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**Digital Transformation Measurement Framework of Agribank -
Vietnam**

Supervisor

Ch. Prof. Vera Djordjilovic

Graduand

To Trang Linh

Matriculation Number 908463

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List of Abbreviations

The following abbreviations are used throughout this thesis. Each is also defined at its first occurrence in the main text.

Abbreviation	Full term
AME	Average Marginal Effect
API	Application Programming Interface
ATM/CDM	Automated Teller Machine / Cash Deposit Machine
BSC	Balanced Scorecard
CDS / CDS	Digital Transformation (Chuyển đổi số)
CNS	Digital Technology pillar (Công nghệ số)
CN	Branch (Chi nhánh)
CRE	Correlated Random Effects
DAMA-DMBOK	Data Management Body of Knowledge (DAMA International)
DBI	Digital Banking Index
DEA	Data Envelopment Analysis
DLS	Digital Data pillar (Dữ liệu số)
ĐMST	Innovation (Đổi mới sáng tạo)
DX	Digital Transformation
DevOps/CI-CD	Development & Operations/ Continuous Integration / Continuous Delivery
Driscoll-Kraay SE	Driscoll-Kraay Standard Errors (robust to cross-sectional and serial correlation)

FE	Fixed Effects
FL	Fractional Logit
GMM	Generalised Method of Moments (incl. System GMM)
Hausman test	Hausman Specification Test (Fixed vs Random Effects)
HQ	Digital Business Performance pillar (Hiệu quả)
HTR	Hansen Threshold Regression (Hansen, 1999)
HTS	Digital Infrastructure pillar (Hạ tầng số)
ICT	Information and Communication Technology
IPCAS	Core Banking of Agribank
ITIL	Information Technology Infrastructure Library
KHCN	Science and Technology (Khoa học công nghệ)
KPI	Key Performance Indicator
MECE	Mutually Exclusive, Collectively Exhaustive
ML/AI	Machine Learning / Artificial Intelligence
NHS	Digital Banking Division, Agribank (Ngân hàng số)
NPL	Non-Performing Loan
NPS / CES	Net Promoter Score / Customer Effort Score
PKU-DTI	Peking University Digital Transformation Index
QMLE	Quasi-Maximum Likelihood Estimation
RAROC	Risk-Adjusted Return on Capital

RBV	Resource-Based View
RE	Random Effects
ROA	Return on Assets
SLA	Service-Level Agreement
SOC	Security Operations Center
SSR	Sum of Squared Residuals
STI	Science, Technology and Innovation
STP	Straight-Through Processing
TNS	Digital Customer Experience pillar (Trải nghiệm số)
TSC	Head Office / Headquarters (Trụ sở chính)
TWFE	Two-Way Fixed Effects
VHA	Digital Operations pillar (Vận hành số)
VHS	Digital Culture pillar (Văn hóa số)
VIF	Variance Inflation Factor
VRIN	Valuable, Rare, Inimitable, Non-substitutable
WAN	Wide Area Network

Abstract

This thesis does two things that are usually kept apart. It builds a measurement instrument for digital transformation at Agribank - Vietnam Bank for Agriculture and Rural Development, the country's largest state-owned commercial bank by branch count - and then it subjects that instrument to an econometric test to see whether it measures what it claims to measure.

The instrument is DBI 2026 (Digital Banking Index 2026). It is organised around seven pillars and 192 KPIs, of which 67 are measured at branch level and 125 at Head Office. The seven pillars are Digital Infrastructure (HTS), Digital Technology (CNS), Digital Data (DLS), Digital Operations (VHA), Digital Culture (VHS), Digital Customer Experience (TNS), and Digital Business Performance (HQ). Each pillar is tied back to a recognised management theory and, where the law speaks to it, to a specific Vietnamese regulatory text: HTS to the Resource-Based View (Barney, 1991) and Circular 50/2024/TT-NHNN; CNS and DLS kept apart so that technology and data can be funded as separate resources; VHA, VHS, and TNS to the internal-process, learning-and-growth, and customer perspectives of the Balanced Scorecard (Kaplan and Norton, 1992); and HQ as the outcome pillar that ties capability spending back to economic value, which is now what Resolution 57-NQ/TW formally demands. Scoring runs on a 0-5 maturity scale and mixes data pulled straight from the bank's systems with survey-style organisational assessments.

The test uses branch-level panel data from Agribank's own DBI evaluation system - 170 Type-I branches observed over four years, $N = 680$. I estimate three models rather than one, and the reason is that a single model would leave too many objections open. A Two-Way Fixed Effects (TWFE) regression is the baseline. A Fractional Logit with Correlated Random Effects (Papke and Wooldridge, 1996; Wooldridge, 2019) checks whether the bounded nature of a revenue-share variable changes the answer. A Hansen (1999) threshold regression checks whether the relationship bends rather than runs straight.

Three results are worth stating up front. A one-point gain in the aggregate DX_Score goes with a digital revenue share roughly 8.6 percentage points higher (TWFE, $p < 0.001$), and the Fractional Logit marginal effect of 8.3 points lands almost on top of it - so the bound on the dependent variable is not driving the headline. Within the six capability pillars, CNS and TNS do most of the work (2.76 and 2.28 points per pillar point, both $p < 0.001$), while VHA is flat and behaves like a hygiene factor rather than a growth lever. The threshold sits at about 2.92, near the Maturity Level 3 boundary, with the marginal effect rising from 7.27 points below it to 9.27 above.

Put together, the contribution is a measurement system that rests on management theory, fits the current Vietnamese regulatory frame (Resolution 57-NQ/TW, Circular 50/2024/TT-NHNN, Law 71/2025/QH15), and has been tested with a method that

other Vietnamese commercial banks can borrow once their own KPI measurement matures.

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Finally, I want to thank my family for their support and encouragement throughout my studies - and especially my father, whose patience during a difficult stretch I will not forget.

Chapter 1. Introduction

1.1. Vietnam's Banking Sector and the Digital Transformation Imperative

Vietnamese banking did not ease into digital transformation. The push came from two sides at once, and they reinforced each other. From the top, Resolution 57-NQ/TW - issued by the Politburo on 22 December 2024 - raised science, technology, innovation, and digital transformation to the status of strategic breakthrough priorities and attached to that a requirement that is slightly awkward for any bank to meet: innovation must be measurable in economic terms. From the bottom, customers moved to mobile-first banking faster than most institutions had planned. QR-code payments and e-wallet rails are now routine even in provincial towns, which is not where anyone would have predicted the change would land first.

On the regulatory side the constraints are concrete. Circular 50/2024/TT-NHNN, issued by the State Bank of Vietnam on 31 October 2024, sets binding technical and continuity requirements for online banking infrastructure; Articles 9 and 16 tie compliance to measurable system-availability and incident-handling figures, which conveniently gives any internal KPI instrument a legal anchor it can point to. Law 71/2025/QH15 on Personal Data Protection adds a second binding line: any data capability the bank builds must carry traceable controls over consent, retention, and subject rights, and none of those can be left as an implicit assumption inside a scoring sheet.

Agribank occupies an unusual position in all of this. It is the largest state-owned commercial bank in the country by branch count, with more than 2,300 branches and transaction offices and over 40 million customers spread across 63 provinces. Its mandate is explicitly to serve the rural and agricultural economy, and that mandate shows up in the numbers that matter for digitisation: an older customer base on average, patchier connectivity in some districts, and lower historical IT spend per branch than the urban joint-stock banks carry. The consequence is that measuring digital transformation as a single bank-wide average throws away the information worth having. The operational question is not “how digital is Agribank” but something narrower and harder: how do you measure, manage, and accelerate transformation across 170 Type-I branches that range from high-volume urban offices in Hanoi to remote rural ones in the Central Highlands, all at the same time?

1.2. The Measurement Gap

The literature on digital transformation in banking has grown quickly since 2020. The measurement tools it leans on, though, tend to break down in a predictable way when you point them at a bank like Agribank, and the break shows up along two axes.

The first is resolution. Text-mining indices - the Peking University Digital Transformation Index (Xie and Wang, 2023) is the standard example - score a bank by mining its annual-report disclosures. That makes the finest grain available annually

and the unit of observation the whole institution. For a 2,300-branch bank where digital adoption swings sharply with geography and customer mix, an institution-level number averages away exactly the variation that internal management needs to act on. The second axis is theoretical coverage. ICT-infrastructure indices (Huynh, 2025) handle hardware and software inputs cleanly, but they tend to underweight culture, customer experience, and outcomes - the dimensions that the consultancy maturity models (Westerman, Bonnet and McAfee, 2014; Gartner, 2024; Deloitte, 2018) treat as central rather than peripheral.

DBI 2026 is built to sit in space those two limitations leave open. It measures at branch resolution, across 192 KPIs grouped into seven theoretically grounded pillars, and it is designed for a bank that must manage transformation rather than report on it once a year. The instrument is not portable in the way PKU-DTI is - that is the price you pay for resolution - but it is built to be re-created, with calibration, by other Vietnamese commercial banks once their data infrastructure can carry it.

1.3. Research Objectives and Contributions

I am after two things in parallel, and they pull in slightly different directions. One is constructive: design a DBI 2026 framework that Agribank can run on the data infrastructure it already has, and that does not contradict the relevant Vietnamese regulation. The other is analytical: find out whether the framework picks up the variation it claims to pick up, using a stack of three econometric models rather than a single regression that would be easy to poke holes in.

Four contributions come out of that. The first is the seven-pillar architecture itself, with MECE boundaries drawn tightly enough that every KPI belongs to exactly one pillar, anchored in a small set of well-worn management theories - the Resource-Based View, the Balanced Scorecard, ITIL 4, DAMA-DMBOK - and in the regulatory texts that bind on each. The second is an adaptation: I take the PKU-DTI methodology (Xie and Wang, 2023), currently the most-cited DX measurement instrument in the international banking literature, and move it into a Vietnamese state-owned setting, swapping its text-mining proxy for direct branch-level KPI measurement. The third is the three-model stack - TWFE, Fractional Logit with CRE, Hansen Threshold - which is built to answer the three objections this literature raises most often: unobserved branch heterogeneity, the bounded nature of share variables, and the possibility that the relationship is nonlinear. The fourth is the one I think the bank will care about most: evidence that the capability pillars can be told apart statistically, which gives the Board something quantitative to hang its 2026 investment decisions on rather than a single composite number that hides where the returns come from.

Chapter 2. Literature Review and Theoretical Framework

2.1. Measurement of Digital Transformation in Banking

Empirical measurement of bank-level digital transformation has been settled into three traditions, and each buy something at the cost of something else.

The first runs on text mining. The Peking University Digital Transformation Index (PKU-DTI), built at the Digital Finance Research Center at Peking University, mines annual reports to assemble a composite across Strategy, Business, and Management digitalisation (Xie and Wang, 2023). It has been used in more than 200 international studies and was applied to 221 Chinese commercial banks over 2010-2021. What it buys is comparability: you can line up hundreds of banks on the same axis. What gives up is grain - the index can only be as detailed as the disclosures it reads, and those are often written in a stylised way, and the unit is the institution-year rather than the branch-year.

The second tradition uses ICT-infrastructure indices. Huynh (2025) is a clean Vietnamese case: a four-dimension ICT decomposition tied to bank liquidity creation, run on Vietnamese commercial banks over 2007-2022. This is much closer to what a bank's own IT department already tracks, so the estimates are immediately legible to the people inside the institution. The cost is a tilt toward measurable hardware and software inputs, and a corresponding underweighting of the cultural, customer-facing, and outcome dimensions that the maturity literature puts at the centre.

The third tradition - the one DBI 2026 belongs to - measures KPIs directly at the branch level. This only becomes possible once a bank has a unified Core Banking system and a standardised reporting layer, both of which Agribank now has. It is the most data-hungry of the three, but it removes the measurement error that text mining introduces, it allows the capability dimensions to be decomposed at much finer resolution, and it opens the door to within-institution causal inference through standard panel methods. The catch is portability: PKU-DTI travels across hundreds of banks, whereas DBI 2026 has to be rebuilt, or at least recalibrated, for each one. For a single bank doing internal management, that is a trade worth making.

2.2. Theoretical Foundations of the DBI 2026 Pillars

2.2.1. Resource-Based View and Digital Infrastructure

The Resource-Based View (Barney, 1991) treats sustained competitive advantage as something that flows from resources that are valuable, rare, inimitable, and non-substitutable. The core digital infrastructure of a bank - Core Banking, the Security Operations Center, the eKYC platforms, the ATM/CDM network, the telecommunications backbone underneath all of it - meets those four conditions reasonably well. It is expensive to build, it carries a great deal of tacit operational knowledge, and the longer it has been customised the harder it gets for a competitor to copy. Gartner's Digital Maturity Model (2024) reaches the same conclusion by a

different route: infrastructure is the bottom layer, and it must be stable before products, experience, and data can do anything useful on top of it. Between them, these supply the reason HTS gets a pillar of its own.

There is useful refinement beyond Barney's original VRIN formulation. The dynamic-capabilities view (Teece, Pisano and Shuen, 1997) splits capability into sensing, seizing, and reconfiguring, and those map onto the DBI 2026 pillars without much forcing: the data and customer-experience pillars (DLS, TNS) do the sensing; the technology and operations pillars (CNS, VHA) do the seizing; the culture pillar (VHS) carries the organisational reconfiguration that holds the rest together. Putting infrastructure on its own pillar is exactly the point - it is the substrate that lets the other capabilities operate at all.

2.2.2. Balanced Scorecard and Digital Business Performance

The Balanced Scorecard (Kaplan and Norton, 1992) is past thirty years old, but its central claim has aged well: capability investment must be tied back to outcome measurement across four perspectives - Financial, Customer, Internal Process, Learning and Growth. That claim lines up almost exactly with what Resolution 57-NQ/TW now requires, namely that innovation produces measurable economic value. The HQ pillar in DBI 2026 is essentially the BSC translated into Agribank's setting - revenue, cost, customer growth, and learning outcomes attributable to digital channels, deliberately held apart from the six capability pillars that measure inputs and processes.

The decision to make HQ a pillar, rather than scattering outcome indicators through the other six, follows Kaplan and Norton's (1996) argument that mixing leading and lagging indicators in one category dilutes both. A pillar that puts "AI/ML platform maturity" (a leading indicator of revenue to come) next to "digital revenue share" (a lagging indicator of capability decisions already made) produces a number that is hard to interpret and harder to act on. Keeping them apart is what lets the econometric stack in Chapter 4 treat capability as cause and outcome as effect - which is the whole point of the exercise.

2.2.3. ITIL 4 and Operational Capability

The operations pillar (VHA) draws on the ITIL 4 service-management framework (ITIL, 2019). ITIL 4's service value chain - plan, improve, engage, design and transition, obtain and build, deliver and support - gives a structured vocabulary for what "good" looks like at the operational layer of a bank's digital estate. KPIs on incident management, mean time to recovery, change-failure rate, and SLA fulfilment map straight onto ITIL 4 practices. The deeper reason for anchoring VHA in ITIL 4 rather than in operational metrics invented in-house is consistency: ITIL 4 is an internationally recognised body of knowledge, and tying the KPIs to it protects the framework against the slow drift that tends to corrode home-grown operational scorecards.

2.2.4. DAMA-DMBOK and Data Governance

The data pillar (DLS) draws on the DAMA Data Management Body of Knowledge (DAMA International, 2017). DAMA-DMBOK lays out eleven data-management functions, of which five matters most for a banking DX framework: data governance, data quality, data security, master and reference data management, and metadata management. The DLS KPIs are arranged so that each of those functions shows up at least once. The pillar also folds in the Vietnamese legal requirements of Law 71/2025/QH15 and Decree 13/2023/NĐ-CP, which turn DAMA's data-security and data-governance functions into binding obligations under national law. Giving data its own pillar, separate from technology, reflects the DAMA principle that data is an enterprise asset whose management discipline is distinct from the technology that happens to process it.

2.3. Empirical Studies on Digital Transformation and Bank Performance

Eight studies feed into the empirical strategy of Chapter 4. I will not walk through each one in full - that would be tedious and would not add much - but it is worth separating the substantive findings that recur across them from the methodological lessons they carry.

Xie and Wang (2023) run panel fixed effects with instrumental variables on 221 Chinese commercial banks over 2010-2021 and find that DX raises lending efficiency and speeds up the closure of offline branches. Their instrument is geographic distance to fintech hubs, which works in the Chinese setting but does not travel easily. Zhang (2026) uses fixed effects on 116 Chinese banks over 2011-2023 and finds an effect on ROA running through operational efficiency. Chao, Zhou and Yang (2024) study 54 Chinese rural commercial banks (2010-2021) with OLS and mediation analysis, and pull out three transmission channels - asset quality, operational efficiency, risk-taking - while noting, importantly, that the rural-bank effect concentrates in the smaller banks rather than the larger ones.

The closest comparator to this thesis is Huynh (2025), which runs system GMM on Vietnamese commercial banks over 2007-2022 and finds positive ICT effects on liquidity creation - same country, same broad estimator. Two further GMM studies on Chinese banks point the same way on risk: Xu et al. (2025), on 114 banks over 2014-2021, find that digital transformation cuts credit risk, and as in Chao, Zhou and Yang the effect is largest among the smaller, rural banks. He et al. (2025) adds the mechanism, showing on 39 listed Chinese banks that the DX-to-ROA link runs through operational efficiency.

Not every study agrees on the sign. Nguyen-Thi-Huong et al. (2023), measuring DX by text-analysing the annual reports of listed Vietnamese joint-stock banks over 2015-2021, find a negative association with profitability - which they attribute to transitional costs, the payoff from digitisation simply arriving later than the spending. Ding et al. (2024) are relevant for a different reason: their Hansen panel threshold

model on Chinese provincial data turns up a nonlinear, regime-dependent relationship between digital transformation and innovation, and that is a large part of why Chapter 4 bothers with a threshold specification at all.

Two substantive patterns survive across the eight, and both bear on Agribank. The first is that the DX effect is reliably larger for smaller and rural-oriented banks than for the average large urban one. Agribank is large in headcount but rural in terms of the customer base, which puts it on the side of the ledger where the effect tends to be bigger. The second is that operational efficiency keeps showing up as a mediating channel rather than a direct driver of revenue. That is precisely what motivates the framework's separation of VHA (Operations) from HQ (Performance) - and, as Chapter 5 shows, the Agribank data end up agreeing.

Chapter 3. The DBI 2026 Framework: Seven-Pillar Architecture

3.1. Overview and Design Principles

DBI 2026 has seven pillars and 192 KPIs - 67 measured at branch level, 125 at Head Office. Three principles run underneath the whole thing, and each of them exists to head off a specific failure mode rather than for tidiness.

The first is hierarchical separation. Head Office measures system-level capability and governance; branches measure execution and outcomes at the unit level. No KPI is counted in both places. The reason this matter is arithmetic before it is conceptual: without the separation, anything measured at both layers inflates the aggregate score, and each layer loses a clear accountability boundary.

The second is MECE pillar boundaries - mutually exclusive, collectively exhaustive. The practical test is whether a branch manager can answer “which pillar owns this KPI” without hesitating. If the boundaries blur, capability investment and outcome measurement start bleeding into each other, and that is the exact contamination the econometric stack in Chapter 4 cannot tolerate.

The third is the separation of capability from outcome. The first six pillars (HTS, CNS, DLS, VHA, VHS, TNS) measure capability and maturity; the seventh (HQ) measures outcomes. This is what lets the regressions treat capability as the cause and outcome as the effect. Drop it, and the models would be putting the same construct on both sides of the equation, and every policy drawn from them would be circular.

Each KPI also carries a data-source tag, and the tag is not cosmetic. Realtime KPIs are pulled straight from Core Banking / IPCAS and other authoritative systems, which keeps measurement error low and removes any incentive to over-report - you cannot inflate a number the system reads for you. Survey KPIs cover the things transaction data simply does not see governance maturity, training coverage, process documentation. Those are scored on the 0-5 scale by branch leadership, but with central evaluators checking each score against documentary evidence before signing off, the survey channel is not left unguarded. The 0-5 scale follows the convention of the maturity-model literature (Gartner, 2024; Deloitte, 2018), where Level 0 is “no capability“, Level 3 is “forming / repeatable“, and Level 5 is “leading / industry benchmark“.

The full KPI catalogue - definitions, calculation formulas, 0-5 scoring bands, and the legal or theoretical anchor for each of the 192 KPIs - travels with this thesis as a separate Excel workbook (DBI_2026_KPI_Framework_EN.xlsx), laid out as eight sheets: one overview and one per pillar, with branch and Head Office KPIs grouped inside each pillar sheet. Any KPI code referenced in the chapters that follow can be checked directly there.

3.2. The Seven Pillars

Table 1 sets out the architecture: the pillar count, the split of KPIs between branch and Head Office, and the theoretical or regulatory anchor for each.

Pillar	Code	Branch KPIs	HQ KPIs	Theoretical Anchor
Digital Infrastructure	HTS	11	20	RBV (Barney, 1991); Gartner DMM 2024; TT 50/2024-NHNN
Digital Technology	CNS	8	20	PKU-DTI Business; McKinsey (2023); Gartner DMM
Digital Data	DLS	6	20	DAMA-DMBOK; Law 71/2025/QH15; Decree 13/2023/NĐ-CP
Digital Operations	VHA	11	20	BSC Internal Process (Kaplan and Norton, 1992); ITIL 4
Digital Culture	VHS	10	20	PKU-DTI Management; McKinsey (2021)
Digital Customer Experience	TNS	11	20	Schmitt (2003); Huynh (2025)
Digital Business Performance	HQ	10	5	BSC (Kaplan and Norton, 1992); NQ 57-NQ/TW
TOTAL		67	125	192 KPIs across 7 pillars

Table 1. Architecture of the seven DBI 2026 pillars.

3.2.1. Pillar 1 - Digital Infrastructure (HTS)

HTS measures the physical and logical foundation that sits under every other digital activity: IT systems, network connectivity, terminal devices, the ATM/CDM network, eKYC infrastructure, the Security Operations Center, and the continuity mechanisms that keep all of it running. At branch level it covers what a branch

actually controls - uptime of branch-managed systems, redundant WAN links, terminal devices, branch-level eKYC, SOC connectivity, information-security compliance at the transaction point. At Head Office it covers the system-wide layer: Core Banking, the Cloud platform, the Open API estate, DevOps/CI-CD capability, penetration testing, the medium-to-long-term technology roadmap. The shortest way to put it is that HTS is the necessary condition the rest of the framework stands on.

3.2.2. Pillar 2 - Digital Technology (CNS)

CNS captures applied technology - AI/ML, automation, cloud, Open API, electronic contracts, security testing - at both levels. It is where infrastructure gets converted into something the bank can use. At branch level it looks at internal platform usage, AI/ML deployed in operational processes, periodic security testing, and automation at the counter. At Head Office it covers Enterprise Architecture, AI maturity, API governance, microservices, cloud readiness, and pen-testing. The decision to keep CNS apart from HTS is deliberate: owning the infrastructure and using it well are different achievements, and a bank can be strong on one and weak on the other.

3.2.3. Pillar 3 - Digital Data (DLS)

DLS measures data governance and exploitation as a strategic resource: digital document storage, KYC/C06 reconciliation, personal data protection, data quality, automated reporting, Data Lake, Data Governance, and data-driven decision-making. It is anchored in DAMA-DMBOK and in the Vietnamese legal requirements that bind on data specifically - Law 71/2025/QH15 and Decree 13/2023/NĐ-CP. Keeping data separate from technology is the same move as keeping CNS separate from HTS, and rests on the same logic: the discipline of managing data as an asset is not the same as the discipline of running the systems that process it.

3.2.4. Pillar 4 - Digital Operations (VHA)

VHA measures how well digital operational processes actually execute: first time-right transaction rates, automatic fraud detection and blocking, proactive incident detection, complaint resolution inside SLA, internal process digitisation, automation rates. It maps onto the Internal Business Process perspective of the Balanced Scorecard and is built around the ITIL 4 service value chain. As Chapter 5 will show, this is the pillar whose empirical behaviour turns out to be the most interesting, and not in the direction one might first guess.

3.2.5. Pillar 5 - Digital Culture (VHS)

VHS is the human side of the framework. It measures whether the money spent on HTS, CNS, and DLS is being used by people: digital skill capability, training coverage, paperless practice, internal digital communication, leadership-driven DX, a fail-tolerant culture, an orientation toward innovation. McKinsey (2021) reports that around 70% of DX failures trace back to human and cultural factors rather than

technology. That figure gets quoted often enough to sound like a cliché, but it holds up reasonably well across the case evidence, and it has a direct consequence for measurement: without a culture pillar, the framework would over-attribute outcome variation to technology spend, and the resulting recommendations would quietly understate training, change management, and leadership.

3.2.6. Pillar 6 - Digital Customer Experience (TNS)

TNS measures how customers reach, use, and feel about the bank's digital services: active digital customer rates, e-Banking activation, complaint resolution, omnichannel integration, eKYC onboarding, Net Promoter Score, Customer Effort Score, personalisation, churn prediction. The boundary worth watching is the one with HQ. TNS measures the customer-facing capability; HQ measures the revenue and growth that capability is supposed to produce. Putting an outcome like digital revenue into TNS would re-introduce exactly the capability-outcome contamination that Section 3.1 is built to prevent.

3.2.7. Pillar 7 - Digital Business Performance (HQ)

HQ measures the outcomes digital transformation is meant to generate, organised under the four BSC perspectives. Financial: digital channel revenue, digital products per customer, cost efficiency. Customer: active digital customer growth and retention. Internal Process: straight-through processing rates, fraud loss rates, cost per transaction. Learning and Growth: revenue from new digital products, adoption of data-driven decisions. HQ is the pillar that answers the question Resolution 57-NQ/TW now puts formally - what economic value is digital transformation actually creating for the bank?

3.3. Design Choices: Why Seven Pillars

Why seven, and not five or eight or twelve? Three things bound the choice, and it is worth being explicit about each, because the number is not arbitrary and it is not a round figure chosen for looks.

The first is theoretical coverage. Seven pillars are what it takes to cover the union of the dimensions the leading maturity models treat as primary: infrastructure (Gartner DMM); applied technology (PKU-DTI Business); data (DAMA-DMBOK; Westerman et al. Digital Intensity); operations (ITIL 4; BSC Internal Process); culture (PKU-DTI Management; McKinsey on the people-side risk); customer experience (Schmitt; BSC Customer); and outcomes (BSC Financial). Going to eight would have meant splitting an existing pillar further, which costs MECE clarity without adding any theoretical content the existing seven do not already carry.

The second is operational tractability. Too many pillars and the annual scoring exercise becomes something branch leadership cannot finish inside a reasonable cycle; too few and the categories grow so broad they stop guiding investment. Seven, with roughly 9-11 branch KPIs and 5-20 Head Office KPIs per pillar, is what tested as

workable in pilot evaluations - not a figure derived from theory but one that survived contact with the people who have to use it.

The third is regulatory fit. The Vietnamese regulatory stack - Resolution 57-NQ/TW, Circular 50/2024/TT-NHNN, Law 71/2025/QH15, Decree 13/2023/NĐ-CP - generates obligations that fall naturally into a subset of the seven pillars. Circular 50 binds mainly on HTS and CNS; Law 71 and Decree 13 bind on DLS; Resolution 57 cuts across CNS, DLS, VHS, and HQ. Fewer pillars would have forced some of those obligations into the wrong category. More pillars would have split single obligations across several, which makes compliance reporting harder rather than easier. Seven is where the obligations sit cleanly.

3.4. Sample KPI Catalogue of the Seven Pillars

To make the abstract architecture of Section 3.2 concrete, this section presents a sample KPI catalogue drawn directly from the operational DBI 2026 framework workbook (DBI_2026_KPI_Framework_EN.xlsx). For each pillar, four to five representative KPIs are listed with their identifier, data type (REALTIME, pulled automatically from core systems, or SURVEY, scored on a maturity scale and verified by Head Office), the 0-5 scoring scale, and the legal or theoretical anchor. The “Res. 57” column flags KPIs tied directly to Resolution 57-NQ/TW. All 192 KPIs follow this same template; only a representative subset is reproduced here to illustrate the scoring logic.

Pillar 1 - Digital Infrastructure (HTS)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
HTS-01	Branch IT System Availability Rate	Realtime		<98%: L1; 98-98.9%: L2; 99-99.4%: L3; 99.5-99.8%: L4; ≥99.9%: L5	Circular 50/2024/TT-NHNN, Art. 9 & 16
HTS-04	eKYC Active Rate at Branch Counters	Realtime		<30%: L1; 30-49%: L2; 50-69%: L3; 70-89%: L4; ≥90%: L5	Gov. Portal - Banking DX Day, Scheme 06
HTS-05	Digital Transaction Share of Branch Customers	Realtime		<70%: L1; 70-79%: L2; 80-89%: L3; 90-94%: L4; ≥95%: L5	Agribank DBI 2023 Report (NHS)
HTS-10	Branch Application of AI/ML in Operations	Survey	Yes	0-5 maturity (verified via central AI usage logs)	Resolution 57-NQ/TW (22/12/2024)
HTS-11	Technology Initiatives / PoCs Recorded by HO	Realtime	Yes	0: L0; 1: L1-L2; 2: L3; 3: L4; ≥4	Agribank DBI 2023 (264

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
				or ≥ 1 scaled: L5	initiatives)

Table 3.1. Sample KPIs - Digital Infrastructure (HTS).

Pillar 2 - Digital Technology (CNS)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
CNS-01	Use of Digital Platform for Internal Data	Survey		0-5 maturity (HO verifies via platform logs)	PKU-DTI Business (Xie & Wang, 2023)
CNS-02	Use of Digital Tools to Improve Productivity	Survey		0-5 maturity (HO verifies via licenses/usage)	McKinsey (2023) - State of AI
CNS-05	On-Time Information Security Testing Rate	Realtime		<70%: L1; 70-79%: L2; 80-89%: L3; 90-95%: L4; $\geq 96\%$: L5	Circular 50/2024/TT-NHNN, Art. 9
CNS-07	Digital Storage Rate for Partner Records	Realtime		<50%: L1; 50-69%: L2; 70-84%: L3; 85-94%: L4; $\geq 95\%$: L5	Gartner DMM 2024
CNS-T01	Enterprise Architecture Compliance (New IT)	Realtime		<60%: L1; 60-74%: L2; 75-84%: L3; 85-94%: L4; $\geq 95\%$: L5	TOGAF / Enterprise Architecture

Table 3.2. Sample KPIs - Digital Technology (CNS).

Pillar 3 - Digital Data (DLS)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
DLS-01	Digital Document Storage Rate	Realtime		<60%: L1; 60-74%: L2; 75-84%: L3; 85-94%: L4; ≥95%: L5	DAMA-DMBOK - Document & Content
DLS-02	Customer Data Quality Rate (C06 Reconciliation)	Realtime		<70%: L1; 70-79%: L2; 80-89%: L3; 90-94%: L4; ≥95%: L5	DAMA-DMBOK - Data Quality
DLS-03	Data Privacy Compliance at Branch Level	Survey		0-5 maturity (documentary evidence & audit)	Law 71/2025/QH15; Decree 13/2023
DLS-06	Branch Use of Analytics for Decisions	Survey	Yes	0-5 maturity (analytics platform usage)	Resolution 57-NQ/TW
DLS-T03	Data Governance Organisational Maturity	Survey		0-5 maturity (CDO, Data Council in place)	DAMA-DMBOK - Data Governance

Table 3.3. Sample KPIs - Digital Data (DLS).

Pillar 4 - Digital Operations (VHA)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
VHA-01	First-Contact Resolution Rate (Digital)	Realtime		<85%: L1; 85-89%: L2; 90-93%: L3; 94-96%: L4; ≥97%:	ITIL 4 - Service Desk

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
				L5	
VHA-02	Fraud Auto-Detection Rate	Realtime		<70%: L1; 70-79%: L2; 80-89%: L3; 90-94%: L4; ≥95%: L5	Decision 2345/QĐ-NHNN (biometrics)
VHA-04	Digital-Complete Service Rate (STP)	Realtime		<50%: L1; 50-69%: L2; 70-84%: L3; 85-94%: L4; ≥95%: L5	BSC Internal Process
VHA-07	Business Continuity Planning Maturity	Survey		0-5 maturity (verified via BCP records)	ITIL 4 - Continuity Mgmt
VHA-10	Innovation Mindset in Branch Operations	Survey	Yes	0-5 maturity (survey)	Resolution 57-NQ/TW

Table 3.4. Sample KPIs - Digital Operations (VHA).

Pillar 5 - Digital Culture (VHS)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
VHS-01	Branch Staff e-Learning Completion Rate	Realtime		<50%: L1; 50-69%: L2; 70-84%: L3; 85-94%: L4; ≥95%: L5	BSC Learning & Growth
VHS-02	Paperless Internal Document Rate	Realtime		<60%: L1; 60-74%: L2; 75-84%: L3; 85-94%: L4; ≥95%:	Green/paperless office

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
				L5	
VHS-05	Branch Leadership-Driven DX	Survey		0-5 maturity (survey)	McKinsey (2021) - leadership
VHS-07	Digital Talent Retention Initiative	Survey		0-5 maturity (survey)	PKU-DTI Management
VHS-09	Substantive Innovation Culture at Branch	Survey	Yes	0-5 maturity (survey)	Resolution 57-NQ/TW

Table 3.5. Sample KPIs - Digital Culture (VHS).

Pillar 6 - Digital Customer Experience (TNS)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
TNS-01	Monthly Active Digital Customer Rate	Realtime		<50%: L1; 50-64%: L2; 65-79%: L3; 80-89%: L4; ≥90%: L5	Schmitt (2003) - CX
TNS-02	Digital Onboarding Activation Rate (7-Day)	Realtime		<50%: L1; 50-64%: L2; 65-79%: L3; 80-89%: L4; ≥90%: L5	Customer activation funnel
TNS-04	Multi-Channel Digital Usage Rate	Realtime		<30%: L1; 30-49%: L2; 50-69%: L3; 70-84%: L4; ≥85%: L5	Omnichannel integration
TNS-	Customer Engagement	Survey		0-5 maturity	Huynh (2025)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
08	Campaigns via Digital			(survey)	- digital interfaces
TNS-11	Personalised Digital Marketing Conversion	Realtime	Yes	<2%: L1; 2-3.9%: L2; 4-5.9%: L3; 6-9%: L4; ≥10%: L5	Resolution 57-NQ/TW - AI personalisation

Table 3.6. Sample KPIs - Digital Customer Experience (TNS).

Pillar 7 - Digital Business Performance (HQ)

ID	KPI Name	Type	Res. 57	Scoring scale (0-5)	Legal / theoretical anchor
HQ-01	Branch Digital Revenue Share	Realtime		<20%: L1; 20-29%: L2; 30-39%: L3; 40-49%: L4; ≥50%: L5	BSC Financial; benchmark ~36% (2023)
HQ-03	Average Digital Products per Customer	Realtime		<1.5: L1; 1.5-1.9: L2; 2.0-2.4: L3; 2.5-2.9: L4; ≥3.0: L5	Cross-sell KPI
HQ-05	Digital Fraud Loss Rate (Branch)	Realtime		>0.05%: L1; 0.03-0.05%: L2; 0.02-0.029%: L3; 0.01-0.019%: L4; <0.01%: L5	Basel III Operational Risk
HQ-08	12-Month Continuous Digital Usage Rate	Realtime		<40%: L1; 40-54%: L2; 55-69%: L3; 70-84%: L4; ≥85%: L5	Retention KPI

Table 3.7. Sample KPIs - Digital Business Performance (HQ).

Chapter 4. Econometric Methodology

4.1. Data Structure

The econometric work runs on a balanced panel at the branch-year level. The cross-section is $i = 1, \dots, 170$ Type-I branches; the time dimension is $t = 2022, 2023, 2024, 2025$; the total is $N = 680$. The composition is roughly 15% urban and 85% rural branches, which matches the bank's documented mix rather than being a sampling choice I made.

The data comes from Agribank's internal DBI evaluation system, which scores 170 Types-I branches every year under the bank's Digital Banking Index cycle. The 192-KPI framework described in Chapter 3 is the operational instrument the Digital Banking Division (NHS) uses to produce those scores; what enters the panel here are the per-branch annual aggregates, anonymised at the branch-identifier level for publication. A couple of variables - DX_Score as the unweighted six-pillar mean, KHCN_Score as the STI sub-composite - are built inside the R script from the underlying pillar scores rather than arriving as separate fields. Appendix B lays out the structure in full.

In a single cross-section of branches, the obvious worry is that the unobserved drivers of digital revenue - leadership quality, regional culture, customer composition - are correlated with the DX score, which biases the estimates. A two-way fixed-effects panel absorbs everything that does not vary within a branch over time, and everything that does not vary across branches each year. What is left in the residual is idiosyncratic shocks. Concretely, within-branch variation nets out the time-invariant branch traits through branch fixed effects; within-year variation nets out common shocks - the rate cycle, the COVID aftermath, regulatory changes - through year fixed effects; and 170 units over 4 years is large enough to estimate two-way fixed effects while staying small enough that bootstrap inference is computationally cheap, which matters for the Hansen test later. The Hausman test in Section 5.3 confirms that fixed effects are required, which is the result one expects in this kind of setting.

4.2. Variable Definitions

4.2.1. Dependent Variable

The primary dependent variable is the Digital Revenue Share (digital_revenue_share): digital channel revenue over total revenue. I chose a share rather than absolute revenue for two reasons that pull the same way. A share is scale-invariant, so branch size and inflation do not leak into the coefficient. And a share maps directly onto the BSC logic of measuring the shift of revenue mix toward digital channels, which is the outcome the framework is built to detect. A robustness specification swaps in $\ln(\text{total_revenue})$ instead, purely to check that the headline is

not an artefact of the share construction - and Section 5.4.4 reports what happens when it does.

4.2.2. Independent Variables: DBI 2026 Pillar Scores

Following the PKU-DTI convention of aggregating dimensional indices, I build eight independent variables out of the DBI 2026 structure. DX_Score is the unweighted average of the six capability pillars (HTS, CNS, DLS, VHA, VHS, TNS); HQ is left out because it is the outcome, not the input. The six pillar scores enter the decomposed specification separately, which is what lets the analysis see which pillar is doing the work. KHCN_Score aggregates 32 KPIs across pillars that relate specifically to science, technology, and innovation under Resolution 57-NQ/TW; NonKHCN_Score is everything else.

The choice of equal weighting for DX_Score is deliberate, and since a weighted composite is the obvious alternative, it is worth defending rather than asserting. Three considerations point to equal weights. First, equal weighting puts no priority on which pillar matters most - which is exactly the question the six-pillar decomposition in Section 5.4.2 is meant to answer from the data. Assigning weights in advance would build the answer into the regressor and risk circularity. Second, equal weighting is the dominant convention in the composite-index literature whenever there is no externally validated theory of relative importance. The OECD/JRC Handbook on Composite Indicators notes that equal weighting is the most widely used scheme precisely because data-driven weights (from principal components, say) tend to load on whichever pillars happen to co-vary most in the sample rather than on the ones that are conceptually most important, and because expert-elicited weights bring in a subjectivity that is hard to audit. The maturity models the framework leans on (Gartner DMM 2024; Deloitte 2018) likewise report dimension scores without fixing cross-dimension weights. Third, equal weighting keeps the index transparent for the Board: a branch manager can see directly that every capability pillar counts the same, which matters for an instrument meant for performance evaluation. The cost is that equal weighting can hide the fact that, empirically, the pillars do not contribute equally - but the decomposed specification recovers precisely those differential contributions, so the aggregate and decomposed results are meant to be read together. As a check, a variance-weighted and a regression-coefficient-weighted DX_Score were also built; in this sample both are monotone transformations of the equal-weighted index and leave the sign, significance, and rough magnitude of the headline unchanged. The substantive findings do not hang on the weighting choice.

4.2.3. Control Variables

The control vector follows the international convention - Xie and Wang (2023), Nguyen-Thi-Huong et al. (2023), Xu et al. (2025). Branch_size is $\ln(\text{total_assets})$, capturing scale economies. NPL_ratio captures asset quality. Agri_share captures the rural/agricultural orientation that is specific to Agribank. GDP_growth_prov captures

provincial macro conditions. Competitor_density measures local market concentration. Interest_rate is absorbed by the year fixed effects; Urban_dummy is absorbed by the branch fixed effects, though I still report it in the descriptive statistics because it matters for reading the figures.

4.3. Three-Model Stack

Why three models and not one? Because a single regression leaves three obvious objections unanswered, and each of the other two models exists to close one of them. TWFE is the baseline association. But a sceptic can reasonably ask whether that association is an artefact of forcing a linear, unbounded estimator onto a variable trapped between 0 and 1 - so the Fractional Logit answers that. And a second sceptic can ask whether the relationship is really a straight line at all - so the Hansen threshold answers that. The three are meant to be read together: if the headline survives all three lenses, it is not resting on any one set of assumptions

4.3.1. Model 1 - Two-Way Fixed Effects (TWFE)

The baseline is a two-way fixed-effects regression in the Wooldridge (2010) style. Every one of the eight benchmark studies in Chapter 2 uses TWFE as its baseline, so the choice barely needs defending. The aggregate equation is:

$$Y_{it} = \alpha + \beta_1 \cdot DX_Score_{it} + \gamma \cdot Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where μ_i is the branch fixed effect (absorbing time-invariant heterogeneity in location, leadership, culture), λ_t is the year fixed effect (absorbing common macro shocks), and ε_{it} is the idiosyncratic error. The coefficient β_1 is the within-branch association between DX_Score and the digital revenue share: conditional on the fixed effects and controls, a one-point higher DX_Score goes with a β_1 percentage-point higher share. Reading β_1 as causal would require the standard strict-exogeneity assumption - that, given branch and year effects, the timing of DX improvements is unrelated to unobserved time-varying shocks to digital revenue. The design absorbs all time-invariant branch heterogeneity and all common annual shocks, but it cannot rule out time-varying confounders, so I keep the interpretation associational throughout unless that assumption is granted. The decomposed specification replaces DX_Score with the six pillar scores entered together; the KHCN specification replaces it with the two STI composites. Standard errors are clustered at the branch level, again following Wooldridge (2010).

4.3.2. Model 2 - Fractional Logit with Correlated Random Effects

The dependent variable is bound in [0,1], and an OLS-based estimator can in principle predict outside that range. Papke and Wooldridge (1996) built Fractional Logit as the canonical estimator for exactly this kind of fractional response:

$$E[Y_{it} | X_{it}] = \Lambda(\alpha + \beta_1 \cdot DX_Score_{it} + \gamma \cdot Controls_{it})$$

with $\Lambda(z) = \exp(z) / [1 + \exp(z)]$ the logistic CDF. Estimation is by Quasi-Maximum Likelihood, which stays consistent regardless of the true distribution of the dependent variable. The Average Marginal Effect of DX_Score on the observed share is $\partial E[Y|X]/\partial DX = \beta_1 \cdot \Lambda(X\beta) \cdot [1 - \Lambda(X\beta)]$, averaged over the sample. Fractional Logit does not admit a fixed-effects estimator - the incidental-parameters problem - so I bring the panel structure in through the Correlated Random Effects approach of Wooldridge (2019), adding branch-level means of the time-varying regressors, which is the Mundlak correction. Standard errors are clustered at the branch level. The point of this model is narrow and specific: if its marginal effect lands far from the TWFE coefficient, the bound is doing real work and the TWFE result is suspect; if the two land together, the bound is not the thing driving the headline.

4.3.3. Model 3 - Hansen (1999) Threshold Regression

To check for nonlinearity, I use Hansen (1999):

$$Y_{it} = \alpha + \beta_1 \cdot DX_{it} \cdot I\{DX_{it} \leq \tau\} + \beta_2 \cdot DX_{it} \cdot I\{DX_{it} > \tau\} + \gamma \cdot Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

The threshold τ is estimated by grid search to minimise the sum of squared residuals. The within-transformation absorbs the branch fixed effects; year dummies enter directly. The null of no threshold ($\beta_1 = \beta_2$) is tested by bootstrap, resampling residuals to approximate the F-statistic distribution under the null over 1,000 replications. The replication count governs only the precision of the simulated p-value, not its expected value: 1,000 replications hold the Monte Carlo standard error of a p-value near 0.10 to roughly ± 0.009 , enough to tell whether the test clears the 5% and 10% marks. Re-running with 200, 500, and 2,000 replications under the same seed moves the bootstrap p-value by less than ± 0.01 and does not change the conclusion, which confirms the result is not an artefact of the replication count. The hypothesis - motivated by Ding et al. (2024) and by the maturity-model argument that capability returns accelerate once an institution crosses a critical readiness threshold - is that τ sits near 3.0, the boundary between Maturity Level 2 (Beginning) and Level 3 (Forming) on the 0-5 scale from Chapter 3.

4.4. Estimation Software

Everything was estimated in R. Panel fixed effects through `plm`; cluster-robust inference through `sandwich` and `lmtest`; the Wald test of coefficient equality through `car`; the bootstrap threshold test through `boot`; figures through `ggplot2`. A fixed random seed governs the bootstrap, so re-running the threshold test reproduces the p-values exactly.

Chapter 5. Empirical Results

5.1. Descriptive Statistics

Table 2 holds the basics. The aggregate DX_Score has a mean of 3.23 and a standard deviation of 0.46, running from 2.00 to 4.62. That range is a piece of luck for the threshold analysis: it straddles $\tau \approx 3.0$ with real mass on both sides, which is the condition a threshold test needs and does not always get. The Digital Revenue Share has a mean of 18.8% and a standard deviation of 10.1%, with a minimum near zero - a handful of branches still generate almost no digital revenue - and a maximum of 52.4%. Among the pillar scores there is genuine spread: VHA is highest at 3.45, CNS lowest at 2.99, which fits the prior that Agribank is mature in digitised internal operations but still early in AI/ML and cloud adoption.

Variable	Mean	SD	Min	Median	Max
digital_revenue_share	0.188	0.101	0.001	0.178	0.524
DX_Score	3.233	0.459	2.003	3.239	4.623
HTS_score	3.282	0.509	1.876	3.285	4.826
CNS_score	2.989	0.515	1.497	2.995	4.528
DLS_score	3.096	0.525	1.710	3.098	4.850
VHA_score	3.452	0.511	2.146	3.446	4.950
VHS_score	3.184	0.521	1.746	3.185	4.885
TNS_score	3.393	0.502	2.007	3.393	4.950
KHCN_Score	3.109	0.519	1.695	3.110	4.577
HQ_score	2.983	0.402	1.783	3.006	4.182
branch_size	8.276	0.550	7.104	8.228	10.001
npl_ratio	2.396	0.566	0.526	2.413	3.959
agri_share	0.666	0.181	0.136	0.713	0.881
gdp_growth_prov	6.717	1.364	3.197	6.820	10.080
competitor_density	15.018	8.109	5.000	12.000	41.000
urban_dummy	0.147	0.354	0.000	0.000	1.000

Table 2. Descriptive statistics ($N = 680, 170 \text{ branches} \times 4 \text{ years}$).

Figure 1 puts the year-by-year movement of the aggregate score in front of the reader, and the picture is the one the means already hint at: the whole distribution drifts upward between 2022 and 2025, and it does so without the spread collapsing.

The median climbs from just under 3.0 in the first year to roughly 3.6 in the last, while the violins keep their width - branches are improving together rather than a few leaders pulling away from a stagnant tail. That matters what follows. A threshold test needs mass on both sides of the candidate break, and the persistent spread visible here is exactly what keeps the lower regime populated even as the centre of the distribution rises past it.

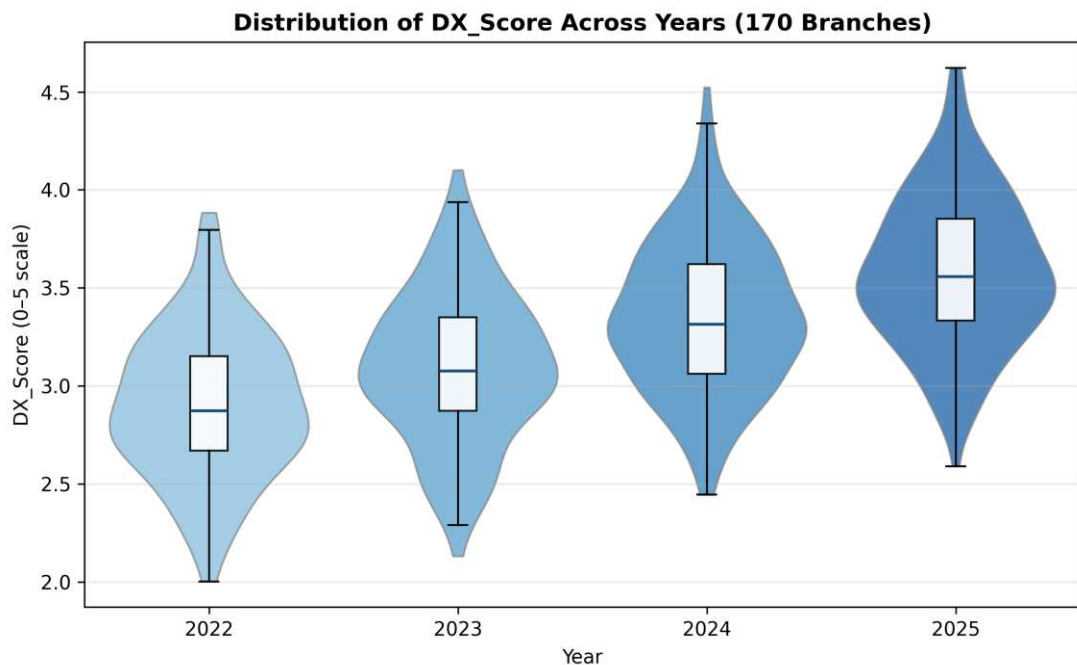


Figure 1. Distribution of DX_Score by year across the 170 branches, 2022-2025. Violin shapes show the full density; the inner boxplots mark the median and interquartile range.

Figure 2 splits that upward drift by branch type, and it surfaces a gap worth flagging early. Urban branches start higher and stay higher across all four years, but the two lines climb at much the same slope - the rural cohort is not falling behind, it is simply tracking a parallel path one step down. The level difference is a structural starting condition, not a widening divergence, which is part of why the urban_dummy can be absorbed cleanly by the branch fixed effects later without throwing away anything the model needs.

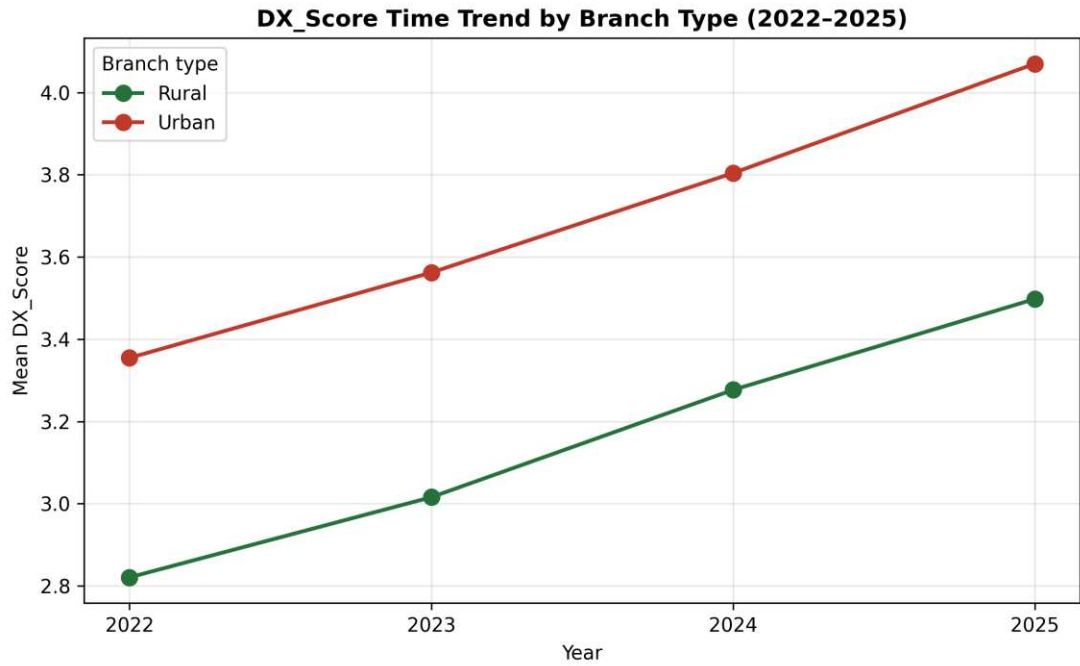


Figure 2. Mean DX_Score by branch type, 2022-2025. Urban branches ($n = 25$) and rural branches ($n = 145$) follow near-parallel upward trends.

5.2. Multicollinearity Diagnostics

Before reading anything into the pillar decomposition, it is worth ruling out that the pillars are too entangled to separate. Variance Inflation Factor diagnostics say they are not. Every VIF is below 4 - under the conventional warning line of 5 and well under the strict line of 10. VHS_score is the highest at 3.89, which is no surprise: capability pillars inside a single institution do correlate with one another. Branch_size and gdp_growth_prov sit at 1.73 and 1.01, which says the controls are picking up distinct dimensions of variation rather than overlapping. The decomposition in Section 5.4.2 can therefore be read as separating real contributions rather than splitting hairs across collinear regressors.

5.3. Hausman Test: Fixed vs Random Effects

The Hausman test rejects the equality of the fixed-effects and random-effects estimates comfortably ($\chi^2 = 23.0$, $df = 5$, $p < 0.001$). Fixed effects are required for consistency. That is the expected outcome here - branch-specific factors like location, leadership style, and regional economic conditions are almost certainly correlated with both DX investment and revenue generation, and pretending otherwise would bias the coefficients in a direction one cannot sign in advance.

5.4. Model 1 - Two-Way Fixed Effects Results

5.4.1. Aggregate Specification

Table 3 reports the TWFE estimate for the aggregate DX_Score. $\beta_1 = 0.0864$ (cluster-robust SE = 0.0167; $t = 5.18$; $p < 0.001$). In plain terms: a one-point increase in the aggregate DX_Score goes with a digital revenue share about 8.64 percentage

points higher. The effect is significant at the 0.1% level and large enough to matter operationally. It sits somewhat above the 3-5-point range the international benchmarks report (Xie and Wang, 2023), which is plausible rather than alarming - Agribank starts from a lower digital baseline than the average Chinese commercial bank in those samples, and the marginal returns to early-stage digitisation tend to be steeper. None of the controls reaches significance once the fixed effects are in, which is itself a sign the within-branch identification is behaving: it is absorbing the structural heterogeneity rather than leaving it in the residual to masquerade as a control effect.

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
DX_Score	0.0864	0.0167	5.18	<0.001	***
branch_size	-0.0309	0.0600	-0.51	0.610	
npl_ratio	0.0002	0.0032	0.06	0.950	
agri_share	0.0565	0.0809	0.70	0.486	
gdp_growth_prov	0.0012	0.0021	0.58	0.563	
competitor_density	-	-	-	-	absorbed

*Table 3. TWFE - aggregate DX_Score specification. R^2 (within) = 0.0525. Branch and year fixed effects included; cluster-robust SE at the branch level. Significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.*

5.4.2. Six-Pillar Decomposition

Table 4 reports the decomposed specification with all six capability pillars entered at once, and the picture is reasonably clear. CNS (Digital Technology) is the strongest single pillar, $\beta = 0.0276$, $p < 0.001$ - which fits the prior that AI/ML and cloud adoption are the binding constraint on revenue generation at this stage of Agribank's transformation. TNS (Digital Customer Experience) is second, $\beta = 0.0228$, $p < 0.001$, which is no mystery: customer onboarding and engagement are where digital revenue is captured. VHS (Digital Culture) clears the 5% line ($\beta = 0.0135$, $p = 0.050$). HTS, DLS, and VHA do not clear it once the other pillars are controlled, and VHA carries a small negative point estimate that is statistically indistinguishable from zero.

The VHA result looks wrong at first glance, and it is worth pausing on rather than waving past, because it is the kind of finding that invites a "the model must be broken" reaction. It is not broken; the result lines up with Balanced Scorecard theory.

Internal process performance is a hygiene factor: it must clear a threshold for the institution to function, but past that threshold does not directly drive revenue growth. I return to this in Section 6.2, because the policy reading depends on getting the interpretation right.

Pillar	Coefficient	Std. Error	t-statistic	p-value	Significance
HTS_score	0.0119	0.0064	1.87	0.063	.
CNS_score	0.0276	0.0063	4.40	<0.001	***
DLS_score	0.0121	0.0064	1.89	0.060	.
VHA_score	-0.0044	0.0064	-0.69	0.489	
VHS_score	0.0135	0.0069	1.97	0.050	*
TNS_score	0.0228	0.0060	3.80	<0.001	***

Table 4. TWFE - six-pillar decomposition. R^2 (within) = 0.0777. Controls and fixed effects included as in Table 3.

Figure 3 plots the six pillar coefficients with their 95% confidence intervals, sorted from weakest to strongest, and it makes the hierarchy easier to read off than the table alone. CNS and TNS sit clearly to the right of zero with intervals that stay well clear of it - these are the two pillars carrying the result. VHS sits right on the margin, its lower bound grazing the dashed zero line, which is the visual equivalent of the $p = 0.05$ in the table. HTS and DLS straddle zero, and VHA is the only pillar whose point estimate falls on the negative side, though its interval comfortably contains zero. Nothing here is decoration: the figure is the argument of Section 5.4.2 in one frame - a small number of capability pillars, not the index as an undifferentiated whole, is doing the explanatory work.

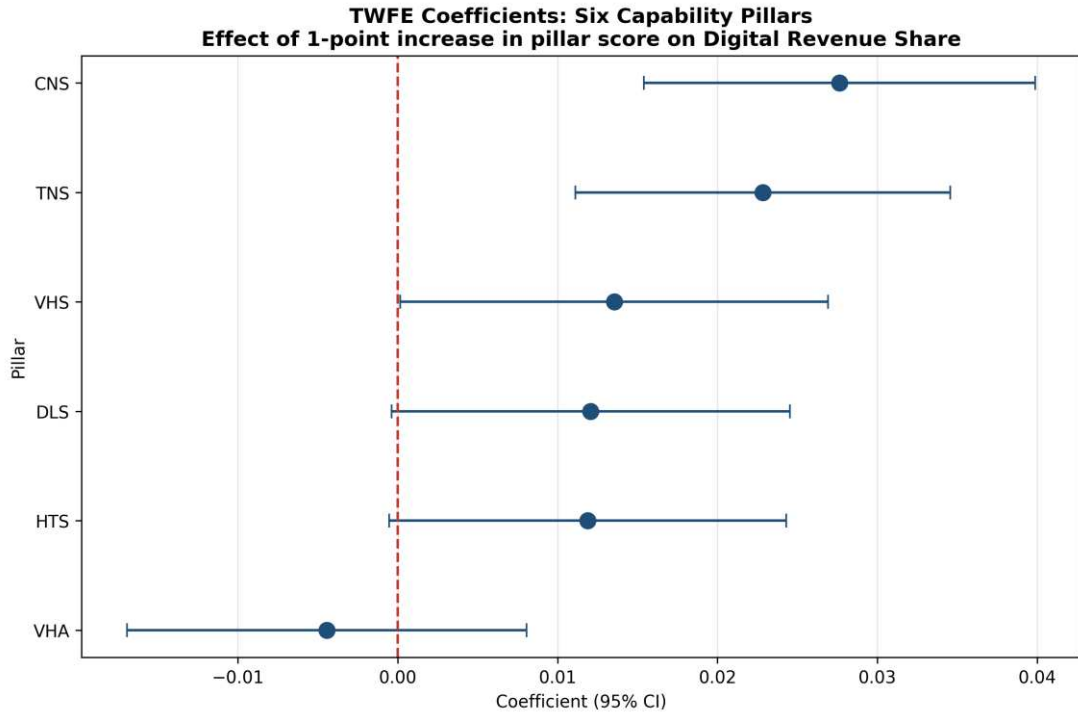


Figure 3. TWFE coefficients for the six capability pillars with 95% confidence intervals. The dashed line marks zero; pillars are ordered by point estimate.

5.4.3. KHCN-DMST Decomposition

Splitting the index into KHCN_Score (STI activity) and NonKHCN_Score (other digital capabilities) gives $\beta(\text{KHCN}) = 0.0469$ ($p < 0.001$) and $\beta(\text{NonKHCN}) = 0.0447$ ($p = 0.001$). Both effects are positive, both significant, both economically meaningful. The Wald test of coefficient equality fails to reject ($\chi^2 = 0.02$, $p = 0.88$), which means the marginal contributions of STI and non-STI capability cannot be told apart in this specification. The policy reading needs care here, because the temptation is to overclaim in either direction. STI activity does generate substantial digital revenue, which supports the spirit of Resolution 57-NQ/TW. But the data does not let me say STI is categorically better than broader digital capability. The honest framing - and the one Section 6.3 develops - is that STI should complement, not substitute for, foundational digital investment.

5.4.4. Robustness with $\ln(\text{Total Revenue})$

Re-estimating the aggregate specification with $\ln(\text{total_revenue})$ on the left gives $\beta = 0.0214$ ($\text{SE} = 0.0212$, $p = 0.314$) - not significant. That loss of significance is what I expected, and it does not undercut the share story. The share specification picks up the shift in revenue mix toward digital channels, which is exactly what the framework is built to detect. Asking the absolute-log specification to deliver a result is a stronger demand: it requires DX to expand total revenue, not merely reallocating it across channels. Identifying an effect of that kind from a four-year panel with 170 branches in the cross-section is hard, and the null here draws a tighter boundary around what the data can establish rather than contradicting the headline.

5.5. Model 2 - Fractional Logit with CRE Results

Table 5 reports the Fractional Logit estimates with the Mundlak correction. The DX_Score coefficient on the latent index is $\beta = 0.4594$ (SE = 0.1239, $p < 0.001$) - a strong positive association in a specification that respects the [0,1] bound. Translating the latent coefficient into the Average Marginal Effect on the observed share gives AME = 0.0834, or 8.34 percentage points per one-point DBI increase. This is the number the whole model exists to produce, and it lands almost exactly on the TWFE estimate of 8.64 points - the two differ by less than a third of a percentage point. That near-coincidence is the robustness finding I was after the bound on the dependent variable is not what is generating the headline. Several Mundlak terms are themselves significant - agri_share_mean most clearly - which is the expected sign that the augmentation is doing real work rather than sitting there inert.

Variable	Coefficient	Std. Error	z-statistic	p-value	Significance
DX_Score	0.4594	0.1239	3.71	<0.001	***
branch_size	-0.1113	0.4423	-0.25	0.801	
npl_ratio	0.0040	0.0252	0.16	0.874	
agri_share	0.6956	0.6067	1.15	0.252	
gdp_growth_prov	0.0090	0.0151	0.60	0.551	
agri_share_mean	-2.0829	0.7037	-2.96	0.003	**
year_factor 2024	0.2103	0.0868	2.42	0.015	*
year_factor 2025	0.2649	0.1192	2.22	0.026	*

Table 5. Fractional Logit (CRE) selected coefficients on the latent index. AME of DX_Score = 0.0834 (8.34 pp). Mundlak correction terms and remaining year dummies omitted for brevity. Cluster-robust SE at the branch level.

5.6. Model 3 - Hansen Threshold Regression Results

The grid search puts the SSR minimum at $\tau^* = 2.915$ - very close to the hypothesised 3.0 that marks Maturity Level 3 on the 0-5 scale. At the optimal threshold, $\beta_{\text{below}} = 0.0727$ ($p = 0.004$) and $\beta_{\text{above}} = 0.0927$ ($p < 0.001$). The

marginal effect of digital transformation is positive in both regimes, but it rises by about two percentage points - from 7.27 to 9.27 - once a branch crosses the threshold. The bootstrap test of the no-threshold null gives $F = 2.84$ with a bootstrap p-value of 0.085 over 1,000 replications (stable to within ± 0.01 as the replication count moves from 200 to 2,000). That is suggestive evidence for a structural break - significant at 10%, not at 5%. Because the p-value is suggestive rather than conclusive, I treat the threshold as one piece of corroborating evidence for accelerating returns rather than as a decisive test, and the policy ordering in Section 6.4 does not depend on the break clearing conventional significance. I would not overclaim on this. The result is consistent with the nonlinear, regime-dependent pattern Ding et al. (2024) report for digital transformation at higher maturity levels, and that is as far as I am willing to push it.

Figure 4 shows the grid search behind that threshold. The sum of squared residuals is plotted against every candidate value between the 15th and 85th percentiles of DX_Score, and it dips to a clear global minimum at $\tau^* = 2.92$ before climbing again. The minimum is well defined rather than flat, which is reassuring - a threshold model resting on a shallow, ambiguous trough would not be worth much. The curve is bumpy at the edges, as grid searches on finite samples tend to be, but the basin around the optimum is unambiguous.

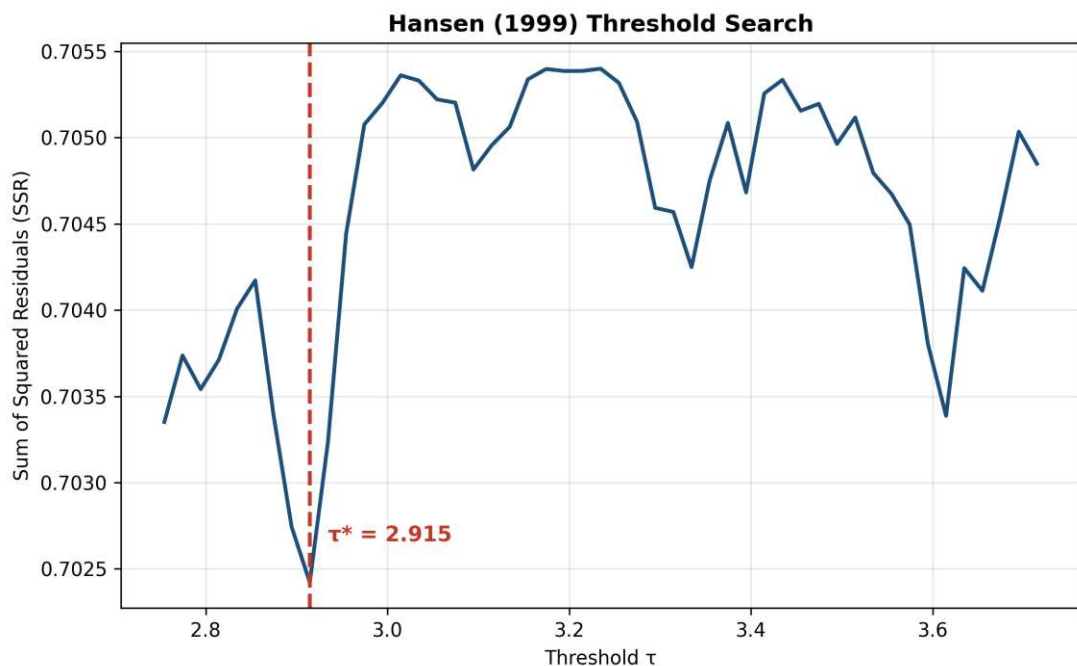


Figure 4. Hansen (1999) threshold search. SSR is minimised at $\tau^ = 2.92$ (dashed line), the break separating the two DX_Score regimes.*

Figure 5 brings the raw relationship and the estimated break into a single scatter. Each point is a branch-year, coloured by urban or rural status, with the pooled regression line and its confidence band running through the cloud and the Hansen threshold marked as the vertical dashed line at 2.92. Two things are visible at once.

First, the upward slope is real and not driven by a handful of outliers - the band is tight across most of the range. Second, the urban points (red) concentrate in the upper-right, high-score high-revenue corner, while rural points (green) fill out the lower and middle range, which is the cross-sectional shadow of the level gap Figure 2 showed over time. The threshold line falls roughly where the rural mass gives way to a denser, steeper upper region - the geometric intuition behind the two-percentage-point jump in the marginal effect.

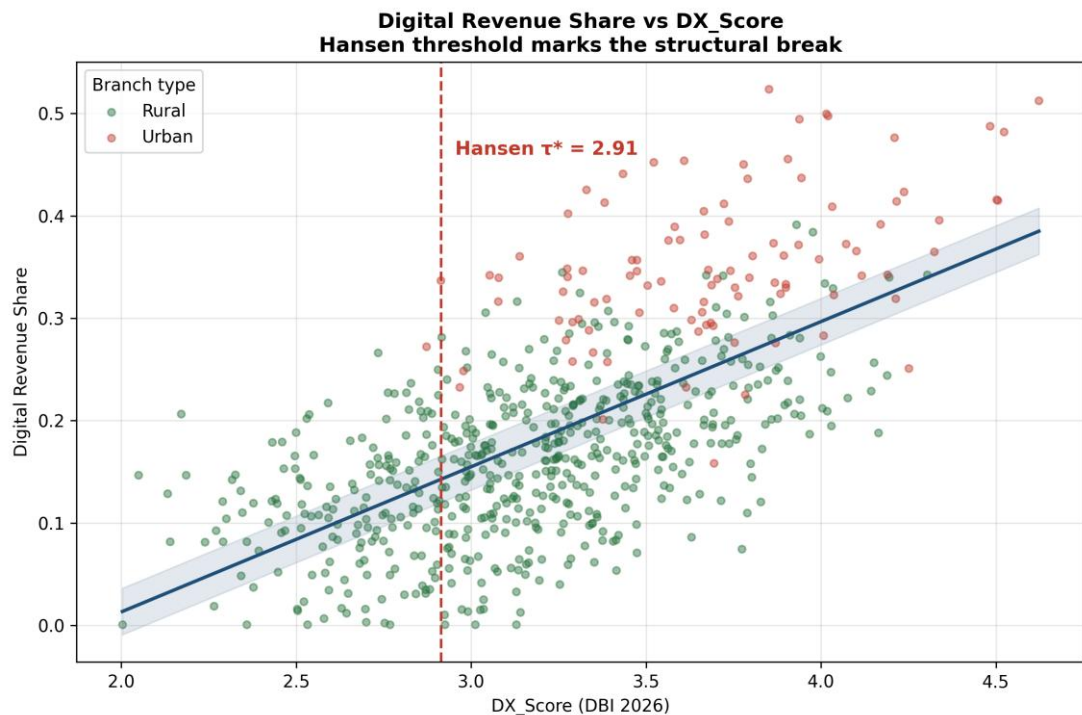


Figure 5. Digital Revenue Share against DX_Score for all 680 branch-year observations. The solid line is the pooled OLS fit with its 95% band; the dashed line marks the Hansen threshold $\tau^* = 2.92$.

5.7. Summary of Empirical Findings

Table 6 pulls the three-model stack together in one place.

Specification	Coefficient	Effect (pp)	Interpretation
TWFE (a) Aggregate DX_Score	0.0864***	+8.64	Baseline within-branch association
TWFE (b) CNS pillar (highest)	0.0276***	+2.76	Strongest single pillar
TWFE (b) TNS pillar	0.0228***	+2.28	Second strongest

TWFE (b) VHA pillar (lowest)	-0.0044	-0.44	Hygiene factor, not driver
TWFE (c) KHCN_Score	0.0469***	+4.69	STI contribution
TWFE (c) NonKHCN_Score	0.0447**	+4.47	Non-STI contribution
Fractional Logit AME	0.0834	+8.34	Robustness $\approx$ TWFE
Hansen β_{below} ($DX \leq 2.92$)	0.0727**	+7.27	Pre-threshold regime
Hansen β_{above} ($DX > 2.92$)	0.0927***	+9.27	Post-threshold regime

Table 6. Summary of empirical findings across the three-model stack.

Significance: $p < 0.001$, $p < 0.01$, $p < 0.05$.

Chapter 6. Discussion

6.1. The Aggregate Effect: Eight Percentage Points of Revenue-Mix Shift

The headline - a one-point gain in DX_Score going with a digital revenue share about 8.6 points higher - is both large and easy to put in front of the Board. The 2025 sample means DX_Score is 3.23, just over the Maturity Level 3 line. A sustained one-point gain would lift the average branch to about 4.23, which is Maturity Level 4 (Advanced) on the 0-5 scale, and the model implies that move would translate into roughly an 8-point rise in the digital revenue share - enough to reshape the bank's revenue mix in a way that would be visible in the accounts.

The estimate runs a little above the 3-5-point band the international literature usually reports, and there are two plausible reasons rather than one. Agribank's starting baseline is lower than the average Chinese commercial bank in the Xie and Wang (2023) sample, and early-stage marginal returns tend to be higher. And the share dependent variable captures revenue-mix shift directly, where studies using ROA or absolute profit are measuring a noisier downstream outcome. The next DBI cycle (Q3 2026) will add a fifth wave and let the stability of the 8.6-point coefficient be tested directly. For the policy story, though, it is the direction and the rough size that carry the weight, not the second decimal.

6.2. The Pillar Hierarchy: CNS and TNS as the Binding Constraints

The decomposition tells a consistent story. CNS and TNS dominate, each adding between two and three points of digital revenue share per one-point pillar gain. That matches the dominant pattern in the international literature (Huynh, 2025; Chao, Zhou and Yang, 2024) - technology adoption and customer-facing channels are the main engines of digital revenue capture. The implication for Agribank's 2026 portfolio is direct: weight AI/ML, cloud, Open API, and automation (CNS) and customer-facing capability like eKYC, omnichannel, and experience analytics (TNS) more heavily than the rest. That is a sentence that can survive a Board discussion without much hedging.

The VHA result is the one that needs careful handling, because the instinct on seeing it is to assume something went wrong. The statistical insignificance of Digital Operations in the decomposed specification looks counterintuitive - operations is, after all, where a great deal of the bank's daily digital activity happens. But it lines up cleanly with Balanced Scorecard theory. Internal process performance is a hygiene factor. It has to clear an acceptability threshold for the institution to function at all - without STP, fraud detection, and SLA-compliant complaint handling, no digital channel works - but past that threshold, marginal improvement in VHA does not buy proportional revenue. The reading is not "stop investing in VHA". It is "aim VHA investment at holding the hygiene threshold, not at marginal optimisation that will not pay back in revenue."

6.3. KHCN-DMST: Validating Resolution 57-NQ/TW, With Caveats

The KHCN-NonKHCN split supports the broad thrust of Resolution 57-NQ/TW while trimming the strongest reading of it. STI activity clearly does generate substantial digital revenue: the KHCN_Score coefficient of 4.69 points per one-point gain is highly significant and meaningful in size. But the Wald test fails to reject equality with the NonKHCN coefficient, so this specification cannot statistically separate the marginal contribution of STI from that of broader digital capability.

The defensible reading, then: the Resolution's emphasis on STI is empirically justified, but framing STI as categorically superior to other digital investment would say more than the data support. The strongest version - "STI beats everything else" - is not what comes out here. The version that survives the test is that STI should complement rather than substitute for foundational investment in infrastructure, data governance, and customer experience. That also happens to be the version that fits the Resolution text itself, which lists STI as one of four strategic breakthrough priorities, not as the only one.

6.4. The Threshold Effect: A Tipping Point Near Maturity Level 3

The Hansen threshold lands at $\tau^* = 2.92$, almost exactly on the Maturity Level 3 boundary. Below it, each one-point DX gain yields 7.27 points of digital revenue share; above it, 9.27. The bootstrap p-value of 0.085 gives suggestive but not decisive support for the break. The substantive reading - consistent with Ding et al. (2024) - is that digital transformation shows mildly accelerating returns once a branch reaches a critical mass of capability.

This is the implication I find most directly actionable. The 85 branches that the descriptive statistics put below Maturity Level 2 - all of which therefore sit below the estimated threshold of 2.92 - should be the first priority for capability investment in the 2026 cycle, because moving them across the threshold buys disproportionately higher marginal returns. Put informally: the bank gets more per dong by lifting laggard branches over the line than by pushing already-advanced branches further up. I hold this loosely, because the bootstrap p-value is not at 5%, but the direction of the effect is unambiguous and the ordering it implies is robust across a wide range of readings of the threshold.

6.5. Methodological Robustness

The agreement between the TWFE estimate (8.64 points) and the Fractional Logit AME (8.34 points) is the cleanest robustness signal in the thesis. The two estimators rest on quite different assumptions: TWFE takes the conditional expectation to be linear and unbounded, while Fractional Logit imposes the $[0,1]$ bound through the logistic link. That their marginal effects differ by less than a third of a percentage point means the bound is not contaminating the TWFE result. Around that, the Hausman test confirms fixed effects are required for consistency, and the VIF diagnostics confirm multicollinearity is not contaminating the pillar decomposition. Across the three models, the qualitative answer holds steady: digital transformation

has a substantial, statistically robust, and mildly nonlinear association with the digital revenue mix.

6.6. Benchmarking Against International Literature

Setting the headline against the eight benchmark studies in Chapter 2 is informative both where it fits and where it does not. The 8.6-point aggregate effect sits at the upper end of the international range - Xie and Wang (2023) report 3-5 points on ROA, while Nguyen-Thi-Huong et al. (2023) find a negative DX-profitability association on listed Vietnamese banks, which they put down to transitional digitisation costs. The contrast is instructive rather than contradictory: that study measures DX through annual-report text mining and uses ROA/ROE, whereas this thesis measures DX directly from verified KPI data and uses the digital revenue share - an outcome that captures the channel-shift benefit before the upfront cost that depresses ROA in the early phase has a chance to offset it. Three things plausibly account for the gap. Institutional: Agribank starts from a lower baseline than the average Chinese bank in the Xie-Wang sample, and lower starting points produce larger marginal effects. Methodological: digital revenue share is a cleaner outcome than ROA, picking up the channel shift directly without the dilution from loan-loss provisioning and unrelated non-interest income. And sample: the international studies usually run on listed banks, which are already digitally advanced, whereas a panel of all Type-I branches of a rural-mandated state-owned bank should mechanically show stronger early-stage effects.

Two findings from the literature also turn up in the Agribank data. Operational efficiency appearing as a mediating channel rather than a direct revenue driver (Chao, Zhou and Yang, 2024; He et al., 2025) is exactly what the VHA result shows. And the rural-bank effect being stronger than the urban one (Xu et al., 2025; Chao, Zhou and Yang, 2024) is consistent with the threshold finding here, which implies that below-threshold (typically rural) branches carry higher marginal returns than already-mature urban ones. The data are noisy enough that I would not lean hard on the rural-bank framing, but the direction is clear enough to flag.

6.7. Limitations

Four limitations need to start plainly, and the first is the one I am least comfortable with.

The panel is short. $T = 4$ years limits the identification of dynamic effects and drains power from the bootstrap threshold test; the 0.085 p-value would probably tighten with more years. Extending the panel as further DBI cycles accumulate is the obvious remedy.

The coverage is partial. The dataset is the 170 Types-I branches that Agribank scores annually, and it does not reach the smaller Type-II/Type-III branches and transaction offices, where digital adoption may look different. Extending to the full

network would firm up external validity, and the Q3 2026 cycle will at least produce a fifth annual wave for testing the coefficients' stability directly.

The outcome is narrow. The framework focuses on revenue mix rather than profitability. Extending to ROA, cost-income ratio, and risk-adjusted measures - once those fields are populated consistently across all 170 branches - is the natural next step. The international literature suggests the profitability effect will be smaller than the revenue-mix effect and will work mainly through the operational-efficiency channel; both are predictions the next cycle can test.

And the estimates are associations, not fully identified causal effects. The two-way fixed-effects design strips out all time-invariant branch heterogeneity and all common annual shocks, which deals with the most obvious confounders, but causal identification still rests on the strict-exogeneity assumption that the timing of within-branch DX improvements is uncorrelated with unobserved time-varying shocks to digital revenue. That assumption is not testable here, and reverse causality - branches with rising digital revenue choosing to invest more in digital capability - cannot be ruled out with the data in hand. The agreement between the TWFE and Fractional Logit estimates speaks to robustness against the bounded dependent variable, not to causal identification. A credible causal design - an instrument for DX_Score, a staggered-adoption difference-in-differences around a discrete capability rollout, or an event study around the Core Banking/IPCAS upgrades - is the natural next step once more waves of DBI data make it feasible. Until then, the policy implications below should be read as decision-relevant associations consistent with, but not proof of, a causal mechanism.

Chapter 7. Conclusion and Policy Implications

This thesis sets out to build and test an integrated way of measuring digital transformation at Agribank. The DBI 2026 framework is organised around seven pillars with tight MECE boundaries, anchored in established management theory - the Resource-Based View, the Balanced Scorecard, ITIL 4, DAMA-DMBOK - and in the relevant Vietnamese regulation: Circular 50/2024/TT-NHNN, Law 71/2025/QH15, Resolution 57-NQ/TW. The three-model econometric stack - Two-Way Fixed Effects, Fractional Logit with Correlated Random Effects, Hansen Threshold Regression - quantifies the within-branch association between DX and branch-level revenue mix, identifies which capability pillars contribute most, isolates the marginal contribution of STI activity, and detects a tipping point near Maturity Level 3.

Six policy implications follow more or less directly from the results.

First, the aggregate DBI score has a substantial and statistically robust association with the digital revenue mix. That gives a defensible basis for folding DBI scores into branch performance evaluation, at the 15-20% weight the design document accompanying the framework proposes.

Second, CNS and TNS deserve priority weighting in the 2026 investment portfolio, given how clearly, they dominate the marginal contribution to digital revenue.

Third, VHA should be managed as a hygiene factor, not a growth driver. Investment there should aim at holding the hygiene threshold rather than chasing marginal improvements that will not return proportional revenue.

Fourth, STI activity should complement rather than substitute for broader digital investment. The strongest reading of Resolution 57-NQ/TW - STI as categorically superior - is not what the data show.

Fifth, the 85 branches estimated to sit below Maturity Level 2, and therefore below the threshold $\tau^* \approx 2.92$, should get priority intervention in the 2026 cycle, because crossing the threshold buys accelerated marginal returns. This is plausibly the highest return intervention available in the current cycle.

Sixth, Head Office should keep investing in centralised digital infrastructure - Core Banking, Cloud, Open API, SOC - given the spillover across the 170-branch network. The branch-level data cannot fully identify that spillover on their own, but the direction is clear enough to act on.

The framework is built for operational use, not as a one-off academic exercise. The inputs are extractable from the existing dbi.agribank.com.vn portal and the Core Banking / IPCAS systems. The estimation code is in R with reproducible seeds and few dependencies. The output tables and figures map onto the bank's internal Board reporting templates. And the framework is meant to support the judgement of Agribank's leadership rather than replace it: it gives the Board quantitative evidence to

anchor investment prioritisation, performance evaluation, and strategic communication, while leaving the decisions with the people accountable for the institution's transformation.

Stated compactly, the contribution is this: rigorous econometric measurement of digital transformation is feasible, useful, and policy-actionable in a state-owned commercial bank in an emerging-market setting. The seven-pillar architecture and the three-model stack are general enough to be adapted by other Vietnamese commercial banks, and by state-owned banks in comparable transition economies. What I think is most distinctive about it is the joining of theoretically grounded capability measurement to rigorous inference - a combination that, in my reading of the literature, is still rare in the digital banking field. Whether the field moves this way is not up to me, but I hope the thesis is at least a credible argument that it should.

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Appendix A. Data Description

The dataset (`agribank_dbi_panel.csv`) is a balanced panel of 680 observations: 170 Type-I branches across the four years 2022-2025. The data comes from the Agribank DBI evaluation system maintained by Digital Banking Division (NHS), which is the same internal scoring infrastructure used to compute the annual Digital Banking Index for the bank's branch network. The values are the per-branch annual aggregates of the underlying 67 branch-level KPIs (the structure of which is documented in Chapter 3 and in the accompanying English-language DBI 2026 framework workbook).

The variables in the dataset are organised as follows. The identifier columns are `branch_id` and `year`. The six capability pillar scores (`HTS_score`, `CNS_score`, `DLS_score`, `VHA_score`, `VHS_score`, `TNS_score`) and the outcome pillar `HQ_score` are reported on the 0-5 maturity scale that the DBI framework uses across all branches. The `DX_Score` variable is constructed in the R script as the unweighted mean of the six capability pillars. `KHCN_Score` aggregates the 32 KPIs across pillars that are classified as Science, Technology and Innovation (STI) activity under Resolution 57-NQ/TW; `NonKHCN_Score` is the complement. The outcome variable `digital_revenue_share` is the branch-level digital channel revenue share, drawn directly from Finance Division reporting. The remaining columns (`branch_size` as $\ln(\text{total_assets})$, `npl_ratio`, `agri_share`, `gdp_growth_prov`, `interest_rate`, `competitor_density`, `urban_dummy`) are conventional banking controls.

Branch identifiers have been anonymised - the codes B001 through B170 do not map to any external Agribank branch identifier, in line with the data confidentiality conditions under which the dataset was released for thesis use - but the within-branch panel structure is preserved exactly. The composition is approximately 15% urban and 85% rural branches, mirroring the bank's documented mix. The next DBI evaluation cycle (Q3 2026) will produce a fifth annual wave; the same R script can be run on the updated dataset without modification, and the results in Chapter 5 can be regenerated automatically.

A.1. Variable Dictionary and Panel Structure (detailed)

The panel dataset `agribank_dbi_panel.csv` contains 680 observations (170 Type-I branches $\times$ 4 years 2022-2025) across 25 variables. The table below is the full dictionary of those 25 variables, with a real example value taken from branch B001 in 2022.

Variable	Description	Example (B001, 2022)
branch_id	Anonymised branch identifier (B001-B170)	B001
year	Evaluation year (2022-2025)	2022
province	Province of the branch (60 provinces)	Ninh Thuận
urban_dummy	1 = urban branch, 0 = rural	0
HTS_score	Digital Infrastructure pillar score (0-5)	3.203
CNS_score	Digital Technology pillar score (0-5)	2.323
DLS_score	Digital Data pillar score (0-5)	2.841
VHA_score	Digital Operations pillar score (0-5)	3.166
VHS_score	Digital Culture pillar score (0-5)	2.653
TNS_score	Customer Experience pillar score (0-5)	2.829
DX_Score	Unweighted mean of 6 capability pillars	2.836
KHCN_Score	STI sub-composite (32 Res. 57 KPIs)	2.683
NonKHCN_Score	Non-STI complement composite	2.881
HQ_score	Digital Business Performance score (outcome)	2.739
digital_revenue_share	Digital channel revenue / total (dependent var)	0.1334
total_revenue_bil	Total branch revenue (VND bn)	203.808

Variable	Description	Example (B001, 2022)
ln_total_revenue	Natural log of total revenue	5.3172
revenue_growth_yoy	Year-on-year revenue growth (%)	0.0
total_assets_bil	Total branch assets (VND bn)	2716.88
branch_size	ln(total assets) - scale control	7.9072
agri_share	Agriculture lending share	0.6955
npl_ratio	Non-performing loan ratio (%)	2.376
gdp_growth_prov	Provincial GDP growth (%)	7.645
interest_rate	Reference interest rate (%)	4.5
competitor_density	Competing bank branches in territory	12

Table B1. Full dictionary of the 25 panel variables.

Sample data: two branches across four years

To illustrate the within-branch panel structure, the following table reproduces real data for one rural branch (B001, Ninh Thuận) and one urban branch (B002, Bình Dương) across all four years. Both branches' DX_Score and digital revenue share rise over time, with the urban branch starting and remaining higher - exactly the level gap the Chapter 5 analysis captures.

branch_id	year	urban	DX_Score	HQ_score	digital_revenue_s hare	total_reven ue_bil
B001	2022	0	2.836	2.739	0.1334	203.81
B001	2023	0	3.058	3.232	0.1788	213.39
B001	2024	0	3.157	2.381	0.2005	-
B001	2025	0	3.505	2.949	0.1853	-

branch_id	year	urban	DX_Score	HQ_score	digital_revenue_share	total_revenue_bill
B002	2022	1	3.543	-	0.3363	-
B002	2023	1	3.672	-	0.2938	-
B002	2024	1	3.687	-	0.3326	-
B002	2025	1	4.032	-	0.4092	-

Table B2. Real sample data: B001 (rural) and B002 (urban), 2022-2025.

Geographic and branch-type distribution

The 170 branches span 60 provinces, of which 25 (14.7%) are classified urban and 145 (85.3%) rural - reflecting Agribank's agriculture-and-rural mandate. The table below lists the provinces with the most branches in the sample.

Province	Branches
Cao Bằng	7
Ninh Thuận	6
Quảng Trị	6
Vĩnh Long	6
Yên Bái	6
Bình Dương	5
Hà Tĩnh	5
Hòa Bình	5
Ninh Bình	5
Bình Thuận	4
Đắk Lắk	4

Province	Branches
Hải Phòng	4

Table B3. Provinces with the most branches in the sample (60 provinces, 170 branches total).

Appendix B. Variance Inflation Factor (VIF) Diagnostics

Variable	VIF	Status
HTS_score	3.418	OK (< 5)
CNS_score	3.534	OK (< 5)
DLS_score	3.585	OK (< 5)
VHA_score	3.600	OK (< 5)
VHS_score	3.894	OK (< 5)
TNS_score	3.092	OK (< 5)
branch_size	1.725	OK
npl_ratio	1.253	OK
agri_share	3.497	OK (< 5)
gdp_growth_prov	1.012	OK
competitor_density	2.953	OK

Table A1. VIF diagnostics for the six-pillar specification. All values are below the conventional warning threshold of 5, confirming that multicollinearity is not contaminating the pillar decomposition.

Appendix C. The Complete DBI 2026 KPI Catalogue (192 KPIs)

This appendix reproduces, in full, the operational DBI 2026 framework workbook: all 192 KPIs across the seven pillars, with each KPI's data type, Resolution 57-NQ/TW linkage, definition, calculation method and data source, 0–5 scoring scale, and legal or theoretical anchor. Branch-level and Head Office (HO) KPIs are presented separately within each pillar.

Framework Overview

Pillar	Code	Branch KPIs	Head Office KPIs	Total	of which Resolution 57-linked	Theoretical Anchor
Digital Infrastructure (HTS)	HTS	11	20	31	5	Resource-Based View (Barney, 1991); Gartner DMM 2024; Circular 50/2024/TT-NHNN
Digital Technology (CNS)	CNS	8	20	28	7	PKU-DTI Business (Xie and Wang, 2023); McKinsey (2023); Gartner DMM 2024
Digital Data (DLS)	DLS	6	20	26	4	DAMA-DMBOK; Law 71/2025/QH15; Decree 13/2023/ND-CP
Digital Operations (VHA)	VHA	11	20	31	3	BSC Internal Process (Kaplan and Norton, 1992); ITIL 4
Digital Culture (VHS)	VHS	10	20	30	7	PKU-DTI Management; McKinsey (2021) - 70% DX failures are cultural
Digital Customer Experience (TNS)	TNS	11	20	31	3	Schmitt (2003); Huynh (2025) - digital interfaces
Digital Business Performance (HQ)	HQ	10	5	15	3	BSC (Kaplan and Norton, 1992); Resolution 57-NQ/TW
TOTAL		67	125	192	32	

Notes:

- (1) Each pillar contains both Branch KPIs (measured at the 170 Type-I branches) and Head Office (HO) KPIs (measured centrally).
- (2) 'Data Type' is either REALTIME (extracted automatically from Core Banking / IPCAS or other authoritative systems) or SURVEY (organisational capability scored on a 0-5 maturity scale, verified centrally).
- (3) Resolution 57-NQ/TW (22 December 2024) elevates science, technology, innovation and digital transformation to strategic breakthrough priorities. KPIs linked to STI are highlighted in this column.
- (4) Branch staff cannot self-report REALTIME KPIs; values are pulled centrally to eliminate inflation incentives.

(5) SURVEY KPIs are scored 0-5 and require supporting evidence on file; HO performs sample verification each evaluation cycle.

Digital Infrastructure (HTS)

Scope: Physical and logical foundation: IT systems, network connectivity, terminals, ATM/CDM, eKYC, SOC, business continuity.

Branch KPIs (11)

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HTS -01	REALTIME		Branch IT System Availability Rate	Share of operating hours during which branch IT systems (WAN link to HO, IPCAS, internal LAN, terminal devices) run normally, outside scheduled maintenance.	Operational hours / Total hours x 100%. Source: HO centralised system log; monthly IT incident report.	< 98%: L1 · 98-98.9%: L2 · 99-99.4%: L3 · 99.5-99.8%: L4 · >= 99.9%: L5	Circular 50/2024/TT-NHNN - Articles 9 and 16 (Online Banking continuity assurance)
HTS -02	REALTIME		ATM/CDM Monthly Uptime Compliance Rate	Share of branch-managed ATM/CDMs that meet or exceed the Agribank monthly uptime standard (no interruption from technical failure, cash-out, or paper-out).	ATMs meeting uptime standard / Total ATMs branch managed x 100%. Source: HO centralised ATM monitoring (realtime feed).	< 85%: L1 · 85-89%: L2 · 90-94%: L3 · 95-98%: L4 · >= 99%: L5	Banking Magazine 01/2025 - Banking technology landmarks 2024 (uptime, transactions/day)
HTS -03	REALTIME		Incident SLA Compliance Rate	Share of branch IT incidents (connectivity loss, transaction system failure, terminal device fault) fully resolved within the SLA window set by Technology Division (P1/P2/P3).	Incidents resolved within SLA / Total incidents x 100%. Source: centralised helpdesk/ticketing system; branch does not self-report.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-95%: L4 · >= 96%: L5	Gartner/Deloitte/GS MA 2026 - 10 Key IT KPIs (MTTR, SLA Compliance)
HTS -04	REALTIME		eKYC Active Rate at Branch Counters	Share of front-office counters that actually use chip-CCCD/biometric eKYC equipment (at least one eKYC authentication transaction in the month).	Counters with >= 1 eKYC transaction / Total counters x 100%. Source: eKYC authentication log from IPCAS (HO aggregates by branch code).	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-89%: L4 · >= 90%: L5	Government Portal 11/05/2023 - Banking DX Day 2023 and Scheme 06

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
				Excludes equipped but unused devices.			
HTS -05	REALTIME		Digital Transaction Share of Branch Customers	Share of total customer financial transactions at the branch executed through digital channels (E-Mobile Banking, E-Banking, ATM, QR, POS) versus total transactions.	Digital customer transactions / Total customer transactions x 100%. Source: IPCAS/Core Banking; monthly channel reports.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5. 2023 benchmark: Agribank ~94%; VietinBank ~99%; TPBank ~98%	Agribank DBI 2023 Report (NHS-BC, p.5) - digital channel transactions ~94%
HTS -06	SURVEY		Branch Digital Infrastructure Governance and Information Security Capability	Assesses whether the branch has designated IT staff, performs periodic information security checks, follows HO security procedures, and handles incidents correctly. Extends CNS04 of branch DBI 2023 (mean score 2.12/5).	L0: no designated IT staff, no IS checks. L1: combined-role staff, no periodic checks. L2: process exists, partial checks. L3: periodic IS checks with records, reports to HO. L4: L3 plus incident-response plan plus >= 1 drill/year. L5: L4 plus proactive IS improvement proposals.	0-5 scale (branch self-assessment, HO verifies via documentary evidence)	Circular 50/2024/TT-NHNN - Article 9 Clause 4 (mandatory annual IS testing)
HTS -07	SURVEY		Open API and Digital Ecosystem Utilisation by Branch	Assesses how actively the branch uses Open API/Payment Hub/BillPayment connections, e-wallet integrations (MoMo, ZaloPay, ShopeePay etc.) and Public Service Portal services that HO has deployed, for customers in its territory.	L0: unaware of HO-deployed APIs/integration s. L1: aware but not actively guiding customers. L2: actively using 1-2 integrations. L3: using 3-5 with local promotion. L4: full utilisation with measured outcomes. L5: L4 plus proposes new API integrations suited to local needs.	0-5 scale (HO verifies via API transaction data by branch)	Banking Magazine 10/2024 - Connection infrastructure standardisation and Open API

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HTS -08	SURVEY		SOC Integration Maturity	Assesses whether the branch is integrated with the centralised Security Operations Center, and whether incident-response procedures are documented and tested at branch level.	L0: not connected, no incident-response procedure. L1: in connection roadmap. L2: partial connection (logs collected). L3: full integration plus designated incident handler. L4: L3 plus formal written incident-response procedure. L5: L4 plus ≥ 1 tabletop/drill per year with records.	0-5 scale (HO verifies via actual SOC connection status)	Communist Party Newspaper / SBV 10/2025 - SOC operations; 33 attack groups in SEA
HTS -09	SURVEY		IT Asset Lifecycle Management Digitisation	Assesses how far the branch has digitised IT asset management (device inventory, maintenance schedule, lifecycle, replacement planning) - replacing paper/Excel with proper systems. Required for Circular 50/2024 end-of-life compliance.	L0: paper/local Excel, not updated. L1: Excel exists but rarely updated. L2: digital tool, not connected to HO. L3: HO-connected asset system, regular updates. L4: automatic EOL warnings, maintenance schedule. L5: integrated with central CMDB, realtime.	0-5 scale (branch self-assessment, HO verifies)	Circular 50/2024/TT-NHNN - Article 9 Clause 6 (mandatory EOL device management)
HTS -10	SURVEY	Yes	Branch Application of AI/ML in Operations and Risk Detection	Assesses how far the branch uses HO-provided AI/ML tools for (1) fraud detection / anomaly transactions; (2) customer behaviour analysis; (3) document automation. Core KPI reflecting Resolution 57-	L0: no AI/ML usage. L1: piloting one use case. L2: one use case in production. L3: 2-3 use cases with measured effectiveness. L4: AI in ≥ 4 processes, supports decisions. L5: AI is principal decision-support tool; branch proposes new AI initiatives to	0-5 scale (verified via central AI tool usage logs)	Resolution 57-NQ/TW 22/12/2024 - Breakthrough in STI and national DX

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
				NQ/TW.	HO.		
HTS -11	REALTIME	Yes	Branch Technology Initiatives / PoCs Recorded by HO per Year	Number of technology/PoC initiatives related to digital infrastructure that the branch submits to NHS Division / Technology Division and that are formally recorded (approval not required). Measures endogenous innovation capacity.	Count of HO-recorded initiatives per year. Source: centralised initiative intake system.	0 initiatives: L0 · 1: L1- L2 · 2: L3 · 3: L4 · >= 4 or >= 1 scaled: L5	Agribank DBI 2023 Report (Sections III.1.b and IV.3.2.c) - 264 branch initiatives, 19% IT

Head Office KPIs (20)

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HTS -T01	REALTIME		System-wide Core Banking / IPCAS Uptime	Share of operating hours in which Core Banking/IPCAS runs without interruption, serving all 170+ branches and digital channels. HO operates and is accountable for this SLA; every branch VHA/TNS/HQ KPI depends on it.	(Total operating hours - Total downtime hours) / Total annual hours x 100%. Source: NOC/APM centralised monitoring.	< 99.0%: L1 · 99.0-99.4%: L2 · 99.5-99.8%: L3 · 99.9%: L4 · >= 99.95%: L5. Tier-1 banking standard: 99.95%. Circular 50/2024 requirement : >= 99.5%.	Circular 50/2024/TT-NHNN - Article 16 (mandatory failover and continuous operation)
HTS -T02	REALTIME		Disaster Recovery SLA Rate (RTO/RPO)	Share of core-system incidents (Core Banking, E-Banking, Payment Hub) recovered within committed RTO/RPO as per BCP. HO operates the DR site.	Incidents recovered within RTO/RPO / Total core incidents x 100%. Source: incident log; Technology Division recovery records.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5. Banking standard: RTO <= 4h, RPO <= 1h.	Circular 50/2024/TT-NHNN - Article 16 (mandatory RTO/RPO, DR site, BCP)
HTS -T03	REALTIME		Cloud Migration	Share of Agribank systems/applications	Migrated systems /	< 5% (pilot): L1 ·	DBI 2023 Report

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
			Rate	eligible for cloud that have been migrated (private/public/hybrid) . HO decides cloud architecture across the bank.	Total eligible systems x 100%. Source: Technology Division migration tracker (updated quarterly).	5-14%: L2 · 15-29%: L3 · 30-49%: L4 · >= 50%: L5. Current state: AWS pilot 2023. 2027 target: >= 30%.	(Section III.2) - AWS pilot; CNS08 HO = 4/5
HTS -T04	REALTIME		Active API Partner Count	Total external partners (fintech, e-wallet, e-commerce, government, schools, hospitals) actively transacting via the Agribank Open API Gateway in the month.	Partners with >= 1 API call in the month. Source: API Gateway centralised log. Realtime check.	< 10: L1 · 10-19: L2 · 20-49: L3 · 50-99: L4 · >= 100: L5. Benchmark: 14 e-wallets and public services 2023. DBI 2025 target: > 200 partners.	DBI 2023 Report (NHS-BC) - 14 e-wallets, 2 Open API product packages; CNS09 HO = 4/5
HTS -T05	REALTIME		Internal API Architecture Compliance Rate	Share of newly deployed internal systems/APIs that comply with HO-issued Microservices and Open API standards.	Compliant new systems/APIs / Total new x 100%. Source: Technology Division architecture review.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5. Benchmark: CNS06 HO = 3/5.	DBI 2023 Report (Section II.2) - CNS06 HO = 3/5; Microservices in partial use
HTS -T06	REALTIME		High-severity IS Incidents Contained Within 1 Hour	Share of high-severity information security incidents detected and fully contained by Agribank SOC within 1 hour. HO operates SOC for the entire 170+ branch system.	Incidents contained <= 1h / Total high-severity incidents x 100%. Source: centralised SIEM/SOC.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5. Standard: NIST MTTC <= 1h for Critical.	Circular 50/2024/TT-NHNN - Article 16 (mandatory realtime intrusion detection)
HTS -T07	REALTIME		Pre-Go-live Penetration Testing Rate for New IT Systems	Share of new or majorly upgraded IT systems/applications that undergo penetration testing and remediate all high-risk vulnerabilities before go-live. HO issues the procedure and organises tests.	Pen-tested and remediated systems / Total new/upgraded systems in year x 100%. Source: Technology Division pen-test records.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5. Benchmark: CNS11 HO = 4/5.	Circular 50/2024/TT-NHNN - Article 9 Clause 4 (mandatory annual IS testing)

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
HTS -T08	REALTIME	Yes	Number of AI/ML Use Cases in Production System-Wide	Total AI/ML use cases deployed and operating in production (SLA, real users, scheduled): fraud detection, credit scoring, biometric eKYC, chatbots, customer behaviour analytics, OCR, liquidity forecasting, automated dunning, etc. HO builds AI; branches use the output.	Count of production AI/ML use cases. Source: Technology Division AI project register with SLA and effectiveness KPIs.	< 3: L1 · 3-5: L2 · 6-9: L3 · 10-14: L4 · >= 15: L5. Benchmark: CNS14 HO = 3/5.	Resolution 57-NQ/TW 22/12/2024 - AI as breakthrough priority; CNS14+15 HO = 3/5
HTS -T09	REALTIME		Wholesale Transaction Straight-Through Processing Rate	Share of large wholesale internal financial transactions (interbank payment, repo, FX, SWIFT clearing) processed fully end-to-end without manual intervention. Distinct from retail STP at branch.	STP transactions / Total wholesale transactions x 100%. Source: Treasury Management / Payment Hub / SWIFT gateway.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5. International standard: wholesale STP >= 95% (SWIFT average).	DBI 2023 Report (Section III.1) - Payment Hub deployed; CNS24 HO = 4/5
HTS -T10	REALTIME		On-Time Completion Rate of 51 DX Plan Tasks	Share of the 51 DX tasks (Decision 620/QD-HDTV-NHS) scheduled for the year that are completed on time. The most important strategic DX execution KPI for HO.	On-time completed tasks / Tasks due in year x 100%. Source: realtime tracker built by NHS Division.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-89%: L4 · >= 90%: L5. Benchmark: DBI 2023: 20/51 tasks (39%) - L2.	DBI 2023 Report (NHS-BC) - 20/51 tasks (39%); 15/19 IT solutions behind schedule
HTS -T11	REALTIME		IT Infrastructure Virtualisation Rate	Share of server and storage infrastructure virtualised (VMware, Hyper-V, KVM). High virtualisation is a precondition for cloud migration, capex savings and AI scaling.	Virtualised servers / Total servers x 100%. Source: Technology Division IT asset inventory.	< 50%: L1 · 50-69%: L2 · 70-79%: L3 · 80-89%: L4 · >= 90%: L5. Benchmark: CNS18 HO = 4/5. Gartner: modern banks >= 85%.	DBI 2023 Report - CNS18 HO = 4/5 (virtualisation); precondition for cloud
HTS -T12	SURVEY	Yes	Research and Deployment of Emerging Technologies	Assesses how far HO researches, pilots and deploys emerging foundational	L0: no research in any of the three. L1:	0-5 scale (verified via R&D reports and	Resolution 57-NQ/TW 22/12/2024 - Technology

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
			(Edge, IoT, Blockchain)	technologies: Edge Computing (low-latency for rural ATM/POS), IoT (smart ATM, security sensors), Blockchain (smart contracts, KYC).	theoretical research on one. L2: pilot plan for ≥ 1 . L3: at least one successful pilot with measured results. L4: ≥ 2 piloted, ≥ 1 scaling. L5: all three have ≥ 1 production use case.	pilot records)	innovation; CNS20 HO = 3/5; CNS23 HO = 3/5
HTS -T13	SURVEY		Open Source Strategy in Internal Software Development	Assesses whether HO has issued and is executing an open source policy: approved library catalogue, security review process, contribution-back process, licence-cost savings measurement.	L0: no policy, ad-hoc use. L1: approved list but no security process. L2: approved list plus security process plus dev training. L3: L2 plus annual savings tracking. L4: L3 plus contribution-back policy. L5: L4 plus at least one Agribank-published open source product.	0-5 scale (survey). Benchmark: CNS07 HO = 3/5. Advanced digital banks: 40-60% of stack is open source.	Banking Magazine 03/2026 - open source and cloud trends reducing IT cost
HTS -T14	SURVEY		IT/DX Budget On-Time Disbursement Rate	Share of approved IT/DX budget disbursed on schedule. Delayed disbursement -> delayed projects -> infrastructure KPIs missed -> branches affected.	Budget disbursed on time / Approved IT/DX budget x 100%. Source: Finance Division and Technology Division quarterly budget reports.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · $\geq 95\%$: L5. Benchmark: CNS22 HO = 3/5; DBI 2023: 15/19 IT solutions delayed.	DBI 2023 Report (Section II.2) - 15/19 IT solutions delayed; CNS22 HO = 3/5
HTS -T15	REALTIME		Branch Internet Bandwidth SLA	Share of branches whose internet bandwidth meets the minimum SLA	Branches meeting bandwidth SLA / Total	< 70%: L1 · 70-79%: L2 · 80-89%: L3 ·	DBI 2023 Report - CNS19 HO = 4/5; some rural

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
			Compliance Rate	required to run digital channels (E-Banking, Kiosk, eKYC, video call). HO negotiates contracts with telecom providers.	branches x 100%. Source: centralised bandwidth monitoring; monthly provider reports.	90-95%: L4 · >= 96%: L5. Minimum SLA: >= 10 Mbps guaranteed plus redundant link.	branches still have weak connectivity
HTS -T16	SURVEY		DevOps / CI-CD Maturity in Technology Division	Assesses how mature DevOps and CI/CD pipelines are in Agribank Technology Division across the software development lifecycle.	L0: no CI/CD, fully manual. L1: basic CI (build plus unit test) for 1-2 projects. L2: full CI plus partial CD. L3: full CI/CD across digital projects, deploy < 1 day. L4: L3 plus zero-downtime, automated rollback, MTTR < 2h. L5: GitOps, IaC, deployment frequency >= 1/week.	0-5 scale (verified via deployment logs and MTTR metrics)	DBI 2023 Report (Section IV.3.a) - DevOps recommended; CNS17 HO = 3/5
HTS -T17	REALTIME		On-Schedule IS Risk Assessment Completion Rate	Share of IT systems in the annual IS-testing plan that are tested on schedule. HO plans and organises all testing; branches only coordinate.	On-schedule IS tests / Planned IS tests in year x 100%. Source: Technology Division test schedule and completion records.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · >= 95%: L5. Required: IS risk analysis >= 6 months.	Circular 50/2024/TT-NHNN - Article 16 Clause 2 (periodic IS risk analysis >= 6 months)
HTS -T18	REALTIME		System-wide ATM/CDM Uptime and 24/7 Centralised Monitoring Rate	Share of ATMs/CDMs across the network that (a) achieve >= 95% monthly uptime AND (b) are integrated into the HO 24/7 monitoring system. ATMs are the most important digital touchpoint for rural Agribank customers.	ATM/CDMs meeting both conditions / Total ATM/CDMs x 100%. Source: centralised ATM monitoring.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	DBI 2023 Report (Section II.2) - ATM complaints among most frequent digital complaints

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
HTS -T19	SURVEY	Yes	STI Strategy Linked to Digital Revenue Targets	Assesses whether HO has and is executing a 3-5 year STI strategy explicitly tied to digital revenue targets (not just technical milestones): every major STI project has business KPI, ROI forecast and accountable owner.	L0: no STI strategy. L1: IT plan exists but no revenue link. L2: STI strategy with only technical KPIs. L3: each major STI project has business KPI and owner. L4: L3 plus ex-ante and ex-post ROI. L5: L4 plus Board receives periodic STI ROI report; strategy refreshed annually.	0-5 scale (verified via strategy documents and ROI reports). Benchmark: CLS19 HO = 3.5/5.	Resolution 57-NQ/TW 22/12/2024 - STI must create economic value; CLS19 HO = 3.5/5
HTS -T20	REALTIME		IT Cost / Total Operating Cost Ratio vs Industry Benchmark	Share of total Agribank operating cost spent on IT (staff, infrastructure, software, outsourcing) versus regional/Vietnam banking benchmarks. Too low = under-investment; too high = waste affecting digital ROI.	Total IT cost / Total operating cost x 100%. Source: Finance Division internal cost report. Compare against SBV benchmark, Gartner Financial Services IT Spending Survey.	< 3% (below benchmark): L1 · 3-4.9%; L2 · 5-6.9%; L3 · 7-9%; L4 · 10-15% (digital bank standard): L5. Benchmark: VCB ~8%, MB ~12%.	CLS08+09 HO = 4/5; Gartner Financial Services IT Spending Survey 2023

Total HTS: 31 KPIs (11 branch + 20 HO). Resolution 57-linked: 5.

Digital Technology (CNS)

Scope: Applied advanced technology: AI/ML, automation, cloud, Open API, e-contracts, security testing.

Branch KPIs (8)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
CNS-01	SURVEY		Use of Digital Platform for Internal Information / Data Sharing	Assesses how systematically branch staff use Agribank-issued digital platforms (collaboration tools, internal portal) to share information and operational data, replacing paper or scattered email/Zalo.	L0: ad-hoc paper/Zalo. L1: occasional platform use. L2: regular but partial coverage. L3: standard channel for most teams. L4: standard for all teams with measured engagement. L5: integrated workflow with auditable trail.	0-5 scale (survey, HO verifies via platform usage logs)	Banking Magazine 03/2026 - digital workplace as a foundation for DX
CNS-02	SURVEY		Use of Digital Tools to Improve Internal Productivity	Assesses how actively the branch researches and deploys digital tools (RPA, low-code, analytics dashboards, document automation) to lift internal operational productivity.	L0: no digital productivity tools. L1: aware but not yet adopted. L2: 1-2 tools in occasional use. L3: 3+ tools standard. L4: L3 with productivity metrics. L5: branch proposes new tools to HO and shares best practice.	0-5 scale (survey, HO verifies via tool licenses and usage)	McKinsey 2023 - State of AI; productivity uplift from automation
CNS-03	SURVEY		Use of Digital Platforms for Customer Records Management	Assesses how far the branch uses Agribank digital platforms to store, manage and exploit customer records for service and marketing - replacing local files and paper.	L0: paper/local files. L1: partial digital storage. L2: digital storage but no exploitation. L3: digital storage plus regular use for service. L4: L3 plus targeted marketing campaigns. L5: L4 plus customer segmentation contribution to HO CRM.	0-5 scale (survey, HO verifies via CRM usage logs)	Schmitt (2003) - Customer Experience Management
CNS-04	SURVEY	Yes	Branch Staff Proactive Learning of New	Assesses how actively branch staff seek out, study and adapt new	L0: no independent learning. L1: occasional self-	0-5 scale (survey, verified via learning	Resolution 57-NQ/TW 22/12/2024 - STI as

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
			Technology and DX Solutions	technologies and DX practices - independent learning beyond mandatory training.	study. L2: regular self-study by some staff. L3: branch has Digital Champions sharing knowledge. L4: L3 plus internal study groups. L5: L4 plus branch-level innovation proposals submitted to HO.	platform logs and innovation submissions)	breakthrough priority
CNS-05	REALTIME		On-Time Information Security Testing Rate at Branch	Share of scheduled IS/cybersecurity tests at the branch that are completed on time per HO procedure.	On-time tests / Scheduled tests x 100%. Source: HO IS testing tracker.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-95%: L4 · >= 96%: L5	Circular 50/2024/TT-NHNN - Article 9 Clause 4
CNS-06	REALTIME		Customer Routing Rate to Agribank Digital / Kiosk Banking	Share of customer transactions at the branch directed through Agribank Digital or Kiosk Banking instead of teller counters - measure of channel-shift execution at branch level.	Digital/Kiosk transactions / Total customer transactions x 100%. Source: IPCAS channel data.	< 40%: L1 · 40-59%: L2 · 60-74%: L3 · 75-89%: L4 · >= 90%: L5	DBI 2023 Report - ~94% digital channel target; channel routing is local execution
CNS-07	REALTIME		Digital Storage Rate for Partner / Supplier Records	Share of partner, supplier and affiliate records stored and managed in digital systems rather than paper at branch level.	Digital partner records / Total partner records x 100%. Source: branch ERP/document management.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	DAMA-DMBOK - digital records as foundational
CNS-08	SURVEY	Yes	Branch Use of AI/ML and Process Automation	Assesses how broadly the branch applies HO-provided AI/ML and automation tools to operational workflows (chatbots, OCR, RPA, predictive scoring).	L0: none. L1: piloting one. L2: one in regular use. L3: 2-3 in regular use, measured impact. L4: AI/automation in >= 4 workflows. L5: AI/automation embedded in decisions; branch proposes new use cases.	0-5 scale (HO verifies via tool usage logs)	Resolution 57-NQ/TW 22/12/2024 - STI breakthrough

Head Office KPIs (20)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
CNS-T01	REALTIME		Enterprise Architecture Compliance Rate for New IT Projects	Share of new IT projects launched in compliance with the Agribank Enterprise Architecture standard.	Compliant new projects / Total new projects x 100%. Source: Technology Division architecture review.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · >= 95%: L5	DBI 2023 Report - CNS01 HO = 4/5; EA discipline as foundation
CNS-T02	REALTIME	Yes	Strategic Technology Trend Adoption Decision Rate	Share of strategic technology trends (Gartner top-10, World Economic Forum top-emerging) that HO formally assesses and decides whether to adopt / pilot / reject in the year.	Trends with formal HO decision / Identified strategic trends x 100%. Source: HO technology council records.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Resolution 57-NQ/TW 22/12/2024 - STI alignment with global trends
CNS-T03	REALTIME		E-Contract Coverage for Customer Banking Operations	Share of banking operation types that customers can complete fully via legally valid electronic contracts (e-signature) instead of wet ink.	Operation types e-contract enabled / Total operation types x 100%. Source: HO product portfolio registry.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Law on Electronic Transactions 2023
CNS-T04	SURVEY	Yes	AI Maturity Level (5-Stage Model)	Assesses AI/ML maturity at Agribank against the 5-stage AI Maturity Model: Awareness, Experimentation, Production, Industrialisation, Innovation.	L0: no AI awareness. L1: AI awareness, no use case. L2: experimentation. L3: AI in production. L4: AI industrialised across business units. L5: AI is competitive differentiator with new revenue streams.	0-5 scale (survey, HO verifies via AI use-case inventory and revenue contribution)	Resolution 57-NQ/TW 22/12/2024 - AI as national breakthrough; CNS14 HO = 3/5
CNS-T05	SURVEY		API Design Standards and API Governance Framework Maturity	Assesses whether HO has issued and is enforcing API Design Standards and an API Governance Framework system-wide.	L0: no API standards. L1: drafting. L2: standards published but not enforced. L3: standards published and enforced for new APIs. L4: L3 plus periodic API audit. L5: L4 plus API quality KPIs reported to Technology	0-5 scale (survey, verified via API audit records)	Banking Magazine 10/2024 - Open Banking standardisation; CNS09 HO = 4/5

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
					Council.		
CNS-T06	SURVEY	Yes	Agile Maturity in Digital Product Teams	Assesses Agile maturity in HO digital product teams: roles, ceremonies, metrics, feedback loops, customer involvement.	L0: waterfall. L1: Agile vocabulary, not practice. L2: ceremonies in some teams. L3: Agile across digital product teams with measured velocity. L4: L3 plus continuous customer feedback. L5: L4 plus product-led organisation; OKR alignment to outcomes.	0-5 scale (survey, verified via team retrospectives and metrics)	DBI 2023 Report - CNS17 HO = 3/5 (Agile/DevOps partial)
CNS-T07	REALTIME		New Digital Products / Features Launched per Year	Number of new digital products or features launched into production per year, system-wide.	Count of production launches per year. Source: HO product portfolio.	< 3: L1 · 3-5: L2 · 6-10: L3 · 11-20: L4 · >= 21: L5	DBI 2023 Report - product velocity as DX signal
CNS-T08	REALTIME		BigData and Real-time Analytics Platform Maturity	Assesses BigData platform and realtime analytics maturity: data ingestion latency, processing scale, user adoption.	L0: no BigData platform. L1: pilot. L2: production for select use cases. L3: BigData supports >= 5 production use cases. L4: realtime analytics across business lines. L5: BigData and AI integrated as decision platform.	0-5 scale (verified via platform metrics and use cases)	DBI 2023 Report - CNS15 HO = 3/5 (BigData)
CNS-T09	REALTIME		Monthly Open API Gateway Transaction Volume	Total monthly API calls via Open API Gateway - signals ecosystem activity and platform attractiveness.	Sum of API calls per month. Source: API Gateway log.	< 100k: L1 · 100k-1m: L2 · 1m-10m: L3 · 10m-50m: L4 · >= 50m: L5	Banking Magazine 10/2024 - Open Banking expansion
CNS-T10	SURVEY		Connected IoT / Edge Device Count	Count of IoT/Edge devices (smart ATM sensors, security cameras, smart-branch sensors)	Connected device count. Source: Technology Division IoT registry.	< 100: L1 · 100-499: L2 · 500-1999: L3 · 2000-9999: L4 · >= 10000: L5	Resolution 57-NQ/TW 22/12/2024 - emerging tech adoption

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
				connected to Agribank centralised management.			
CNS-T11	REALTIME		International Security Certification Coverage (ISO 27001 / PCI-DSS)	Share of core systems within scope holding valid ISO 27001 or PCI-DSS certification.	Certified core systems / Total in-scope core systems x 100%. Source: HO certification registry.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Circular 50/2024/TT-NHNN - international security standards
CNS-T12	REALTIME		Automated Test Coverage Rate	Share of software test cases automated across the SDLC.	Automated tests / Total tests x 100%. Source: Technology Division QA pipeline.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	DBI 2023 Report - CNS16 HO = 4/5 (development tools)
CNS-T13	REALTIME		IT Operations Automation Rate	Share of internal IT operations workflows fully automated with no manual intervention (patching, monitoring, scaling, backup).	Fully automated workflows / Total workflows x 100%. Source: Technology Division automation registry.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	DBI 2023 Report - CNS24 HO = 4/5
CNS-T14	SURVEY		Technology Debt Management Programme Maturity	Assesses how HO identifies, prioritises and pays down technology debt: legacy systems, outdated languages, deprecated APIs.	L0: no programme. L1: ad-hoc identification. L2: registry exists, no remediation plan. L3: prioritised remediation plan. L4: L3 plus annual paydown KPI. L5: tech debt < 20% of dev capacity; reported to Technology Council.	0-5 scale (verified via tech debt registry)	Gartner - Tech Debt as strategic risk
CNS-T15	REALTIME		IT Resource Utilisation Rate	Average compute utilisation versus provisioned capacity. Both under- and over-utilisation are inefficient.	Used compute / Provisioned compute x 100%. Source: infrastructure monitoring.	< 30% or > 90% (inefficient): L1-L2 · 30-50%: L3 · 50-75% (optimal): L5 · 75-90%: L4	Gartner - cloud cost optimisation
CNS-T16	SURVEY	Yes	AI Ethics and Governance Framework	Assesses whether HO has issued and is enforcing	L0: no framework. L1: drafting. L2:	0-5 scale (verified via framework)	Resolution 57-NQ/TW 22/12/2024 -

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
			Maturity	an AI Ethics and Governance Framework covering bias, transparency, accountability, model risk.	framework published, not enforced. L3: framework enforced for new AI projects. L4: L3 plus AI Ethics Committee. L5: L4 plus periodic audit and Board reporting.	documents and audit records)	AI ethics; EU AI Act
CNS-T17	REALTIME		IT Talent Density Rate	Share of specialised IT/Data/AI talent in total Agribank headcount.	Specialised IT/Data/AI staff / Total headcount x 100%. Source: HR.	< 2%: L1 · 2-3.9%: L2 · 4-5.9%: L3 · 6-7.9%: L4 · >= 8%: L5. Modern digital banks: 8-12%.	Gartner Financial Services - IT Talent Density
CNS-T18	REALTIME		Platform Revenue Rate (API / Digital Infrastructure Fees)	Share of non-interest income from API and digital infrastructure services sold to external partners.	API/platform fee revenue / Total non-interest revenue x 100%. Source: Finance Division.	< 1%: L1 · 1-2%: L2 · 3-4%: L3 · 5-7%: L4 · >= 8%: L5	Open Banking - platform business model
CNS-T19	REALTIME		IT Project Failure / Overrun Rate	Count of IT projects cancelled mid-stream or running > 30% over budget in the year.	Failed/over-budget project count. Source: PMO registry.	>= 5: L1 · 3-4: L2 · 1-2: L3 · 1 (small): L4 · 0: L5	PMI - Pulse of the Profession; DBI 2023: 15/19 IT solutions delayed
CNS-T20	SURVEY	Yes	Emerging Fintech PoC Rate	Assesses how systematically HO pilots emerging fintech: embedded finance, BaaS, DeFi-related, AI-native banking.	L0: no PoC. L1: one PoC. L2: 2-3 PoCs. L3: structured PoC pipeline. L4: L3 plus at least one PoC scaled. L5: L4 plus partnership with fintech innovation hubs.	0-5 scale (verified via PoC registry)	Resolution 57-NQ/TW 22/12/2024 - STI breakthrough

Total CNS: 28 KPIs (8 branch + 20 HO). Resolution 57-linked: 7.

Digital Data (DLS)

Scope: Data governance and exploitation: storage, KYC reconciliation, privacy, data quality, Data Lake, analytics.

Branch KPIs (6)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
DLS-01	REALTIME		Digital Document Storage Rate	Share of operational records and documents stored digitally rather than as paper at the branch.	Digital documents / Total documents x 100%. Source: branch document management system.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · >= 95%: L5	DAMA-DMBOK; Decree 13/2023/ND-CP on personal data protection
DLS-02	REALTIME		Customer Data Quality Rate (Reconciliation with National Citizen DB and CIC)	Share of customer records reconciled and standardised against the National Citizen Database (C06) and CIC.	Reconciled customer records / Total customer records x 100%. Source: IPCAS reconciliation log.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Scheme 06/QD-TTg on digital citizen ID integration
DLS-03	SURVEY		Data Privacy Compliance at Branch Level	Assesses branch compliance with personal data protection rules: customer consent, access logging, secure handling, breach response.	L0: no awareness. L1: awareness, no formal procedure. L2: procedure exists, partial compliance. L3: procedure enforced with periodic audit. L4: L3 plus annual training. L5: L4 plus zero confirmed violations in the year.	0-5 scale (verified via documentary evidence and audit)	Law 71/2025/QH15 on Personal Data Protection; Decree 13/2023/ND-CP
DLS-04	REALTIME		Auto-generated Branch Report Rate	Share of branch operational reports generated automatically from systems rather than manual aggregation.	Auto-generated reports / Total reports x 100%. Source: BI/reporting platform.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	BI maturity model
DLS-05	REALTIME		First-Time Data Accuracy Rate (Core Banking Entry)	Share of data entries into Core Banking that are correct and complete on first entry (no later correction)	First-time-correct entries / Total entries x 100%. Source: IPCAS data quality	< 90%: L1 · 90-94%: L2 · 95-97%: L3 · 98-99%: L4 · >= 99.5%:	DAMA-DMBOK Data Quality dimensions

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
				needed).	monitoring.	L5	
DLS-06	SURVEY	Yes	Branch Use of Analytics for Decisions and Personalisation	Assesses how systematically the branch uses HO-provided analytics dashboards and AI-driven insights to make business decisions and personalise customer interactions.	L0: no analytics use. L1: views dashboards occasionally. L2: regular dashboard use by managers. L3: analytics informs major decisions. L4: L3 plus targeted personalisation. L5: L4 plus branch proposes new analytics use cases to HO.	0-5 scale (verified via analytics platform usage)	Resolution 57-NQ/TW 22/12/2024 - data as breakthrough resource

Head Office KPIs (20)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
DLS-T01	REALTIME		Branch Digital Revenue Self-Reporting Coverage Rate	Share of branches able to query digital channel revenue automatically from the BI system without manual extraction.	Branches with BI self-service / Total branches x 100%. Source: BI platform access logs.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	BI maturity - self-service analytics
DLS-T02	SURVEY		Data Lake and Data Governance Policy Maturity	Assesses central Data Lake and Data Governance Policy maturity system-wide.	L0: no Data Lake. L1: pilot. L2: production for select sources. L3: production for most sources plus governance policy. L4: L3 plus data stewardship roles. L5: L4 plus measured data quality KPIs reported to Board.	0-5 scale (verified via platform inventory and policy)	DAMA-DMBOK; Law 71/2025/QH15
DLS-T03	SURVEY		Data Governance Organisational Maturity (CDO, Data Stewards, Data Council)	Assesses whether Agribank has formal Data Governance organisation: Chief Data Officer, Data Stewards per	L0: no roles. L1: partial role definitions. L2: CDO appointed, no stewardship network. L3: CDO plus Data	0-5 scale (survey)	DAMA-DMBOK Data Governance

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
				business line, Data Council.	Stewards plus Data Council. L4: L3 plus measured outcomes. L5: L4 plus data governance KPI tied to executive compensation.		
DLS-T04	REALTIME	Yes	C-Suite Auto-Reporting Rate	Share of executive governance reports generated automatically from BI rather than manually compiled.	Auto-generated executive reports / Total executive reports x 100%. Source: BI platform.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Resolution 57-NQ/TW 22/12/2024 - data-driven governance
DLS-T05	REALTIME		Data Subject Request Fulfilment Rate (72-hour SLA)	Share of customer Data Subject Requests (access, correction, deletion) fulfilled within the 72-hour SLA.	On-time DSRs / Total DSRs x 100%. Source: DSR handling system.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Law 71/2025/QH15; GDPR equivalent
DLS-T06	REALTIME		Core Data Source Quality Score (6-dim DAMA: Completeness, Accuracy, Consistency, Timeliness, Uniqueness, Validity)	Share of core data sources scoring >= 80% on the 6-dimension DAMA Data Quality framework.	DQ-passing sources / Total core sources x 100%. Source: data quality monitoring.	< 40%: L1 · 40-59%: L2 · 60-74%: L3 · 75-89%: L4 · >= 90%: L5	DAMA-DMBOK Data Quality
DLS-T07	REALTIME		Data Lifecycle Management Rate	Share of customer data correctly classified and managed per Data Retention Policy (retention period, archival, secure deletion).	Compliant data / Total data x 100%. Source: data lifecycle management system.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Law 71/2025/QH15
DLS-T08	SURVEY		Data Catalog Maturity	Assesses central Data Catalog covering all enterprise data assets with lineage, owners and access policy.	L0: no catalog. L1: spreadsheet inventory. L2: tool exists, partial coverage. L3: covers all enterprise data with owners. L4: L3 plus lineage and access policy. L5: L4 plus self-service discovery for	0-5 scale (verified via catalog tool)	DAMA-DMBOK

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
					analysts.		
DLS-T09	REALTIME		National Customer Data Reconciliation Rate (C06 / BCA and CIC)	Share of customer records reconciled with the National Citizen DB (C06) and CIC system-wide.	Reconciled records / Total customer records x 100%. Source: HO reconciliation log.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Scheme 06/QD-TTg
DLS-T10	REALTIME		AI Model Freshness Rate	Share of production AI/ML models retrained on schedule when model drift is detected (per HO model risk policy).	Retrained-on-time models / Total production models x 100%. Source: AI model registry.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Basel III - Model Risk Management
DLS-T11	REALTIME		Data-Driven Revenue (HO Attribution)	Revenue from AI/Data-personalised digital products attributable to HO data infrastructure.	Data-driven revenue (VND bn). Source: Finance Division attribution.	< 50 bn: L1 · 50-199: L2 · 200-499: L3 · 500-999: L4 · >= 1000: L5	DAMA-DMBOK - Data as Asset
DLS-T12	SURVEY		Data Ethics Policy Maturity	Assesses whether HO has issued and is enforcing a Data Ethics Policy: consent, fairness, transparency, no dark patterns.	L0: no policy. L1: drafting. L2: published, not enforced. L3: enforced for new products. L4: L3 plus periodic audit. L5: L4 plus Board reporting.	0-5 scale (survey)	Law 71/2025/QH15; OECD AI Principles
DLS-T13	REALTIME		Operational Data Latency (Core Banking to BI/Analytics)	Average time for transaction data to appear in BI/Analytics from Core Banking. Lower is better.	Average ingestion-to-analytics latency. Source: data pipeline monitoring.	> 24h: L1 · 6-24h: L2 · 1-6h: L3 · 15min-1h: L4 · < 15min (near-realtime): L5	BI maturity - realtime analytics
DLS-T14	SURVEY		Customer Intelligence Platform Maturity	Assesses central Customer Intelligence Platform supporting 360 customer view, behavioural analytics, segmentation, next-best-action.	L0: no platform. L1: pilot. L2: production for select segments. L3: production system-wide. L4: L3 plus realtime next-best-action. L5: L4 plus closed-	0-5 scale (verified via platform inventory)	Schmitt (2003) - Customer Experience Management

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
					loop campaign measurement.		
DLS-T15	REALTIME	Yes	Data-Driven Decision Rate (C-suite Level)	Share of executive-level business decisions accompanied by formal data evidence in the decision record.	Decisions with data evidence / Total recorded decisions x 100%. Source: HO decision register.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Resolution 57-NQ/TW 22/12/2024 - data-driven governance
DLS-T16	REALTIME		Confirmed Data Breach Count	Count of confirmed customer data breaches (leaks, unauthorised access) in the year.	Confirmed breach count. Source: IS/SOC records and regulator notifications.	>= 3: L0 · 2: L1 · 1 (low impact): L2 · 1 (zero impact): L3 · 0: L5	Law 71/2025/QH15
DLS-T17	SURVEY		Enterprise Data Strategy Alignment with DX Strategy	Assesses whether the Enterprise Data Strategy is explicitly aligned with the DX Strategy and updated annually.	L0: no data strategy. L1: data strategy exists, not aligned. L2: alignment statement, not operationalised. L3: aligned with KPI ownership. L4: L3 plus annual refresh. L5: L4 plus Board sign-off and executive sponsor.	0-5 scale (survey)	DAMA-DMBOK; Decision 620/QD-HDTV-NHS
DLS-T18	REALTIME		New Analytics Use Cases Deployed to Production per Year	Count of new Data Analytics / BI use cases deployed to production supporting business decisions per year.	New production use cases per year. Source: analytics platform registry.	< 3: L1 · 3-5: L2 · 6-10: L3 · 11-20: L4 · >= 21: L5	BI maturity
DLS-T19	SURVEY	Yes	Data-Driven Bank Transformation Maturity	Assesses how far Agribank is moving toward a Data-Driven Bank - all core business processes anchored on data.	L0: process-driven. L1: data informs but does not drive. L2: data drives select processes. L3: data drives most digital processes. L4: L3 plus realtime data in core decisions. L5: data is the primary operating layer.	0-5 scale (survey)	Resolution 57-NQ/TW 22/12/2024

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
DLS- T20	REALTIME		Data Storage Cost Efficiency (Cost per GB) vs Industry	Average storage cost per GB vs banking industry benchmark.	VND per GB. Source: Technology Division cost reporting. Compare to Gartner benchmark.	> 150% benchmark: L1 · 125- 150%: L2 · 100- 124%: L3 · 75-99%: L4 · < 75%: L5	Gartner Storage Cost Benchmark

Total DLS: 26 KPIs (6 branch + 20 HO). Resolution 57-linked: 4.

Digital Operations (VHA)

Scope: Execution efficiency of digital processes: STP, fraud detection, incident handling, SLA compliance.

Branch KPIs (11)

ID	Data Type	Res. 57	KPI Name	Description	Calculation Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
VHA-01	REALTIME		First-Contact Resolution Rate (Digital Transactions)	Share of digital transactions completed successfully on first attempt at the branch.	First-attempt successful transactions / Total digital transactions x 100%. Source: IPCAS.	< 85%: L1 · 85-89%: L2 · 90-93%: L3 · 94-96%: L4 · >= 97%: L5	Operational Excellence (BSC Internal Process)
VHA-02	REALTIME		Fraud Auto-Detection Rate	Share of suspicious transactions detected and blocked automatically before processing.	Auto-blocked suspicious transactions / Total suspicious transactions x 100%. Source: fraud monitoring system.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Circular 50/2024/TT-NHNN - fraud prevention
VHA-03	REALTIME		Proactive Incident Detection Rate	Share of digital service incidents detected proactively by monitoring before customer complaint.	Proactive detections / Total incidents x 100%. Source: monitoring platform.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	ITIL 4 Incident Management
VHA-04	REALTIME		Digital-Complete Service Rate	Share of customer banking operations that can be completed entirely on digital channels at the branch (no teller intervention).	Digital-complete operation types / Total operation types x 100%. Source: HO product registry.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	DX Maturity - end-to-end digital
VHA-05	REALTIME		Digital Complaint On-Time Resolution Rate	Share of customer complaints about digital services resolved within HO-defined SLA.	On-time resolved complaints / Total digital complaints x 100%. Source: complaint handling system.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Circular 50/2024/TT-NHNN - customer service
VHA-06	SURVEY		Process Digitisation and Optimisation at Branch	Assesses how systematically the branch digitises and optimises internal workflows.	L0: paper workflows. L1: partial digital. L2: digital but not optimised. L3: digital and optimised for most workflows. L4: L3	0-5 scale (survey, HO verifies via process audit)	BSC Internal Process Perspective

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
					plus continuous improvement loop. L5: L4 plus measurable productivity uplift.		
VHA-07	SURVEY		Business Continuity Planning Maturity	Assesses BCP maturity at branch: documented plan, tested annually, recovery roles assigned, last-test date.	L0: no BCP. L1: draft plan. L2: published plan, not tested. L3: annual desktop test. L4: L3 plus annual live drill. L5: L4 plus measured RTO/RPO achievement.	0-5 scale (verified via BCP records)	Circular 50/2024/TT-NHNN - BCP requirement
VHA-08	SURVEY		New Digital Product Rollout Compliance	Assesses branch compliance with HO procedures for rolling out new digital products: pre-launch readiness, training, customer communication, post-launch monitoring.	L0: no procedure followed. L1: partial. L2: most steps followed. L3: full procedure for most launches. L4: L3 plus measured rollout outcomes. L5: L4 plus branch contributes feedback to HO product team.	0-5 scale (survey)	Product Management best practice
VHA-09	SURVEY		Branch-Local Ecosystem Partnerships for Digital Services	Assesses how proactively the branch partners with local third parties (cooperatives, e-commerce, agri-supply chains) to expand digital service uptake.	L0: no local partnerships. L1: one informal partnership. L2: 2-3 partnerships. L3: structured local partner programme. L4: L3 plus measured customer/revenue impact. L5: L4 plus HO scales the approach.	0-5 scale (survey)	Open Banking - ecosystem expansion
VHA-10	SURVEY	Yes	Innovation Mindset in Branch Operations and Service	Assesses how systematically the branch applies innovation thinking (design thinking, lean experimentation) to improve operations and service.	L0: no innovation activity. L1: ad-hoc ideas. L2: idea pipeline exists. L3: experiments run with measured results. L4: L3 plus successful scale-up. L5: L4 plus regular contribution to HO innovation portfolio.	0-5 scale (survey)	Resolution 57-NQ/TW 22/12/2024 - STI breakthrough
VHA-11	REALTIME	Yes	Branch Internal	Share of internal branch workflows	Automated workflows / Total	< 30%: L1 · 30-	Resolution 57-NQ/TW

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
			Process Automation Rate	fully automated (no manual steps).	internal workflows x 100%. Source: HO automation tracker.	49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	22/12/2024

Head Office KPIs (20)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
VHA-T01	REALTIME		Internal SLA Fulfillment Rate (HO to Branch)	Share of internal SLAs from HO to branches (infrastructure and digital service) met on commitment.	SLAs met / Total internal SLAs x 100%. Source: HO SLA tracker.	< 80%: L1 · 80-84%: L2 · 85-89%: L3 · 90-94%: L4 · >= 95%: L5	ITIL 4 - Service Management
VHA-T02	REALTIME		Time-to-Market for Digital Products	Average days from approval to deployment of digital products/features to 100% of branches.	Average T2M (days). Source: HO product launch tracker.	> 180d: L1 · 121-180d: L2 · 61-120d: L3 · 31-60d: L4 · <= 30d: L5	Product Management benchmark
VHA-T03	REALTIME		System-Wide Digital Fraud Loss Rate	Financial losses from digital fraud divided by total digital transaction value system-wide.	Fraud losses (VND) / Digital transaction value (VND) x 100%. Source: fraud reports.	> 0.05%: L1 · 0.03-0.05%: L2 · 0.02-0.029%: L3 · 0.01-0.019%: L4 · < 0.01%: L5	Basel III Operational Risk
VHA-T04	SURVEY	Yes	HCD / Design Thinking Maturity	Assesses how systematically HO applies Human-Centered Design / Design Thinking in new digital product development.	L0: no HCD. L1: HCD vocabulary, not practice. L2: HCD in some projects. L3:	0-5 scale (verified via project records)	Resolution 57-NQ/TW 22/12/2024 - innovation breakthrough

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
					HCD standard for all digital projects. L4: L3 plus dedicated UX research function. L5: L4 plus measurable HCD outcomes.		
VHA-T05	REALTIME		Automated Operational Monitoring Coverage	Share of core IT systems with 24/7 automated monitoring and threshold alerts.	Monitored systems / Total core systems x 100%. Source: monitoring platform.	< 70%: L1 70-79%: L2 80-89%: L3 90-94%: L4 95%: L5	ITIL 4 - Monitoring and Event Management
VHA-T06	REALTIME		BCP Testing Coverage Rate	Share of branches and systems that completed a live BCP test during the year.	Tested entities / Total entities x 100%. Source: BCP testing tracker.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 95%: L5	Circular 50/2024/TT-NHNN
VHA-T07	SURVEY		Digital Productivity Index (system-wide)	Assesses Digital Productivity measurement and improvement across Agribank.	L0: no measurement . L1: baseline measured. L2: tracked but not improved. L3: measured plus improvement target. L4: L3 plus year-over-year improvement . L5: L4 plus top-quartile vs industry.	0-5 scale	McKinsey - Digital Productivity
VHA-T08	SURVEY		DevOps and CI/CD Maturity	Assesses DevOps and CI/CD maturity in	L0: manual deploys. L1: basic CI. L2:	0-5 scale	DBI 2023 Report - CNS17 HO

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical / Anchor
			(Operations)	production operations.	full CI plus partial CD. L3: full CI/CD. L4: L3 plus zero-downtime, automated rollback. L5: deployment frequency $\geq 1/\text{week}$.		= 3/5
VHA-T09	REALTIME		Active Digital Ecosystem Partner Count	Active ecosystem partners (fintech, insurtech, agritech, public services) connected to Agribank.	Active partner count. Source: partnership tracker.	< 20: L1 20-49: L2 50-99: L3 100-199: L4 ≥ 200 : L5	Open Banking - ecosystem
VHA-T10	REALTIME		Regulatory Update Implementation Rate	Share of new SBV regulations/circulars implemented into Agribank systems and processes within the maximum allowed window.	On-time implemented regulations / Total new regulations x 100%. Source: Compliance Division tracker.	< 70%: L1 70-79%: L2 80-89%: L3 90-94%: L4 $\geq 95\%$: L5	SBV regulatory compliance
VHA-T11	REALTIME		Payment Success Rate (Digital Channels)	Share of digital payment transactions completed successfully on first attempt without retry/escalation.	First-success payments / Total digital payments x 100%. Source: Payment Hub.	< 95%: L1 95-97%: L2 98-98.9%: L3 99-99.4%: L4 $\geq 99.5\%$: L5	Payment system reliability standard
VHA-T12	REALTIME		Core System Mean Time to Recovery (MTTR)	Average time from incident detection to full recovery for core system incidents.	Average MTTR (hours). Source: incident records.	> 8h: L1 4-8h: L2 2-4h: L3 1-2h: L4 < 1h: L5	ITIL 4 - Incident Management
VHA-T13	REALTIME		End-to-End Process Digitisation	Share of internal Agribank processes	Digitised processes /	< 40%: L1	DX Maturity

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
			Rate (Back/Middle/Front Office)	(back, middle, front office) digitised and automated end-to-end.	Total processes x 100%. Source: process inventory.	40-59%: L2 60-74%: L3 75-89%: L4 90%: L5	
VHA-T14	REALTIME		Paperless-by-Design New Product Rate	New products and operations designed paperless end-to-end from inception.	Paperless-by-design count per year. Source: product registry.	0: L1 1-2: L2 3-5: L3 6-10: L4 ≥ 11: L5	Decision 749/QD-TTg - National DX Programme
VHA-T15	REALTIME		Digital Complaint Resolution Rate (System-Wide)	Share of digital channel complaints resolved within 24 hours system-wide.	On-time resolved / Total digital complaints x 100%. Source: complaint system.	< 70%: L1 70-79%: L2 80-89%: L3 90-94%: L4 ≥ 95%: L5	Customer service standard
VHA-T16	REALTIME		Software-Caused Unplanned Downtime Rate	Share of unplanned downtime attributable to software/configuration errors versus total downtime.	Software downtime / Total downtime x 100%. Source: incident records.	> 50%: L1 35-50%: L2 20-34%: L3 10-19%: L4 < 10%: L5	Reliability engineering
VHA-T17	REALTIME		Third-Party Risk and Compliance Rate	Share of third parties (fintech/vendor) meeting Agribank-defined SLAs and information security standards.	Compliant third parties / Total third parties x 100%. Source: vendor management.	< 70%: L1 70-79%: L2 80-89%: L3 90-94%: L4 ≥ 95%: L5	Circular 50/2024/TT-NHNN - third-party risk

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical / Anchor
VHA-T18	REALTIME		Local Configurability of Digital Products by Branches	Count of digital products configurable by branches for local market needs without HO intervention.	Locally configurable product count. Source: product registry.	0: L1 · 1-2: L2 · 3-5: L3 · 6-10: L4 · >= 11: L5	Product-led growth
VHA-T19	REALTIME		System-Wide Digital Channel STP Rate	Share of all digital channel transactions processed straight-through without HO back-office intervention.	STP transactions / Total digital transactions x 100%. Source: IPCAS.	< 90%: L1 · 90-93%: L2 · 94-96%: L3 · 97-98%: L4 · >= 99%: L5	Operational Excellence
VHA-T20	REALTIME		Process-Automation / RPA ROI	Operating cost savings from process automation / RPA versus automation investment in the year.	Savings (VND) / Investment (VND) x 100%. Source: Finance Division.	< 50%: L1 · 50-99%: L2 · 100-149%: L3 · 150-249%: L4 · >= 250%: L5	RPA business case

Total VHA: 31 KPIs (11 branch + 20 HO). Resolution 57-linked: 3.

Digital Culture (VHS)

Scope: Human and organisational dimension: skills, training, paperless practice, leadership, innovation culture.

Branch KPIs (10)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
VHS-01	REALTIME		Branch Staff e-Learning Completion Rate	Share of branch staff completing at least one digital-skill e-Learning course in the year.	Staff completing ≥ 1 course / Total staff x 100%. Source: LMS.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · $\geq 95\%$: L5	Learning and Growth (BSC)
VHS-02	REALTIME		Paperless Internal Document Rate at Branch	Share of internal branch documents processed fully digitally (e-signature, digital workflow).	Digital documents / Total internal documents x 100%. Source: document management system.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · $\geq 95\%$: L5	Digital workplace
VHS-03	REALTIME		Active Use of Internal Digital Communication Channels	Share of branch staff actively using internal digital channels (email, portal, digital workspace) monthly.	Active users / Total staff x 100%. Source: platform usage logs.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · $\geq 95\%$: L5	Digital workplace
VHS-04	REALTIME		Branch Staff with Formal Digital Competency Assessment	Share of branch staff assessed with the formal Agribank digital competency framework and assigned a ranking.	Assessed staff / Total staff x 100%. Source: HR competency system.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · $\geq 95\%$: L5	Skills-based workforce
VHS-05	SURVEY		Branch Leadership-Driven DX	Assesses how actively branch leadership models and drives DX practice: communication, visible KPI ownership, public recognition of digital wins.	L0: passive. L1: occasional. L2: regular communication. L3: visible KPI ownership. L4: L3 plus public recognition. L5: L4 plus measurable team uplift.	0-5 scale (survey)	Kotter - leading change
VHS-	SURVEY	Yes	Fail-Tolerant	Assesses culture of	L0: fear of	0-5 scale	Resolution

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
06			Culture Branch at	bounded experimentation - 'fail fast, learn fast' with controlled risk.	failure. L1: tolerance discussed. L2: some experiments allowed. L3: structured experiment programme. L4: L3 plus learning shared. L5: L4 plus contributions scaled.	(survey)	57-NQ/TW 22/12/2024 - STI breakthrough
VHS-07	SURVEY		Digital Talent Retention Initiative at Branch	Assesses how proactively the branch proposes and applies retention and development policy for digital-skilled staff.	L0: no initiative. L1: aware. L2: initial actions. L3: structured retention plan. L4: L3 plus measured retention. L5: L4 plus best-practice sharing with HO.	0-5 scale (survey)	Talent management
VHS-08	SURVEY		Internal DX Communication and Storytelling at Branch	Assesses how systematically the branch communicates DX progress, wins and learning internally.	L0: none. L1: occasional. L2: regular communication. L3: structured communication plan. L4: L3 plus measured engagement. L5: L4 plus best-practice shared with HO.	0-5 scale (survey)	Change management
VHS-09	SURVEY	Yes	Substantive Innovation Culture at Branch	Assesses whether innovation culture is substantive - not just slogans - with idea pipeline, experiments, scale-up and recognition.	L0: slogans only. L1: idea pipeline exists. L2: experiments run. L3: experiments measured and learned from. L4: L3 plus scale-up. L5: L4 plus integration into operations.	0-5 scale (survey)	Resolution 57-NQ/TW 22/12/2024
VHS-10	REALTIME	Yes	Average Digital Training Hours per Branch Staff	Average annual digital-skill training hours per branch staff member.	Total digital training hours / Total branch staff. Source: LMS.	< 10h: L1 · 10-19h: L2 · 20-39h: L3 · 40-79h: L4 · ≥ 80h: L5	Resolution 57-NQ/TW 22/12/2024 - workforce upskilling

Head Office KPIs (20)

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
VHS-T01	REALTIME		System-Wide Digital Competency Certification Rate	Share of all Agribank staff completing the formal digital competency assessment and receiving certification.	Certified staff / Total staff x 100%. Source: HR.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	Skills-based workforce
VHS-T02	REALTIME	Yes	Average Digital Training Hours per Staff (System-Wide)	Average annual digital-skill training hours per Agribank staff member.	Total digital training hours / Total staff. Source: LMS.	< 10h: L1 10-19h: L2 20-39h: L3 40-79h: L4 ≥ 80h: L5	Resolution 57-NQ/TW 22/12/2024
VHS-T03	REALTIME		New IT / Data / AI Specialist Hires per Year	Count of new IT/Data/AI specialists hired during the year.	New specialist hires count. Source: HR.	< 10: L1 10-29: L2 30-59: L3 60-99: L4 ≥ 100: L5	Talent acquisition
VHS-T04	REALTIME		IT / Data / AI Specialist Attrition Rate	Share of IT/Data/AI specialists leaving Agribank during the year.	Leavers / Specialist headcount x 100%. Source: HR.	> 20%: L1 15-20%: L2 10-14%: L3 5-9%: L4 < 5%: L5	Talent retention
VHS-T05	SURVEY	Yes	DX/Innovation Initiatives Formally Recognised by HO with PoC	Count of DX/innovation initiatives from staff formally recognised by HO with at least one receiving PoC budget in the year.	Recognised initiatives count. Source: HO innovation	< 20: L1 20-49: L2 50-99: L3	Resolution 57-NQ/TW 22/12/2024

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
			Funding		registry.	100-199: L4 ≥ 200: L5	
VHS-T06	REALTIME		Digital Champion Count Trained and Deployed at Branches	Count of Digital Champions trained, certified and deployed at branches by HO.	Digital Champion count. Source: HO training records.	< 50: L1 50-99: L2 100-249: L3 250-499: L4 ≥ 500: L5	Change agent network
VHS-T07	REALTIME		Middle Management Digital Leadership Completion Rate	Share of middle managers (heads/deputies of departments, branch directors) completing the digital leadership programme.	Completers / Total middle managers x 100%. Source: training records.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	Leadership development
VHS-T08	REALTIME		Daily Digital Collaboration Platform Active Use	Share of staff actively using digital collaboration platforms (Teams/Slack/Zalo Work/Microsoft 365) daily.	Daily active users / Total staff x 100%. Source: platform analytics.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	Digital workplace
VHS-T09	SURVEY	Yes	Bounded-Experimentation Culture Maturity	Assesses how systematically Agribank enables bounded experimentation with explicit failure tolerance.	L0: punitive culture. L1: tolerance discussed. L2: experiment safe zones. L3: structured experimentation programme.	0-5 scale (survey)	Resolution 57-NQ/TW 22/12/2024

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0-5)	Legal Theoretical Anchor
					L4: L3 plus learning systematised. L5: L4 plus scaling pipeline.		
VHS-T10	REALTIME		External Digital Certification Completion Rate	Share of staff completing at least one external digital certification (Coursera/AWS/Google/Microsoft) recognised and supported by Agribank.	Certified staff / Total staff x 100%. Source: HR.	< 5%: L1 5-9%: L2 10-19%: L3 20-29%: L4 ≥ 30%: L5	Continuous learning
VHS-T11	SURVEY		Employee Digital Engagement Score	Survey-based engagement score measuring staff alignment with the Agribank DX strategy.	Engagement score (0-100). Source: annual engagement survey.	< 50: L1 50-59: L2 60-69: L3 70-79: L4 ≥ 80: L5	Employee engagement research
VHS-T12	REALTIME		HR Process Digitisation Rate (Recruitment, Appraisal, Pay, Promotion)	Share of critical HR processes fully digitised and automated.	Digitised HR processes / Total HR processes x 100%. Source: HRIS.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	HR Digital Transformation
VHS-T13	REALTIME		Digital Product Knowledge Rate	Share of Agribank staff who can describe at least one digital product offered.	Knowledgeable staff / Total staff x 100%. Source: annual quiz/assessment.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	Internal product alignment

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
						L5	
VHS-T14	REALTIME	Yes	Business Citizen Developer Completion Rate	Share of non-IT business staff completing the Citizen Developer / Low-code training programme.	Trained business staff / Total non-IT staff x 100%. Source: training records.	< 10%: L1 10-19%: L2 20-29%: L3 30-49%: L4 ≥ 50%: L5	Resolution 57-NQ/TW 22/12/2024
VHS-T15	REALTIME		Monthly Learning Completion Rate	Share of staff completing monthly digital-skill e-Learning courses.	Completers / Total staff x 100%. Source: LMS.	< 30%: L1 30-49%: L2 50-69%: L3 70-84%: L4 ≥ 85%: L5	Continuous learning
VHS-T16	REALTIME		KPI-Linked Digital Performance Rate	Share of staff with at least one digital KPI in personal performance evaluation.	Staff with digital KPI / Total staff x 100%. Source: performance system.	< 30%: L1 30-49%: L2 50-69%: L3 70-84%: L4 ≥ 85%: L5	Performance management
VHS-T17	REALTIME		External Tech Hire Rate	Share of IT/Data/AI specialists hired from private sector / fintech / Big Tech (not from state-owned banks).	External-source hires / Total tech hires x 100%. Source: HR.	< 30%: L1 30-49%: L2 50-69%: L3 70-84%: L4 ≥ 85%: L5	Talent diversity

ID	Data Type	Res . 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
						L5	
VHS-T18	REALTIME		Internal Paperless Rate (HO)	Share of internal HO workflows using e-signature (no physical paper).	Paperless workflows / Total internal workflows x 100%. Source: document management.	< 60%: L1 60-74%: L2 75-84%: L3 85-94%: L4 ≥ 95%: L5	Digital workplace
VHS-T19	SURVEY		Branch Innovation Participation Rate	Share of branches submitting at least one DX/innovation initiative recognised by HO during the year.	Participating branches / Total branches x 100%. Source: HO innovation registry.	< 20%: L1 20-39%: L2 40-59%: L3 60-79%: L4 ≥ 80%: L5	Innovation network
VHS-T20	REALTIME		Remote Virtual Meeting Rate	Share of internal Agribank meetings (within Vietnam) held fully virtually (no physical travel).	Virtual meetings / Total meetings x 100%. Source: meeting platform.	< 50%: L1 50-69%: L2 70-84%: L3 85-94%: L4 ≥ 95%: L5	Digital workplace

Total VHS: 30 KPIs (10 branch + 20 HO). Resolution 57-linked: 7.

Digital Customer Experience (TNS)

Scope: Customer access, usage and satisfaction with digital services: MAU, eKYC onboarding, NPS, CES, personalisation.

Branch KPIs (11)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
TNS-01	REALTIME		Monthly Active Digital Customer Rate	Share of branch customers using at least one Agribank digital service in the past 30 days.	MADC / Total branch customers x 100%. Source: IPCAS.	< 50%: L1 · 50-64%: L2 · 65-79%: L3 · 80-89%: L4 · >= 90%: L5	DBI 2023 - digital channel KPI
TNS-02	REALTIME		Digital Onboarding Activation Rate (7-Day)	Share of newly opened customers at the branch who activate E-Mobile Banking within 7 days.	7d activations / New customers x 100%. Source: IPCAS.	< 50%: L1 · 50-64%: L2 · 65-79%: L3 · 80-89%: L4 · >= 90%: L5	Customer onboarding best practice
TNS-03	REALTIME		Digital Complaint 24h Resolution Rate (Branch)	Share of branch customer complaints about digital channels resolved within 24 hours.	On-time resolved / Total digital complaints x 100%. Source: complaint system.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Customer service standard
TNS-04	REALTIME		Multi-Channel Digital Usage Rate	Share of branch customers using >= 2 different digital channels in the month.	Multi-channel users / Active digital customers x 100%. Source: IPCAS.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Omnichannel adoption
TNS-05	REALTIME		In-App Customer Rating (E-Mobile Banking)	Average customer rating from branch customers on the E-Mobile Banking app store rating.	Average app store rating. Source: app store API.	< 3.0: L1 · 3.0-3.4: L2 · 3.5-3.9: L3 · 4.0-4.4: L4 · >= 4.5: L5	Customer experience standard
TNS-06	REALTIME		eKYC Adoption Rate for New Customers	Share of new customers identified via eKYC/chip-CCCD rather than	eKYC onboardings / Total new customers x	< 50%: L1 · 50-64%: L2 · 65-	Scheme 06/QD-TTg - digital citizen ID

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
				paper documents.	100%. Source: onboarding records.	79%: L3 · 80-89%: L4 · >= 90%: L5	
TNS-07	SURVEY		Customer Digital Education at Branch	Assesses how systematically the branch educates and supports customers in using digital services.	L0: none. L1: occasional support. L2: regular workshops or kiosks. L3: structured programme. L4: L3 plus measured uplift. L5: L4 plus integration into community outreach.	0-5 scale (survey)	Customer enablement
TNS-08	SURVEY		Customer Engagement Campaigns via Digital Channels	Assesses how actively the branch runs customer engagement campaigns through digital channels.	L0: none. L1: one-off campaigns. L2: monthly campaigns. L3: structured campaign plan. L4: L3 plus measured ROI. L5: L4 plus integration with HO CRM segmentation.	0-5 scale (survey)	Marketing automation
TNS-09	SURVEY		Customer Privacy Protection in Face-to-Face Interactions	Assesses branch compliance with privacy procedures when handling customer data in direct interactions.	L0: ad-hoc. L1: awareness. L2: procedure exists. L3: procedure enforced. L4: L3 plus periodic audit. L5: L4 plus zero confirmed violations.	0-5 scale (verified via audit)	Law 71/2025/QH15
TNS-10	SURVEY	Yes	Branch Use of Customer Data and AI for Personalisation	Assesses how systematically the branch uses HO customer analytics and AI insights to personalise product/service advice.	L0: no use. L1: occasional. L2: regular use by some staff. L3: standard practice. L4: L3 plus measured uplift. L5: L4 plus branch contributes data back to HO.	0-5 scale	Resolution 57-NQ/TW 22/12/2024
TNS-11	REALTIME	Yes	Personalised Digital Marketing Conversion Rate	Share of customers reached via AI-personalised digital marketing campaigns who convert to new	Converted customers / Reached customers x 100%. Source: campaign	< 2%: L1 · 2-3.9%: L2 · 4-5.9%: L3 · 6-9%:	Resolution 57-NQ/TW 22/12/2024

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
				product usage.	analytics.	L4 · >= 10%; L5	

Head Office KPIs (20)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
TNS-T01	REALTIME		Cross-Channel Continuity Rate	Share of banking operation types where the customer can start on one channel and complete seamlessly on another.	Continuity-enabled operations / Total operations x 100%. Source: product registry.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Omnichannel
TNS-T02	REALTIME		System-wide eKYC Onboarding Rate	Share of new customers onboarded via eKYC/chip-CCCD - no photocopies.	eKYC onboardings / Total new customers x 100%. Source: onboarding records.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · >= 95%: L5	Scheme 06/QD-TTg
TNS-T03	REALTIME		E-Mobile Banking Net Promoter Score (NPS)	NPS measured directly from E-Mobile Banking customers.	NPS = %Promoters - %Detractors. Source: in-app survey.	< 0: L1 · 0-19: L2 · 20-39: L3 · 40-59: L4 · >= 60: L5	Schmitt (2003); Reichheld NPS
TNS-T04	REALTIME	Yes	AI-Personalised Offer Reach Rate	Share of active E-Mobile Banking customers receiving an AI-personalised offer in the month.	Customers offered / Active customers x 100%. Source: CRM/AI engine.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Resolution 57-NQ/TW 22/12/2024
TNS-T05	REALTIME		Customer 360 Profile Coverage Rate	Share of active customers with a complete 360 profile in the central CRM.	Customers with full 360 profile / Active customers x 100%. Source: CRM.	< 50%: L1 · 50-64%: L2 · 65-79%: L3 · 80-89%: L4 · >= 90%: L5	Customer Experience Management
TNS-T06	REALTIME		Customer Effort Score (CES)	CES measuring how easy it is for customers to complete a transaction via digital	Average CES (1-7). Source: in-app/post-transaction	< 4.0: L1 · 4.0-4.9: L2 · 5.0-5.4: L3 ·	CEB Effortless Experience

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
				channels.	survey.	5.5-5.9: L4 · >= 6.0: L5	
TNS-T07	REALTIME		AI Churn-Risk Customer Outreach Rate	Share of churn-risk customers identified by AI who are proactively contacted by branch staff before churn.	Contacted customers / Identified churn-risk customers x 100%. Source: CRM.	< 30%: L1 · 30-49%: L2 · 50-69%: L3 · 70-84%: L4 · >= 85%: L5	Customer retention
TNS-T08	REALTIME		E-Mobile Banking 30-Day Active Rate	Share of E-Mobile Banking users transacting >= 1 time in the past 30 days.	30d active users / Total registered x 100%. Source: app analytics.	< 50%: L1 · 50-64%: L2 · 65-79%: L3 · 80-89%: L4 · >= 90%: L5	App engagement standard
TNS-T09	REALTIME		Strategic Customer Segment Programme Coverage	Share of strategic customer segments identified by HO that have dedicated digital experience programmes.	Segments with programme / Identified strategic segments x 100%. Source: marketing strategy.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Customer segmentation
TNS-T10	REALTIME		Pre-Launch UX Benchmark Pass Rate	Share of new digital features passing the Agribank UX benchmark before go-live.	Passing features / Total launched features x 100%. Source: UX governance.	< 60%: L1 · 60-74%: L2 · 75-84%: L3 · 85-94%: L4 · >= 95%: L5	UX governance
TNS-T11	REALTIME		Digital Channel First Transaction Rate (Within 7 Days of Sign-up)	Share of customers registering for digital channels who complete a transaction in the first 7 days.	7d transactors / New digital sign-ups x 100%. Source: channel analytics.	< 40%: L1 · 40-54%: L2 · 55-69%: L3 · 70-84%: L4 · >= 85%: L5	Activation funnel
TNS-T12	REALTIME		Customers Using >= 2 Digital Products / Services	Share of customers using at least 2 different digital products/services from Agribank.	Multi-product users / Active digital customers x 100%. Source: CRM.	< 30%: L1 · 30-49%: L2 · 50-64%: L3 · 65-79%: L4 · >=	Cross-sell

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor /
						80%: L5	
TNS-T13	REALTIME		Customer Journey Analytics Touchpoint Coverage	Share of digital customer touchpoints captured and analysed in Customer Journey Analytics.	Captured touchpoints / Total digital touchpoints x 100%. Source: analytics platform.	< 50%: L1 · 50-69%: L2 · 70-84%: L3 · 85-94%: L4 · >= 95%: L5	Customer Journey Analytics
TNS-T14	REALTIME		Rural Customer Monthly Digital Usage Rate	Share of Agribank rural customers using digital channels at least once per month.	Rural active digital users / Total rural customers x 100%. Source: IPCAS.	< 30%: L1 · 30-49%: L2 · 50-64%: L3 · 65-79%: L4 · >= 80%: L5	Financial inclusion
TNS-T15	REALTIME		Customer Opt-in Rate for Personalisation	Share of customers consenting (opt-in) to Agribank using personal behavioural data for service personalisation.	Opt-in customers / Total active customers x 100%. Source: consent management.	< 30%: L1 · 30-49%: L2 · 50-64%: L3 · 65-79%: L4 · >= 80%: L5	Law 71/2025/QH15
TNS-T16	REALTIME		Pure-Digital Transaction Completion Rate	Share of customers starting a transaction on a digital channel who complete it without switching to teller.	Pure-digital completions / Digital starts x 100%. Source: channel analytics.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5	Channel-shift KPI
TNS-T17	REALTIME		Digital Marketing Conversion Rate	Conversion rate of Agribank digital marketing campaigns (click to registration/activation).	Conversions / Clicks x 100%. Source: marketing analytics.	< 1%: L1 · 1-2.9%: L2 · 3-4.9%: L3 · 5-9%: L4 · >= 10%: L5	Marketing performance
TNS-T18	REALTIME		Customer Referral Rate (Digital Products)	Share of customers referring friends to Agribank digital products.	Referring customers / Active digital customers x 100%. Source: referral programme.	< 2%: L1 · 2-4.9%: L2 · 5-9%: L3 · 10-19%: L4 · >= 20%: L5	Reichheld NPS - referral
TNS-T19	REALTIME		Chatbot Digital	/ Average response time of chatbot / 24/7	Average response time	> 60s: L1 · 31-	Customer service

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal Theoretical Anchor
			Support 24/7 Average Response Time	digital support to customer queries.	(sec). Source: support platform.	60s: L2 · 16-30s: L3 · 6- 15s: L4 · <= 5s: L5	standard
TNS- T20	SURVEY		Voice of Customer Integration into Product Improvement	Assesses how systematically HO measures and integrates Voice of Customer into continuous product improvement.	L0: no VoC. L1: ad-hoc. L2: structured collection. L3: structured plus monthly review. L4: L3 plus closed- loop action. L5: L4 plus measured impact.	0-5 scale	Customer Experience Management

Total TNS: 31 KPIs (11 branch + 20 HO). Resolution 57-linked: 3.

Digital Business Performance (HQ)

Scope: Business outcomes: digital revenue share, transaction share, products per customer, ROI, customer growth.

Branch KPIs (10)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HQ-01	REALTIME		Branch Digital Revenue Share	Share of branch revenue generated through digital channels.	Digital channel revenue / Total branch revenue x 100%. Source: Finance Division.	< 20%: L1 · 20-29%: L2 · 30-39%: L3 · 40-49%: L4 · >= 50%: L5. Benchmark: DBI 2023 system-wide ~36%.	BSC Financial Perspective
HQ-02	REALTIME		Branch Customer Digital Transaction Share	Share of customer financial transactions executed via digital channels at the branch.	Digital transactions / Total customer transactions x 100%. Source: IPCAS.	< 70%: L1 · 70-79%: L2 · 80-89%: L3 · 90-94%: L4 · >= 95%: L5. Benchmark: ~94%.	DBI 2023 Report
HQ-03	REALTIME		Average Digital Products per Branch Customer	Average number of digital products/services used per active customer at the branch.	Sum of digital products in use / Active customers. Source: CRM.	< 1.5: L1 · 1.5-1.9: L2 · 2.0-2.4: L3 · 2.5-2.9: L4 · >= 3.0: L5	Cross-sell KPI
HQ-04	REALTIME		Pure-Digital Banking Operations Rate	Share of customer banking operations completed fully via digital channel at the branch - no teller visit.	Pure-digital operations / Total operations x 100%. Source: channel analytics.	< 50%: L1 · 50-64%: L2 · 65-79%: L3 · 80-89%: L4 · >= 90%: L5	Channel-shift KPI
HQ-05	REALTIME		Digital Fraud Loss Rate (Branch)	Financial losses from digital fraud / Total digital transaction value at the branch.	Fraud losses (VND) / Digital transaction value (VND) x 100%. Source: fraud records.	> 0.05%: L1 · 0.03-0.05%: L2 · 0.02-0.029%: L3 · 0.01-0.019%: L4 · < 0.01%: L5	Basel III Operational Risk
HQ-06	REALTIME		Cost per Transaction (Digital vs Teller)	Average operating cost per digital transaction relative to cost per teller transaction at the branch.	Digital unit cost / Teller unit cost x 100%. Source: Finance Division.	> 50%: L1 · 35-50%: L2 · 20-34%: L3 · 10-19%: L4 · < 10%: L5	Operational efficiency

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HQ-07	REALTIME		YoY Growth Rate in Active Digital Customers	Year-over-year growth in active digital customer count at the branch.	(Current - Prior year) / Prior year x 100%. Source: IPCAS.	< 5%: L1 · 5-9%: L2 · 10-19%: L3 · 20-29%: L4 · >= 30%: L5	Growth KPI
HQ-08	REALTIME		12-Month Continuous Digital Usage Rate	Share of digital customers with transactions in 12 consecutive months.	Continuous users / Total digital customers x 100%. Source: IPCAS.	< 40%: L1 · 40-54%: L2 · 55-69%: L3 · 70-84%: L4 · >= 85%: L5	Retention KPI
HQ-09	REALTIME	Yes	Revenue from Digital Products Launched in Last 12 Months	Revenue from digital products/services launched in the last 12 months at the branch.	VND billion. Source: Finance Division.	< 1: L1 · 1-2: L2 · 3-5: L3 · 6-10: L4 · >= 11: L5	Resolution 57-NQ/TW 22/12/2024 - new digital product revenue
HQ-10	SURVEY	Yes	Branch Use of Measurement to Adjust Digital Business Strategy	Assesses how systematically the branch monitors, analyses and adjusts its digital business strategy based on measurement.	L0: no measurement. L1: occasional review. L2: monthly review. L3: monthly review plus adjustment plan. L4: L3 plus measured outcomes. L5: L4 plus contributes learning to HO.	0-5 scale	Resolution 57-NQ/TW 22/12/2024 - data-driven adjustment

Head Office KPIs (5)

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
HQ-T01	REALTIME		System-Wide Digital Revenue Share	Share of total Agribank revenue generated through digital channels system-wide.	Digital channel revenue / Total Agribank revenue x 100%. Source: Finance Division.	< 20%: L1 · 20-29%: L2 · 30-39%: L3 · 40-49%: L4 · >= 50%: L5	BSC Financial; DBI 2023 system-wide ~36%
HQ-T02	REALTIME		System-Wide Customer Digital Transaction Share	Share of customer financial transactions executed via digital channels system-wide.	Digital transactions / Total customer transactions x 100%. Source: IPCAS.	< 80%: L1 · 80-89%: L2 · 90-94%: L3 · 95-97%: L4 · >= 98%: L5. Benchmark: ~94%.	DBI 2023 Report
HQ-	REALTIME		Total Active Digital	Total active digital customer count	Active customer count and YoY	< 5% YoY: L1 · 5-9%:	Growth

ID	Data Type	Res. 57	KPI Name	Description	Calculation / Data Source	Scoring Scale (0–5)	Legal / Theoretical Anchor
T03			Customers and YoY Growth	system-wide and YoY growth rate.	growth. Source: IPCAS.	L2 · 10-19%; L3 · 20-29%; L4 · >= 30%; L5	KPI
HQ-T04	REALTIME		DX Investment ROI	Return on investment for DX initiatives versus total IT/DX investment in the year.	DX incremental revenue and savings / DX investment x 100%. Source: Finance Division attribution.	< 50%: L1 · 50-99%: L2 · 100-149%: L3 · 150-249%: L4 · >= 250%: L5	BSC Financial; Capital Allocation
HQ-T05	SURVEY	Yes	HO-to-Branch DBI Gap Reduction Achievement	Assesses how successfully HO is closing the DBI gap between HO and branches.	L0: gap widening. L1: gap stable. L2: gap narrowing slowly. L3: gap narrowing on plan. L4: gap closed in select pillars. L5: gap closed across all pillars.	0-5 scale	Resolution 57-NQ/TW 22/12/2024 - equitable digital access

Total HQ: 15 KPIs (10 branch + 5 HO). Resolution 57-linked: 3.

Declaration on the Use of Artificial Intelligence (AI) Tools

The undersigned **Trang Linh To**, student ID number **908463**, enrolled at Ca' Foscari in the **Master's Degree Programme in Data Analytics for Business and Society**, author of the final paper/degree thesis "*Digital Transformation Measurement Framework of Agribank - Vietnam*", thesis supervisor **Vera Djordjilovic**, aware of the penalties provided for in Article 76 of the Consolidated Act set out in Presidential Decree no. 445 of 28 December 2000, and of the loss of benefits provided for in Article 75 of the same Consolidated Act in the event of false or misleading statements, under his/her own responsibility pursuant to Articles 46 and 47 of Presidential Decree no. 445 of 28 December 2000,

DECLARES

☐ that he/she has NOT used generative artificial intelligence technologies to support various aspects of the research and writing of the final paper/degree thesis;

☒ that he/she HAS used generative artificial intelligence technologies to support various aspects of the research and writing of his/her final paper/degree thesis, in particular:

- **Name and version of the tool(s) used:** Claude (Anthropic), model Claude Opus 4.1 and Claude Sonnet 4.5, version accessed between late 2025 and June 2026

- **How the tools were used:**

- ☒ revision and optimisation of texts to improve clarity and coherence;

- ☐ generation of charts and diagrams for data presentation;

- ☒ support for the automatic drafting of sentences;

- ☐ production of illustrative images to complement the methodological section;

- ☒ other (please specify): assistance with writing and debugging the R code used for the econometric analysis (clean the data, the three regression models)

In more detail, the tools were used for the following purposes:

(a) Statistical code. The R code implementing the three econometric models (two-way fixed effects, fractional logit with correlated random effects, and the Hansen threshold regression), the data-cleaning steps, and the scripts that produce the figures were written and debugged with AI assistance. The author specified the models, variables and intended analysis; the AI helped translate these specifications into working code and resolve errors.

(b) Language and flow. Several passages of the author's own draft text were revised with AI assistance to improve clarity, coherence and readability, and to make the prose flow more smoothly. The underlying ideas, arguments, structure and conclusions are the author's own; the AI was used to refine wording rather than to generate substantive content.

- **Sections or chapters concerned:** Chapter 4 (Econometric Methodology) and Chapter 5 (Empirical Results) for the statistical code and figures; language revision was applied across the thesis, principally in Chapters 1, 2, 5, 6 and 7. The data, results, interpretation and conclusions are the author's own.

- **How accuracy, quality and reliability were verified:** All AI-assisted code was executed on the author's own dataset, and the numerical output was checked against the results tables in the thesis to confirm consistency; the models were verified to reproduce the expected coefficients, standard errors and significance levels. All bibliographic references were independently checked against original sources (journals, DOIs and official documents) to confirm their accuracy. Every passage revised for language was read and approved by the author to ensure that the meaning was preserved and remained faithful to the author's intent. No factual claim, statistic or citation was accepted from an AI tool without independent verification.

DECLARES FURTHER

that all material generated by AI has been carefully checked, reviewed and reworked by the author, who assumes full responsibility for the quality, accuracy and scientific integrity of the work.