al., 2018).

A complementary strategy view explains that ecosystems become viable when modularity allows distinct organizations to coordinate without hierarchical integration; APIs are a primary mechanism by which modularity is implemented in digital financial services (Gawer, 2021). Under this lens, banks orchestrate ecosystems by designing boundary conditions—what is opened, to whom, under what assurance levels, and under what value-capture logic—rather than by building every customer journey internally (Schreieck et al., 2017).

Governance is the managerial "control plane" of ecosystems. Platform owners must balance tensions such as standardization versus variety, control versus autonomy, and collective value versus individual incentives—tensions that are particularly pronounced in regulated financial services where compliance and resilience constrain the degrees of freedom available to complementors (Wareham et al., 2014). This governance challenge explains why open-ecosystem banking cannot rely on ad hoc partner agreements alone; it requires repeatable governance mechanisms and standardized boundary resources to scale safely (Schreieck et al., 2017; Cennamo et al., 2018).

In practical terms, this manuscript's "Open Ecosystem + SNAP" model positions SNAP as the institutional boundary resource that lowers coordination cost through standard interfaces and reduces uncertainty through explicit governance requirements (Bank Indonesia, 2021a; ASPI, 2021). It thereby supports platform strategy outcomes such as faster partner onboarding, reusable API portfolios, and a clearer path to monetizing APIs as products—while preserving regulated controls (Boston Consulting Group, 2020; Mobey Forum, 2022). This logic is consistent with the BCBS view that increased connectivity amplifies third-party and cybersecurity risks, implying that ecosystem growth must be accompanied by disciplined governance and risk management (BCBS, 2019).

2.4 Consumer Protection, Consent, and Trust

Open API ecosystems in finance are ultimately constrained by trust: users must believe that data sharing and payment initiation are safe, controllable, and accountable. Regulatory and industry guidance in open banking emphasizes that openness is conditional on explicit consent, user control over scope and duration of access, and the ability to withdraw consent (Open Banking Limited, n.d.). Open Banking Limited (n.d.) highlights that users decide which applications can access data and for how long, and that access can be cancelled either through the third-party provider or through the bank—illustrating an ecosystem design principle where consent is a continuous control mechanism, not a one-time event. CGAP (2020) further argues that consumer trust is a foundational precondition for inclusion outcomes, as absent credible protection, openness may amplify harm faster than it creates value.

SNAP's governance guideline operationalizes these trust requirements for Indonesia's payment open API context by prescribing minimum governance practices across consumer protection and data protection (ASPI, 2021). It frames consumers as potentially vulnerable and

stresses principles such as fairness, transparency, financial literacy, responsible conduct, asset protection, and data protection (ASPI, 2021). It also requires that Open API providers and users obtain consent for using consumer data, manage consent withdrawal, and implement mechanisms for data deletion and destruction subject to retention and legal obligations—providing a concrete governance scaffold for ecosystem banking (ASPI, 2021; Bank Indonesia, 2021a).

Beyond consent, trust also depends on operational redress. SNAP governance includes requirements for complaint handling that is accessible, accountable, timely, and efficient, with documented procedures and defined timelines (ASPI, 2021)—important because in ecosystem delivery chains, service failures may originate from multiple parties. This reinforces the BCBS concern that open banking increases connectivity and complexity, making accountability and consumer protection mechanisms integral to system stability and legitimacy (BCBS, 2019). Finally, in emerging markets, consumer trust interacts with inclusion outcomes. CGAP (2020) argues that design components—especially around consent, governance, and user protections—are decisive for whether open banking expands access safely for underserved populations. This provides a development-oriented rationale for why SNAP's governance stack, not only its technical specifications, should be treated as a core component of ecosystem infrastructure (ASPI, 2021; CGAP, 2020).

3. METHODS
3.1 Research Design

This study adopts a qualitative, document-based research design using regulatory and governance analysis to develop the proposed framework of a "SNAP-based Open Ecosystem Banking Business Model." The design is appropriate because SNAP is a national standard that formally specifies (i) what must be standardized in Open API Payments, (ii) how multi-actor collaboration should be organized, and (iii) what minimum governance and risk controls are required. Therefore, the study's primary objective is to derive (rather than merely assume) business-model components—actors, roles, value logic, processes, and controls—from authoritative policy and standard-setting documents.

Analytically, SNAP is treated as an ecosystem "rulebook" and an Information Systems artifact that structures inter-organizational connectivity through Open APIs. The research focuses on how SNAP's scope—covering interconnection/interoperability, information security standards, governance, and risk management—can be translated into an actionable platform-ecosystem business model for digital banks, including partner onboarding mechanisms, consent-based data access, and auditability requirements.

The design draws on four core documentary sources as primary evidence: (1) Bank Indonesia's SNAP standard page for definition, policy objectives, and standardized components; (2) the PADG SNAP implementation summary for roles, Open API categories, and verification/testing mechanisms; (3) ASPI's SNAP overview as the post-handover operational reference point; and (4) the SNAP Governance Guidelines covering consumer protection, data protection, prudential requirements, and minimum contractual clauses—elements that operationalize "governed openness" in payment ecosystems.

Expected outputs of this research design are: (1) a structured "Open Ecosystem + SNAP" business-model framework; (2) a mapping from SNAP-aligned API categories to ecosystem use cases and value mechanisms; and (3) a minimum governance-control blueprint (e.g., consent, complaint handling, data protection, and contract requirements) to support scalable collaboration and API monetization under regulatory alignment.

3.2 Unit of Analysis

The unit of analysis in this study is the SNAP-based open-ecosystem banking business model implemented by a digital bank as a platform that exposes Open API Payments to external ecosystem partners under the national SNAP standard.

More specifically, the unit of analysis is conceptualized at three nested levels:

Platform level (digital bank as a platform organization)

The bank is treated as the platform owner that designs and governs an API-enabled ecosystem (e.g., defining which capabilities are exposed, how access is granted, and how ecosystem value is created and captured). This positioning is consistent with SNAP's framing of standardization as an enabler of a healthy, competitive, and innovative payments industry while strengthening interoperability and infrastructure security.

Inter-organizational level (Open API Payment connectivity under SNAP)

At this level, the unit of analysis is the standardized connectivity relationship between Service Providers (Penyedia Layanan) and Service Users (Pengguna Layanan—both PSP and non-PSP entities) as defined by the implementation regulation. This includes the operational mechanisms of onboarding and compliance such as Developer Site registration, testing, and verification/recommendation processes that function as ecosystem "entry gates" and quality assurance for interoperability.

Governance and trust level (consumer protection and data protection controls)

The unit of analysis also includes the governance layer that operationalizes "governed openness," particularly requirements for consumer consent, consent withdrawal, complaint handling, data protection practices, and minimum contractual clauses between ecosystem parties. These controls are treated as constitutive elements of the business model because they directly affect ecosystem scalability, risk exposure, and the feasibility of API monetization in regulated payments.

Boundary conditions of the unit of analysis.

The study focuses on payment-related Open APIs within SNAP's scope (e.g., registration, balance information, transaction history, credit transfer, debit transfer, and other categories determined by BI) and does not attempt to generalize to all forms of open finance beyond the payment domain.

3.3 Data Collection

This study collected data through a systematic documentary collection of authoritative, publicly available materials that define and operationalize Indonesia's SNAP (Standar Nasional Open API Pembayaran) as well as comparative open-banking governance principles. Data collection focused on capturing (i) formal definitions and policy objectives, (ii) implementation mechanisms and roles, and (iii) governance controls required for consumer protection, data protection, and ecosystem risk management.

3.3.1 Primary Documentary Sources (Indonesia: SNAP)

Four primary sources were collected as the core empirical basis because they represent the most authoritative articulation of SNAP's objectives, scope, and governance mechanisms:

Bank Indonesia (BI) SNAP official page—used to capture SNAP's policy intent, standardized components (technical/security/data specs), and the official note on the transfer of SNAP management to ASPI.

BI PADG SNAP implementation summary page (PADG No. 23/15/PADG/2021)—used to extract: formal definitions (API, Open API Payments, SNAP), scope (interoperability, security, governance, risk management), API categories (e.g., registration, balance information, transaction history, credit/debit transfer), and implementation instruments such as Developer Site, testing, verification, and enforcement logic.

ASPI SNAP overview page—used as an operational reference after the governance handover, including access points to governance documents and the developer portal.

SNAP Governance Guidelines (Pedoman Tata Kelola)—collected as the primary evidence for consumer protection, data protection (consent/withdrawal/deletion), complaint handling, prudential requirements, and minimum contractual clauses—i.e., the "governance stack" enabling governed openness.

3.3.2 Secondary Sources (International Benchmarks and Theory Anchors)

To triangulate SNAP with broader open-banking ecosystem infrastructure and risk framing, the study collected three secondary benchmark sources:

BCBS open banking and APIs report—used to establish international framing of open banking benefits and ecosystem risks (data, cyber, third-party risk) and to justify why governance must scale with connectivity. Source

Open Banking UK FAQs—used to capture practical, consumer-facing principles (explicit consent, access control, withdrawal, safety/security framing) to contextualize trust requirements in open API ecosystems.

CGAP working paper on open banking for financial inclusion—used to connect open banking design components with inclusion and protection considerations relevant to emerging markets.

3.3.3 Collection Procedure and Inclusion Criteria

Documents were collected by downloading/archiving the latest accessible versions and retaining their URLs for auditability. Inclusion criteria were:

Authority: issued by regulators/standard bodies (BI, ASPI, BCBS) or widely recognized governance references (Open Banking UK, CGAP).

Relevance: explicitly addresses Open API payments, SNAP implementation, ecosystem roles, testing/verification, or governance controls.

Extractability: contains statements that can be coded into business-model elements (actors, value logic, processes, controls, obligations).

3.3.4 Data Extraction Outputs

From the collected sources, the study extracted and compiled:

A regulatory requirements matrix (scope → obligations → operational mechanisms), derived primarily from PADG SNAP and SNAP governance guidelines.

A governance-control list (consent, complaint handling, data protection, breach response, minimum contract clauses).

A SNAP capability map based on standardized API categories for Open API Payments (used later to map API categories to use cases and monetization options).

3.4 Constructs and Variables (Operational Examples)

This study operationalizes the "Open Ecosystem + SNAP" business model into measurable constructs by translating SNAP's regulatory scope—interconnection/interoperability, information security, governance, and risk management—into platform-ecosystem constructs suitable for Information Systems and Digital Banking research.

Construct A — SNAP-aligned Interoperability Readiness (SIR)

Definition: The extent to which a digital bank's Open API Payments are designed to support standardized interconnection and interoperability.

Operational indicators (examples): (i) completeness of standardized request/response structures; (ii) compliance with standardized API architecture and protocol requirements; (iii) reusability of APIs across partners (reduced need for bespoke integration).

Construct B — API Security & Access Control Maturity (ASACM)

Definition: The degree to which the platform implements security and access management aligned with SNAP's technical/security requirements.

Operational indicators (examples): (i) authentication/authorization mechanisms for Open API access; (ii) encryption practices; (iii) API access management controls; (iv) existence of security testing within SNAP-aligned development and maintenance procedures. Source

Construct C — Ecosystem Governance Effectiveness (EGE)

Definition: The effectiveness of governance mechanisms that enable scalable partner participation while preserving compliance and auditability.

Operational indicators (examples): (i) formal partner onboarding gates using Developer Site processes (registration, testing, verification); (ii) clarity of roles and responsibilities between Service Providers and Service Users; (iii) existence of documented operational procedures for change, maintenance, and partner eligibility assessment.

Construct D — Consumer Consent & Data Protection Capability (CCDPC)

Definition: The capability to obtain, manage, and revoke consumer consent while protecting consumer data across ecosystem participants.

Operational indicators (examples): (i) explicit consent captured in recorded/written form; (ii) consent withdrawal mechanism; (iii) data usage limited to specified purposes; (iv) data deletion/destruction mechanisms subject to legal retention; (v) breach handling procedures.

Comparative benchmark (optional indicator rationale): explicit consent and user control as core open banking protection principle.

Construct E — Partner Onboarding Efficiency (POE)

Definition: Speed and predictability of onboarding fintech/platform partners under SNAP-aligned processes.

Operational indicators (examples): (i) time-to-first-successful-integration (days/weeks); (ii) number of iterations to pass testing; (iii) ratio of partners passing verification within target time. (Derived from SNAP's standardized testing/verification logic.)

Construct F — API Monetization Readiness (AMR)

Definition: Readiness to treat APIs as "products" with measurable usage and commercialization logic under governed openness.

Operational indicators (examples): (i) existence of API portfolio by standardized categories (registration, balance info, transaction history, credit/debit transfer); (ii) availability of usage metrics for pricing (transaction count, call volume); (iii) policy for tiered access/value-added services consistent with governance constraints.

3.5 Data Analysis
The analysis follows a thematic coding + regulatory-to-model mapping procedure designed to ensure replicability in IS and management research.

Step 1 — Document segmentation and coding
All primary documents (BI SNAP page, PADG SNAP summary, ASPI SNAP page, and SNAP Governance Guidelines) are segmented into analyzable units (definitions, obligations, processes, roles, timelines, controls). Codes are assigned using a pre-defined scheme aligned with SNAP's scope:
(a) interoperability; (b) security standards; (c) governance mechanisms; (d) risk management; plus cross-cutting themes: consent, auditability, partner onboarding, and commercialization.

Step 2 — Regulatory-to-construct translation (construct derivation)
Each coded segment is mapped into constructs in Section 3.4. For example, PADG's Developer Site/testing/verifications are mapped to "Ecosystem Governance Effectiveness" and "Partner Onboarding Efficiency," while SNAP Governance Guidelines are mapped to "Consumer Consent & Data Protection Capability."

Step 3 — Business-model synthesis (Open Ecosystem + SNAP)
The mapped constructs are synthesized into a business model logic:
Value creation: standardized interoperability enables faster integration and broader complementor participation.
Value delivery: governed onboarding/testing/verifications ensure quality and compliance.
Value capture: APIs are treated as productized capabilities supported by measurement and controlled access (monetization readiness).
This synthesis is then triangulated against ecosystem risk framing in the BCBS report to avoid "open without governance" claims.

Step 4 — Output artifacts
The analysis produces: (i) a finalized conceptual framework; (ii) an API-category-to-use-case mapping using SNAP API categories; and (iii) a minimum governance-control blueprint derived from the SNAP Governance Guidelines (consent, complaints, data breach response, minimum contract clauses).

3.6 Validity and Reliability
Because this is a qualitative, document-based study, rigor is established via trustworthiness criteria (credibility, dependability, confirmability) and transparent linkage between sources and derived constructs.

3.6.1 Credibility
Source triangulation across BI SNAP, PADG implementation summary, ASPI SNAP page, and SNAP Governance Guidelines to ensure consistent interpretation of scope, roles, and required controls.
External benchmark triangulation using BCBS (risk and supervisory implications) and Open Banking UK (explicit consent and user control) to validate that the derived governance logic is aligned with international open banking principles.
3.6.2 Dependability (process consistency)

Audit trail: maintaining a traceable chain from document excerpt → code → construct → framework element.

Codebook stability: using SNAP's four-domain scope as the fixed backbone of the coding scheme, reducing interpretive drift.

3.6.3 Confirmability (bias control)
Rule-based mapping: constructs are derived only when explicit textual support exists in SNAP/PADG/Governance Guidelines; claims outside the documents are marked as theoretical implications and supported with external references (e.g., BCBS).

3.6.4 Reliability for future empirical extension (optional)
If the study is extended into interviews/surveys, the constructs in 3.4 can become measurable scales, and reliability can be tested using internal consistency metrics (e.g., Cronbach's alpha/CR) and construct validity checks (e.g., convergent/discriminant validity). The operational definitions remain anchored in SNAP's formal scope and governance requirements, supporting measurement consistency across studies.

4. RESULTS
4.1 "Open Ecosystem + SNAP" Business Model Framework
Figure 1 presents the proposed **"Open Ecosystem + SNAP"** business model, in which a digital bank competes as a **platform** by exposing standardized payment capabilities through **SNAP-compliant Open APIs**, while retaining governed openness through security, risk, and consumer-protection controls.

Figure 1. Open Ecosystem + SNAP Business Model (text-based framework)
External Complementors (Fintechs / Merchants / Platforms / Non-PSPs)

(Partner onboarding: registration → testing → verification)
via Developer Site + governance/contract requirements

SNAP-Based Open API Payments (Standardized Boundary Resources)
- Standardized interfaces (request/response, protocols, architecture)
- Security & access control (authentication/authorization/encryption)
- Governance & risk (roles, verification, auditability, controls)

Digital Bank as Platform (Orchestrator)
- API product portfolio & lifecycle management
- Partner management & ecosystem governance
- Compliance alignment & operational resilience

Value Creation & Capture
- Faster scaling (reusable integration patterns)
- Collaboration (fintech/platform use-case expansion)
- Monetization (usage-based / tiered access / value-added services)
- National interoperability & infrastructure reliability

Framework logic (results of the document-based synthesis).
1. **Bank as platform orchestrator.** The bank shifts from selling isolated products to enabling multi-party customer journeys by exposing modular capabilities through Open APIs. SNAP provides the standardization foundation that reduces bespoke integrations and improves repeatability.

2. **Open API as the collaboration gateway.** The PADG implementation summary defines Open API Payments as openly used APIs where connectivity is granted through agreements between service providers and service users, explicitly framing API connectivity as an inter-organizational mechanism.
3. **SNAP as the "national rulebook."** SNAP standardizes technical/security/data specifications (e.g., architecture, authentication/authorization, encryption, access management, request/response structure) and complements them with governance requirements (consumer protection, data protection, prudential requirements, contract standards). This creates "**governed openness**" suitable for regulated payment ecosystems.
4. **Industry governance handover (implementation relevance).** The transfer of SNAP management to **ASPI** (effective 1 September 2023) supports SNAP's role as an evolving ecosystem standard with operational dissemination through an industry body

4.2 API Service Portfolio (Aligned with SNAP Scope)
Based on PADG SNAP, the standardized API categories provide a practical backbone for a **SNAP-aligned API portfolio** that can be treated as productized capabilities. PADG identifies API categories including **registration, balance information, transaction history information, credit transfer, debit transfer**, and other categories determined by BI.

Table 1. SNAP-aligned API service portfolio → ecosystem use cases → value logic (operational mapping)

SNAP API category (PADG)	Typical ecosystem use cases enabled	Primary value to platform-bank	Governance "must-haves" (SNAP governance layer)
Registration	Partner onboarding, account/service enrollment journeys, KYC-adjacent initiation flows (where applicable)	Lower onboarding friction; standardized entry gate	Contract minimum clauses; partner eligibility; audit trail
Balance information	Cashflow visibility for merchant/fintech apps; affordability checks; treasury dashboards	Increased stickiness; embedded finance experiences	Consent for data use; purpose limitation; access control
Transaction history	Personal finance management, SME bookkeeping, analytics, risk scoring inputs	Higher ecosystem innovation velocity; richer complementor apps	Consent + withdrawal; retention/deletion mechanisms; breach response
Credit transfer	Payment initiation, merchant settlement, platform payouts, disbursements	Transaction volume growth; fee opportunities; ecosystem lock-in	Security standards; testing + verification; complaint handling SLA
Debit transfer	Collections, recurring-like payments, pull-based flows (as allowed)	New payment products; stronger platform utility	Explicit authorization/consent; dispute handling; contract clauses
Other categories	Future expansion aligned set with policy direction	Portfolio scalability and policy alignment	Align with updated SNAP publication and evaluation

SNAP API category (PADG) by BI	Typical ecosystem use cases enabled	Primary value to platform-bank	Governance "must-haves" (SNAP governance layer) cycle

How this portfolio becomes "monetizable."
This portfolio can support pricing and packaging because SNAP reduces variability in integration patterns (standard interfaces and testing/verification gates) and imposes governance discipline that protects trust—both prerequisites for treating APIs as scalable products rather than one-off integrations.

4.3 Empirical Findings (To Be Filled with Your Data)
Because the present manuscript section is built on **document-based synthesis**, this subsection specifies **exact empirical slots** you can populate from a bank/fintech case study, interviews, surveys, or integration logs. The goal is to keep it "results-ready" for Scopus-style submission while clearly separating **derived framework outputs** from **field evidence**.

Empirical Slot 1 — Ecosystem scaling performance
- Partner onboarding cycle time (median days from onboarding request → first successful test)
- Number of production partners integrated per quarter
- Integration rework rate (failed tests / total tests) (These metrics align with the PADG emphasis on Developer Site testing and verification gates.)

Empirical Slot 2 — API usage and reliability
- API call volume and growth rate by category (registration, balance, history, credit/debit transfer)
- Success rate, latency percentiles, incident rate, and recovery time (Operational relevance follows from SNAP's technical/security standardization intent.)

Empirical Slot 3 — Governance and trust outcomes
- Consent capture rate and consent withdrawal handling time
- Complaint volume, SLA compliance, and resolution time
- Number/severity of data incidents and response timelines (Directly mapped to SNAP Governance Guidelines on consent, complaint handling, and data breach handling.)

Empirical Slot 4 — Monetization outcomes
- Revenue per API product line (or per partner)
- Pricing model adopted (tiered access, usage-based, revenue share)
- Cross-sell/upsell effects attributable to ecosystem journeys

5. DISCUSSION
5.1 Implications for Bank Platform Strategy
The "Open Ecosystem + SNAP" framework implies a strategic repositioning of digital banks from **standalone product providers** to **platform orchestrators** that enable third-party innovation through standardized boundary resources (Open APIs). At the platform level, SNAP

helps make openness *operationally repeatable* by defining what is standardized (technical/security/data specifications) and what is governed (consumer protection, data protection, prudential requirements, and contracts). This allows banks to scale partner participation without re-negotiating integration architecture for each fintech or platform partner, thereby shifting strategic emphasis toward **ecosystem design** (portfolio selection, partner segmentation, governance mechanisms, and value capture) rather than purely internal product expansion.

At the ecosystem level, PADG SNAP clarifies multi-actor roles (Service Provider vs. Service User, including non-PSP entities) and introduces **developer-site-based onboarding** (registration, testing, verification) as an institutionalized "entry gate." Strategically, this resembles platform governance mechanisms seen in other digital ecosystems: banks can curate complementors and manage quality via standardized processes, which supports a more scalable operating model for collaboration.

5.2 Standardization as Integration Cost and Risk Reduction

A key mechanism through which SNAP creates strategic and operational value is **cost and complexity reduction** in inter-organizational integration. By standardizing communication protocols, API architecture types, authentication/authorization, encryption, access management, and request/response structures, SNAP reduces the need for bespoke "one-off" integrations that typically increase delivery time, defect rates, and maintenance costs across multi-partner ecosystems. This standardization effect is reinforced by PADG SNAP's emphasis on **testing and verification**, which effectively externalizes a portion of quality assurance into a shared compliance process, improving predictability for both providers and users of APIs.

From a risk perspective, standardization also functions as a preventive control. The BCBS report highlights that open banking increases connectivity and data sharing, which amplifies **cybersecurity and third-party risk** and can expose banks to business model and reputational risks if ecosystem participants fail to meet expected assurance levels. SNAP's integrated "technical + governance" standard can be interpreted as a national attempt to manage these systemic risks by narrowing variation in interface design and establishing minimum governance expectations that reduce ambiguity in accountability and operational practices.

5.3 Trust, Consent, and Consumer Protection

In regulated payment ecosystems, ecosystem scale is constrained by **trust**. SNAP's Governance Guidelines explicitly treat consumers as potentially vulnerable and specify minimum governance practices for: (i) consumer protection principles (fairness, transparency, education, responsible business conduct, asset protection, data protection), (ii) complaint handling mechanisms and service levels, and (iii) data protection mechanisms including consent, consent withdrawal, deletion/destruction, and breach response. These provisions imply that "open ecosystem banking" must be designed as **governed openness**, where ecosystem growth is conditional on enforceable consumer and data safeguards.

A notable operational implication is that consent is not treated as a formality: the Governance Guidelines specify concrete requirements such as **explicit, specific, and non-hidden consent**, mechanisms for consent withdrawal, and time-bounded effectiveness (e.g., withdrawal operationalization within defined timelines), all of which must be reflected in platform workflows and partner contracts. This aligns with the UK Open Banking customer guidance, which emphasizes that open banking requires **explicit consent**, gives users control over scope and duration of access, and allows withdrawal either through the third-party provider or via the bank—reinforcing that user control is foundational to sustainable data-sharing ecosystems.

5.4 API Monetization (API as Product)

The discussion on monetization follows from the Results section's portfolio logic: PADG SNAP defines a structured set of API categories (e.g., registration, balance information, transaction history, credit transfer, debit transfer). This categorization enables banks to design an **API product portfolio** where each API category can be packaged into commercial offerings aligned with partner segments (fintechs, merchants, platforms, non-PSPs), subject to governance controls and consumer consent obligations. Conceptually, SNAP reduces technical fragmentation and makes it more feasible to price APIs on measurable units such as transaction count, call volume, or value-added layers (e.g., enhanced reporting, reconciliation support), because the underlying integration and assurance expectations are standardized. Source

However, monetization is viable only when accompanied by a robust governance layer. The SNAP Governance Guidelines require minimum

6. CONCLUSION

This study develops a **SNAP-based "Open Ecosystem + SNAP" business model framework** that positions a digital bank as a **platform orchestrator** rather than a standalone product provider. The framework is grounded in Indonesia's national payment Open API standard, **SNAP**, which was established by Bank Indonesia to support a healthy, competitive, and innovative payments industry while strengthening **integration, interconnection, interoperability, and infrastructure security and reliability**. By standardizing technical/security requirements and complementing them with governance guidance, SNAP provides a national "rulebook" for scaling API-enabled collaboration in a regulated environment.

The results show that SNAP's implementation logic—particularly its defined roles (service provider/service user), scope (interoperability, information security, governance, and risk management), and standardized API categories—can be translated into an actionable **API service portfolio** (e.g., registration, balance information, transaction history, credit transfer, and debit transfer) that supports ecosystem use cases and enables banks to productize APIs for structured partnership growth. This reinforces the strategic argument that standardization can reduce bespoke integration complexity and improve repeatability of partner onboarding and quality assurance through institutionalized mechanisms such as testing and verification.

In addition, SNAP's Governance Guidelines demonstrate that ecosystem scalability must be achieved through **governed openness**: consumer protection, explicit consent, consent withdrawal, complaint handling, data protection, breach response, and minimum contractual clauses are treated as constitutive elements of the ecosystem model, not optional add-ons. This aligns the business model with trust and compliance requirements that become more critical as data sharing and connectivity increase across multiple ecosystem actors.

Finally, the conclusion highlights the institutional relevance of SNAP's operational continuity through the governance handover to **ASPI (effective 1 September 2023)**, indicating that SNAP is intended to function as an evolving industry standard. Overall, the study concludes that SNAP can serve as a practical foundation for Indonesian digital banks to scale collaboration, strengthen interoperability, and pursue API monetization—while maintaining consumer protection and regulatory alignment.

7. Limitations and Future Research
7.1 Limitations
Document-based scope and lack of field validation.

This manuscript is grounded in a qualitative, document-based synthesis of SNAP's policy intent, implementation rules, and governance guidelines. As a result, the framework and portfolio mapping represent a **normative-to-conceptual translation** of the standard, rather than a statistically validated model of organizational performance or adoption outcomes. Future

empirical work is needed to test whether the proposed mechanisms (e.g., faster onboarding, lower integration friction, monetization readiness) materialize consistently across banks and partner types.

Payments-focused boundary conditions.
The analysis is limited to **Open API Payments** within SNAP's scope (e.g., registration, balance information, transaction history, credit/debit transfers, and other BI-defined categories). Therefore, the findings should not be overgeneralized to broader **open finance** domains (e.g., investments, insurance, pensions) that may require different governance, consent semantics, and risk controls.

Limited visibility into operational interpretation and enforcement variance.
While PADG SNAP describes mechanisms such as developer-site publication, testing, verification/recommendation, and evaluation cycles, the study cannot observe potential variation in how these mechanisms are implemented in practice across institutions (e.g., differences in partner due diligence depth, operational SLAs, security testing rigor, or contracting practices). This is important because governance effectiveness often depends on execution details beyond written standards.

No direct measurement of consumer outcomes.
Although SNAP's Governance Guidelines specify consumer protection, complaint handling, consent, withdrawal, deletion/destruction, and breach-handling requirements, this paper does not include consumer-level evidence (e.g., consent comprehension, perceived trust, complaint experience quality). Consequently, trust and protection claims remain **design- and policy-grounded** rather than outcome-validated.

7.2 Future Research Directions
(1) Multi-case validation of the "Open Ecosystem + SNAP" framework.
Future studies should conduct multi-case research across Indonesian digital banks and payment ecosystem partners to test how SNAP-enabled openness affects platform outcomes. Suggested measurable outcomes include partner onboarding time, integration rework rate, API reliability, and compliance incident rates—mapped to the SNAP domains of interoperability, security, governance, and risk management.

(2) Quantitative modeling of ecosystem performance and risk trade-offs.
A survey or log-based quantitative design could test propositions linking SNAP-aligned controls (e.g., standardized testing/verification and consent governance) with ecosystem scale (partner count, call volume growth) and risk outcomes (incident frequency, complaint volume, breach response time). This direction also aligns with international concerns that increasing connectivity in open banking amplifies cyber and third-party risks.

(3) Partner governance and contracting research (platform-to-complementor view).
Given SNAP's emphasis on minimum contractual clauses and prudential requirements for providers and users, future work could examine how contracts operationalize governance (liability allocation, data use boundaries, audit rights, SLA commitments), and how contract design influences complementor participation and innovation incentives.

(4) Consumer-centric trust and consent usability studies.
Building on SNAP governance and comparative open banking practice, researchers can evaluate whether consent journeys are understandable, whether withdrawal mechanisms are discoverable, and how complaint handling affects perceived legitimacy. Comparative designs can benchmark against explicit-consent principles emphasized in other jurisdictions (e.g., UK Open Banking).

(5) API monetization design under "governed openness."
Future research can develop and test pricing and packaging strategies that treat APIs as products while remaining compliant with governance constraints. Potential topics include tiered access models, usage-based pricing governance, value-added data products under consent constraints,

and the organizational capabilities needed to manage API lifecycle at scale. This is particularly relevant because SNAP standardizes both technical interfaces and governance expectations, which may lower commercialization friction relative to bespoke integrations.

(6) Longitudinal study of SNAP's institutional evolution (BI → ASPI governance). Since SNAP's management was transferred to ASPI effective 1 September 2023, longitudinal work can examine how industry governance affects standard updates, adoption velocity, developer experience, and ecosystem innovation over time.

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