Towards Human-Centered AI Banking of The Future

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INAPR x AIDA Unpad x AIPI Unesa x IAIS

Outline

01

Trend of Modern Banking

Everything is Moving and Innovating Digitally
"Covid-19 has greatly accelerated Digital Transformation"

BRI

Everything is Moving to Digital

- Digital Platforms
- Financial Services
- Business Operations

Ripen Digital Adoption

On-Demand & Integrated Solutions
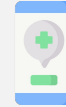
DIGITAL PLATFORMS

E-commerce remains to be Indonesia's main growth driver with 54% YoY. Covid-19 also unlocked an opportunity for HealthTech and EdTech platforms.

Online Retail | **Food Delivery** | **Health Tech** | **Ed Tech**

FINANCIAL SERVICES

Consumers and SMEs have adopted Digital Financial Services more than before.

Insurance | **Digital Lending** | **Online Investment** | **Digital Payment**
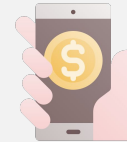
BUSINESS OPERATIONS

Remote Working | **Innovation to Cater Broad Range of Needs** | **Partnership** | **M&A with Digital Platforms/Bank/Fintech**

Source: McKinsey, 2021; e-Conomy SEA 2020, Google, Temasek Bain & Company

4

Banking Technology is Continuously Evolving
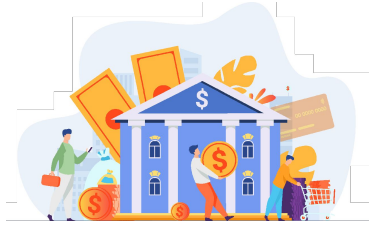
Bank 1.0
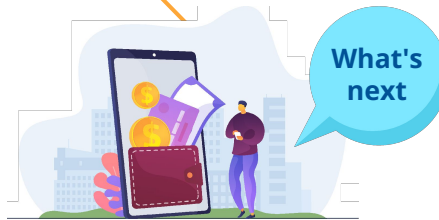Branch banking, negotiable instrument
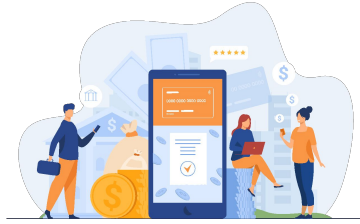
Bank 3.0
Online Banking, Mobile Banking

Bank 2.0
Payment cards, Automated Teller Machine

Bank 4.0
Digital Wallets, Social Media Banking

What's next

"The world need banking services, but not necessarily banks."

Bill Gates

Source: https://www.appknox.com/blog/infographic-evolution-of-banking

First Principles of Banking

BRI

First principles: Basic assumption or truth that cannot be reduced any further

Banking First Principles

Identify and then challenge your assumptions

Separate the problem into its fundamental principles

Create new solutions

vs.
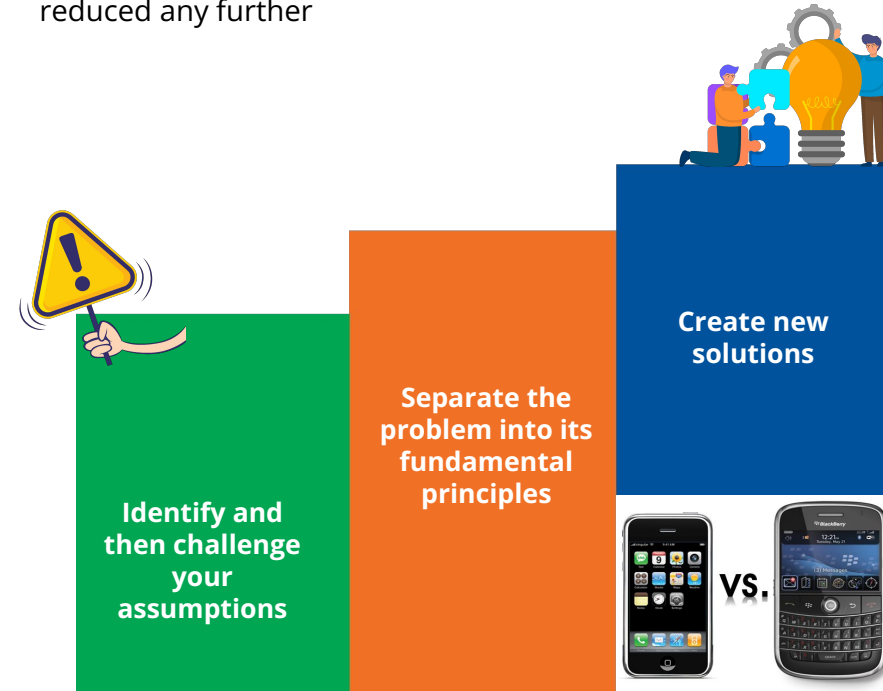
Design by **first principle** vs by **analogy**

Access Credit
- Loan
- Mortgages
- Lines of Credit
- Credit Cards

Move Money
- Pay Bills
- Pay Merchants
- Transfer Money

Store Value
- Deposits
- Savings
- Investments

BRI
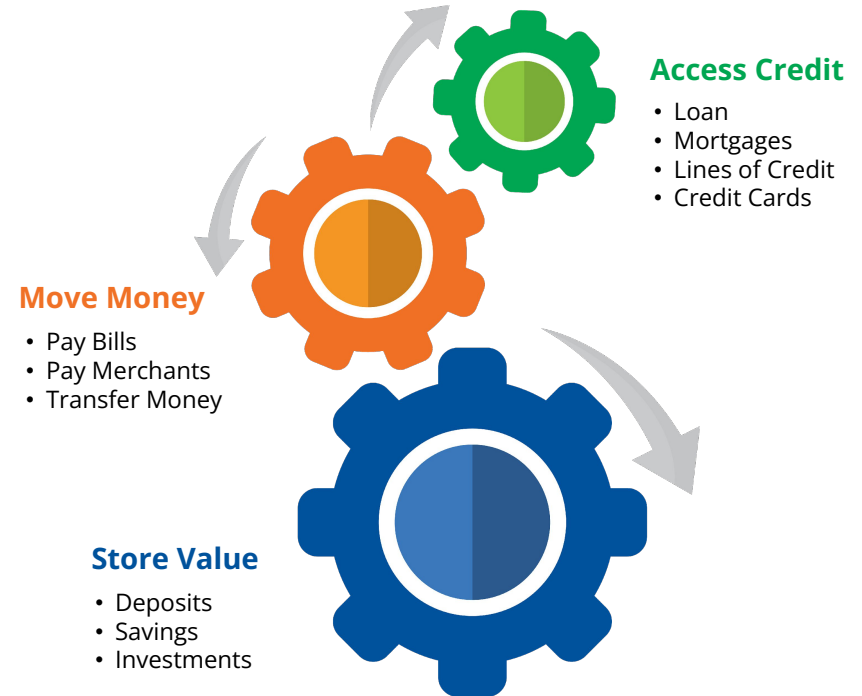
"Growth of Fintech that exponentially high…"

Internet use & fintech payment transaction is known to have increased exponentially. Fintech will play a significant role in providing access to efficient and practical financial service

Size of the Internet Market 2015, 2018, 2025
Sumber: Bank Indonesia

Indonesia
- 8B
- 27B (49%)
- 100B (28%)

Malaysia
- 5B
- 8B (19%)
- 21B (16%)

Philipines
- 4B
- 5B (30%)
- 21B (25%)

Digital Banking 🇮🇩
Ticket Size
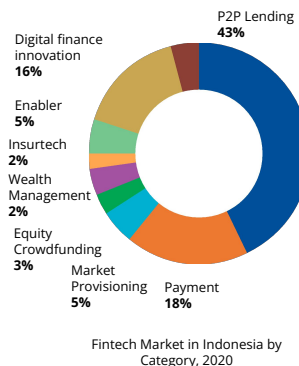- 3 million — 2017
- 8 million — 2019

Payment Transaction 🇮🇩
2 thousands /second

*AVG/PERSON/YEAR
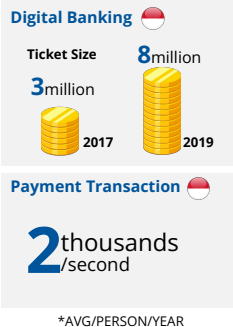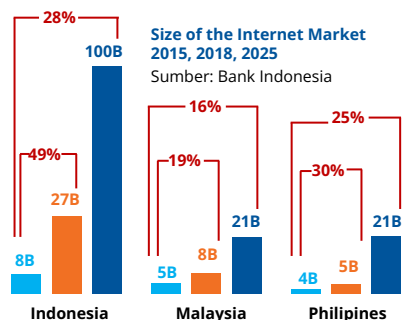
- 161 P2P lending are registered, and 25 are licensed in OJK (149 conventional, 12 sharia)
- Rp87.72 trillion has been distributed
- 16.9 million P2P lending borrowers
- 508.014 P2P lending lenders
- 90 digital finance innovation are recorded

Fintech Market in Indonesia by Category, 2020
- P2P Lending 43%
- Payment 18%
- Digital finance innovation 16%
- Enabler 5%
- Market Provisioning 5%
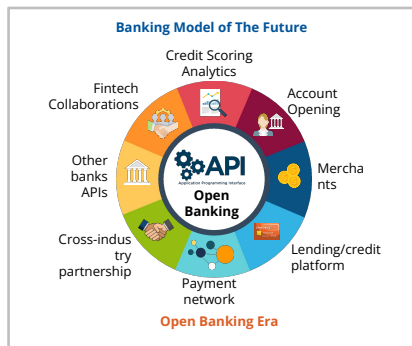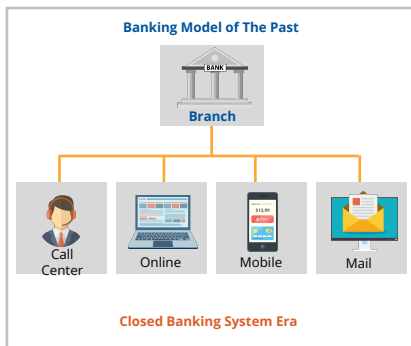- Equity Crowdfunding 3%
- Wealth Management 2%
- Insurtech 2%

The popularity of non-bank e-wallets has bolstered the growth of non bank e-money transactions
Sumber: Bank Indonesia

Transaksi Fintech Payments (Transaksi UE)
Triliun Rupiah

Legend: Bank, Non Bank

2016 (I II III IV), 2017 (I II III IV), 2018 (I II III IV), 2019 (I II III IV)
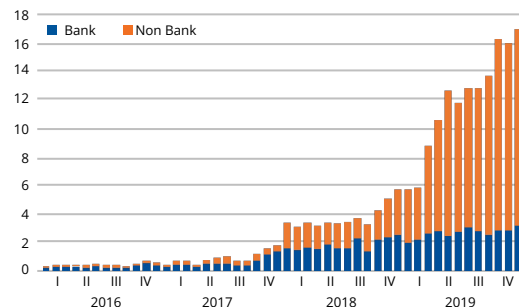
Open Banking, the Future Banking Model
Mobile should now be seen as the basis for an entirely new banking model, a shift that is forcing bankers to accept that branches are no longer the center of the bank. Now, its **Open API to create super-ecosystem faster than ever!**

Banking Model of The Past
Branch — BANK
- Call Center
- Online
- Mobile
- Mail

Closed Banking System Era

Banking Model of The Future
Open Banking — API (Application Programming Interface)
- Credit Scoring Analytics
- Account Opening
- Merchants
- Lending/credit platform
- Payment network
- Cross-industry partnership
- Other banks APIs
- Fintech Collaborations

Open Banking Era

The Indonesian banking sector is expected to undergo transformation in three categories over the next decade.

Hybrid Bank
Banks with offline and online platforms with its own ecosystems

How are they?
3 major banks
BCA, BRI, mandiri

These banks with their respective digital platforms not only have cost ratios that are the lowest among Indonesia banks, but also better fee income trends.

Sharia Bank
A growing acceptance of Shariah-based banks in Indonesia

How are they?
BSI BANK SYARIAH INDONESIA

Indonesia has the largest Muslim population in the world, over 200mn people in 2021. Yet, Syariah-based banking has a very small portion of total banking assets, only around 5% of the country's banking assets (2020).

Digital Bank
Growing adoption of digital banking among Indonesian consumers in specific fintech & non fintech ecosystem
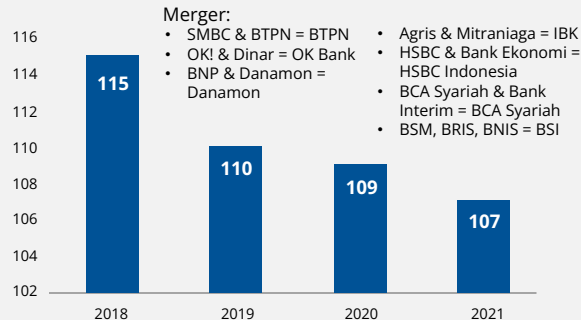
How are they?
Jago (Bank Jago), raya (BRI Agro), BCA digital (BCA Digital)

Digital banks is defined as not only providing internal operations digitally, but also there will be increasing demand from users or customers to have life finance value propositions from digital banks, which would provide all their financial aspects
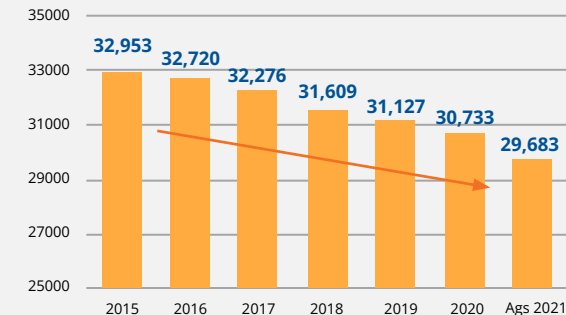
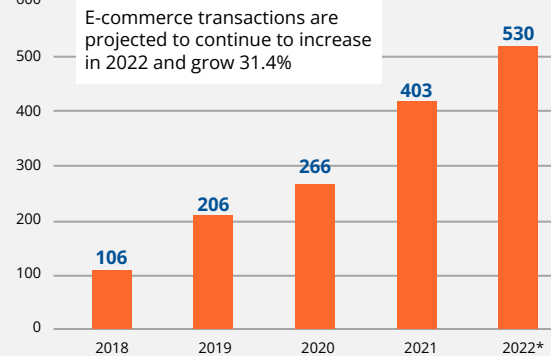# Banking Trend Shifting from Physical to Digital

BRI

Total Commercial Banks

Merger:
- SMBC & BTPN = BTPN
- OK! & Dinar = OK Bank
- BNP & Danamon = Danamon
- Agris & Mitraniaga = IBK
- HSBC & Bank Ekonomi = HSBC Indonesia
- BCA Syariah & Bank Interim = BCA Syariah
- BSM, BRIS, BNIS = BSI

Year	Value
2018	115
2019	110
2020	109
2021	107

Source: SPI OJK

Total Physical Branch Offices

Year	Value
2015	32,953
2016	32,720
2017	32,276
2018	31,609
2019	31,127
2020	30,733
Ags 2021	29,683

Source: SPI OJK

(Trillion Rp)

E-commerce transactions are projected to continue to increase in 2022 and grow 31.4%

Year	Value
2018	106
2019	206
2020	266
2021	403
2022*	530

Total Mobile Banking Transactions

Year	Values (in mio IDR)
2016	1.159
2017	1.638
2018	2.328
2019	3.522
2020	4.770
2021	5.401

■ Volume   ●— Values (in mio IDR)
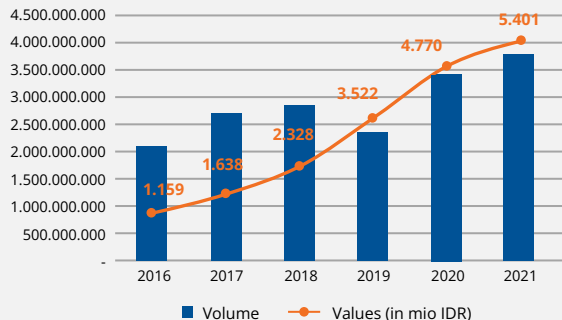
Source: Bank Indonesia

Total Internet Banking Transactions

Year	Values (in mio IDR)
2016	13.233
2017	15.435
2018	20.241
2019	23.764
2020	22.585
2021	23.283

■ Volume   ●— Values (in mio IDR)
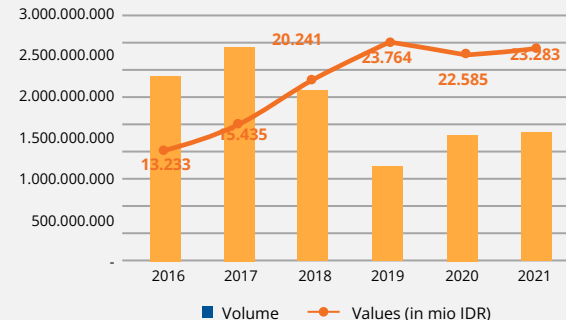
Source: Bank Indonesia

Total ATM/Debit Card Transactions

Year	Values (in mio IDR)
2016	5.623
2017	6.200
2018	6.900
2019	7.474
2020	6.916
2021	6.332

■ Volume   ●— Values (in mio IDR)
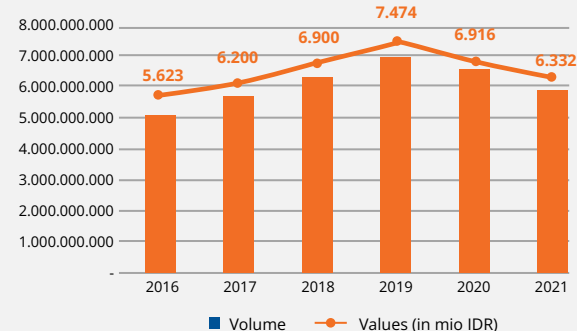
Source: Bank Indonesia

Regulatory Responses on Open Banking & Digital Business Transformation in Indonesian Banking Landscape

BRI

Open Banking Regulation: Standar Nasional Open API Pembayaran

BANK INDONESIA
BANK SENTRAL REPUBLIK INDONESIA

Ensuring the **creation of a level of playing field between stakeholders** in the Payment System Open API ecosystem with integrity

Creating a **strong, competitive and innovative Payment System Industry**

PADG No 23/15/PADG/2021 Tentang Standar Nasional Open API Pembayaran

Encouraging **integration, interconnection, interoperability, and security and reliability of payment system infrastructure**

Commercial Banks and Licensing related to the launch of new banking sector products

OJK Otoritas Jasa Keuangan

Encouraging & **accelerating digital transformation in the banking industry**

POJK No. 12 tentang Bank Umum

Banks can become more **agile with faster time-to-market** for development of digital banking products

POJK No.13 tentang Penyelenggaraan Produk Bank Umum

Increase **industry optimism** in launching digital banking products with faster licensing

Tech Elements of Financial 4.0
AI Plays an Important Role

Artificial Intelligence (AI)

Cloud Computing

Quantum Computing

Task-specific hardware

Augmented/ Virtual reality (AR/VR)

5G networking

Internet of things (IoT)

Distributed ledger technology (DLT)

A — Establishing Ecosystems beyond Finance
- Trusted Data Steward
- Dynamic Life + Health
- Connected Insurance Experience
- Cross Bank Collateral Optimization

B — Integrating Physical and Digital Processes
- Just in-Time Lending
- Verifiable Impact Investing
- Augmented Purchases
- Data Linked Green Bonds
- M2M Payments

C — Reorienting Transaction Flows
- Global Fund Transfer Network
- KYC/AML Utility
- Global Corporate Actions Ledger

D — Reimagining Core Functions
- Cross Bank Collateral Optimization
- Quantum Portfolio Optimization

Source: World Economic Forum, "Forging New Pathways: The next evolution of innovation in financial services"

02

BRI Hybrid Business Model: Banking & Beyond-Banking Digital Strategy

126 Years serving the country:
The Largest Microfinance Institution In the World

BRI

BRIsat

The only bank who owned a satellite in the world!

Market Cap as of Mar 2022
Rp. 701.90 T

Financial Highlight :

Assets As of Dec 2021
Rp. 1,678.1 T

Net Profit As of Dec 2021
Rp. 32.2 T

Forbes 2021
GLOBAL 2000
WORLD'S LARGEST PUBLIC COMPANIES

Global 2000 World's Largest Public Companies Forbes 2021

503,000+ Agen BRILink	**8,600+** Outlets	**1,345 Mio** # of Mobile Banking Trx
21,000+ ATM	**203,027** EDC	**1,786 Mio** Internet Banking Trx

Total Number of Unique Customers: 143+ Mio

BRI Identity: As the Largest Microfinance Bank in the World

BRI

... SERVE AS MUCH COMMUNITIES AS POSSIBLE, WITH THE MOST EFFICIENT COSTS ...

GO Smaller

Reaching wide market & society as possible, banking to small to ultra micro communities.

GO Shorter

Offering products with shorter tenor
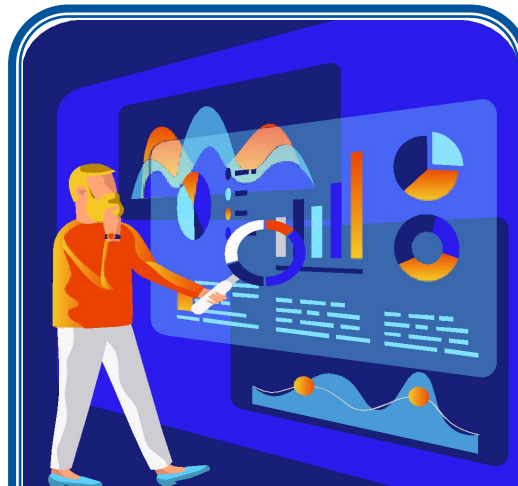
GO Swifter

Through the usage of technology or digitization to make it more efficient.

The Foundation: **"Digital First, Ecosystem First"**

Hybrid Bank Business Model: Combining Physical Presence & Digital Capabilities to Match Our Customer Journey

BRI

BRI HYBRID BANK

Digitizing Core
Digitize existing services and transactions (business process) to **boost productivity** & **unleash the potential**

- **Digital Loan Underwriting** — BRISPOT
- **Smart Virtual Assistance** — Sabrina
- **Digital Learning Application** — brismart
- **Mobile Banking Super Apps** — BRImo
- **Digital Office Application** — BRIStars My BRILian World

Digital Ecosystem
Build ecosystem to offer products and services beyond core business to **leverage new liquidity, new opportunities** and **new source of growth**

- **Digital Ecosystem Platform (B2B, B2B2C)**
  - BRIMOLA — Household LPG Ordering System
  - School Management System
  - BRISmart — Integrated Billing System
  - STROBERI — C2C Micro Payment Transaction
  - pasar.id — Traditional Market Ecosystem
  - **Ventures Capital** — BRIventures Building Digital Nation
- **Digital Partnership & Collaboration**
  - BRIapi — Open Application Programming Interface
  - **Fintech Partnership**
  - E-Commerce Partnership
  - P2P Partnership
  - Ride Hailing Partnership

New Digital Propositions
Create and launch an independent greenfield digital bank to **tap the untapped segment** and **embedded in customer's life**

- **Digital Loan** — ceria, Pinang Powered by BRIAgro
- **Digital Saving** — BRI digital saving
- **Digital Bank** — raya

BRI BRAIN
BRI Big Data & AI

Digital Capabilities ✚ **Physical Presences**

~9000 Outlets +220,000 E-Channels

- **Outlets**
  - +1000 Branches & Sub-branches
  - +6900 Micro Outlets
  - +900 Cash Offices & Payment Points
- **E-Channels**
  - +15,900 ATMs
  - +5,700 CRMs
  - +200,000 EDCs

+500,000 BRILink Agents
BRI Branchless Banking

- Simple Financial transaction Services (i.e., money transfer, cash withdrawal, billing payment)
- Loan Referral
- Saving Referral
- Micro Insurance Referral

+37,000 Experienced Financial Advisors

New Delivery System (NDS)
New Customer Experience Using NDS Omni Channel Platform

BRI

Branch Transformation Initiatives

NDS Platform

BRANCH TRANSFORMATION
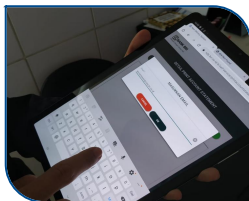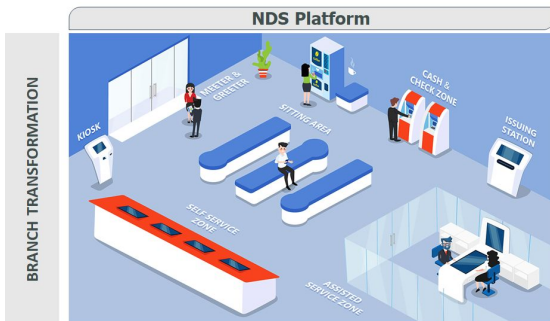
Mendukung Implementasi Universal Banker

Integrasi dengan Mesin - Mesin

Branch Transformation

Outbond Calling

Report KPI UB

Disposisi UB

Terintegrasi dengan Integrated Customer Management

Customer Portfolio Overview

Customer Next Best Offer

Customer Relationship

100% NDS Implementation in KC, KCP, KK & BRI Unit
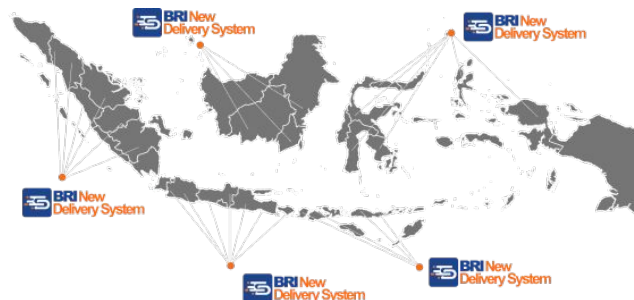
Total Transactions

53.423 Mio

Total Transactions Value

Rp 1.256,5 Bio

BRImo:
Enabling the Shift of Transaction into Digital During Pandemic

Digitizing Core

BRImo

BRI

+109% user YoY

+218% trx YoY

+663% Trx vol YoY

BRImo has shown significant growth during 2021

1 **Lifestyle Ecosystem**

The 10 ecosystems most needed by BRI customers are available in BRImo, such as Travel, Entertainment, Digital Content, etc.

2 **Funding**

Saving account opening to increase BRI CASA: BritAma savings

3 **Lending**

Support Indonesian MSMEs and customers who need loans with BRIGUNA Digital, Ceria Payment, PayLater, Credit Card
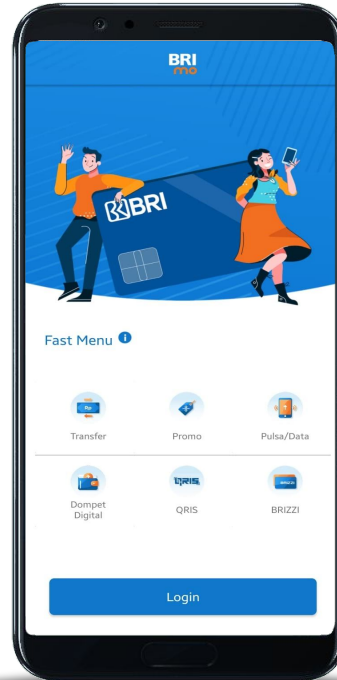
4 **Payment/Purchase**

Development of payment & purchase features such as QR Transfers, international transfers

5 **Investment**

Purchase and sale of investment products such as Danareksa, DPLK, Time Deposits, Bonds, Mutual Funds can be done at BRImo

6 **Insurance**

BRImo as a platform to have life insurance, health, vehicle, business, and others

BRImo

Fast Menu

Transfer | Promo | Pulsa/Data

Dompet Digital | QRIS | BRIZZI

Login

Digitizing Core

BRISPOT

BRI

Boost Productivity & Unleash the Potential

BEFORE | **Digitalization** | **AFTER**

- Double Work
- Variative Financial Assessment
- No Cross Sell Module

- All in one go
- Standardized Template
- Built-in Cross-Sell Module

BEFORE | **Automation** | **AFTER**

- Manual Pre-screening
- Manual Disbursement
- Manually notify by loan officer

- Automated Pre-screening
- Automatic Disbursement
- SMS & e-Mail Notification

BEFORE | **Simplification** | **AFTER**

- Paper Based
- Manual Mapping
- Approval process in 20 days

- Less Paper
- Geo-tagging Technology
- Less in 1 days

BRI SPOT

CONSUMER

BRI SPOT — **MICRO**

BRI SPOT — **SMALL**

What's on BRISPOT?

+47.500 Users (LOAN OFFICERS & APPROVERS)

BRISPOT FEATURES BY SEGMENT

Micro **+65**
SME **+34**
Cons **+43**

+140 IMPACTFUL FEATURES

BRISPOT Existing Features

Boost Productivity

- Sales & Pipeline
- Portfolio Balancing Dashboard
- Profit & Loss Portfolio
- Working Area Mapping
- uMi Corner Integration
- BRILink Partnership

Increase Efficiency

- Automated Pre-Screening
- Less Paper
- All in one Application
- Pick Up Transaction
- BRISURF Integration
- Online Loan Application Letter Register

Increase Strengthen Risk Management

- Monitoring & Evaluation
- Monitoring Point to Point
- "Activity Today"
- Assistance

- Early Warning System
- Loan Collection
- KUR Limit Monitoring

BRI

Senyum Mobile is an integrated digital sales platform to enable joint-acquisition across 3 entities

Product Information

Basic Saving Account Opening

Leads Generation (Loan & Gold Saving Reffreal)
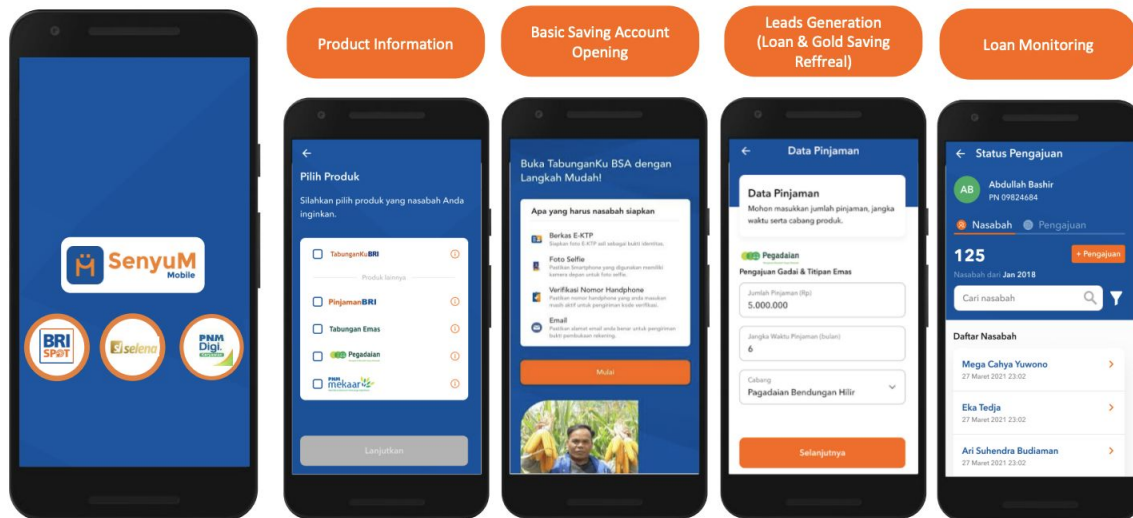
Loan Monitoring

Senyum Mobile

Integrated sales platform for UMi products — provide end to end features including product information, leads submission, application tracking, comprehensive customer database and performance monitoring

Seamless lead generation & allocation platform — within UMi ecosystem (BRI, Pegadaian and PNM) – including tracking of cross-lead generation, real-time status

Promote productivity through joint-selling mechanism — Promote productivity through joint-selling mechanism across 3 entities – to be used by salesforces, branch and agents for cross-referral

Rp64.95B
Total Loan Disbursed

>11,700
Total Gold Saving Account Opening

Senyum Mobile directly connected the existing applications of BRI, Pegadaian and PNM, namely BRISPOT (BRI digital loan origination application), Selena (Pegadaian sales pipeline management system), PNM Digi (PNM digital loan origination application) to enable joint acquisition within sales officers in three entities.

BRILink:
Increasing Volume & Strong Fee Income Growth

AgenBRILink
Layanan Transaksi Keuangan Tanpa Kantor

A branchless banking initiatives performed by BRI's customer through fee income sharing scheme **which retain valuable agents**

Agents

↓ 0,2%

504.233 503.031

Q4'20 Q4'21

Transaction (Mio)

↑ 27,5%

728 928

Q4'20 Q4'21

BRILINK 1.0 → BRILINK 2.0

Organic agent performance	Agent as partner of development
Limited product	Beyond-banking products
BRILink Officer as controller	BRILink Officer as Business Coach
Facilitate transactions	Monitor & Monetize agents

... beyond banking product

dinomarket.com
Payment through agent

bukalapak
Payment through agent

traveloka
Bus ticket reservation

asdp *indonesia ferry*
Ferry ticket reservation

26.3 Thousand saving referrals (↑ **32.5% YoY**)

83.2 Thousand loan referrals (↑ **275% YoY**)

IDR 15.1 T CASA (↑ **60% YoY**)

2,370 Financial Inclusion Acquisition (+1,117 from Mar '21)

BRI Smart Billing:
Smart System for SMEs Multi-Ecosystem Billing Management

BRISmart BILLING

An easy, cheap and fast billing service system

Billers

INVOICE
Simply upload all invoices

Reporting & Administration

Billing Management

User Management

Billing Management

Mobile Application

BRISmart BILLING

Customers

All of bills in one apps

Payment & Administration

Reporting & Notification
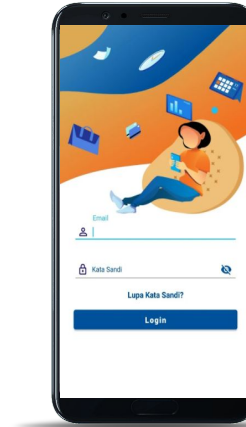
What is BRI Smart Billing?

An effective & practical **integrated billing management** application that makes it easier for MSMEs to **manage their bills and receivables more easily, cheaply and quickly.**

What are the Benefits?

Automatic Confirmation

Flexible Payment Method

Financial reconciliation in real-time basis

Billing Notification

Pioneering Indonesia Open Banking API, Establishing Ecosystems

Execute Digital Partnership with Precision & Speed (OpenAPI)

*API which stands for 'Application Programming Interface' connects business processes, services, content, and data to channel partners, internal teams, and independent developers in an easy and secure way. **#1 in ASEAN with PADSS (Payment Application Data Security Standard) certified***

Transportation Ecosystem

Healthcare Ecosystem

Agri Ecosystem

Fintech & E-Commerce

- Balance Inquiry
- Account Statement
- Money Transfer

Direct Debit BRI

E-Pay BRI

BritAma Valas — Foreign currency Information and Transaction

BRIVA BRI Virtual Account — BRI Virtual Account

Information of BRI Branches Location

Information of BRI E-channel Location

BRI Credit Card

KKB BRI Solusi Kendara Keluarga — BRI Consumer Loan

KUR BRI — BRI Micro and Retail KUR

Oil & Gas Ecosystem, Education Ecosystem, etc

Top BRIAPI's Features

1. BRIVA
2. Inquiry Balance
3. Transfer
4. BRIZZI
5. Direct Debit

*…Digital Partnership Model to connect with Fintech and create digital ecosystem. As of 15th May 2022, **more than 530 partners** have been using **BRIAPI** with 151 M transactions and Rp150 T sales volume…*

PA-DSS

ISO 27001:2013

Sales Volume Rp150 T (↑ 328% YoY)

Transaction Volume 151 M (↑ 178% YoY)

Technology Areas of Focus

Artificial Intelligence & Machine Learning
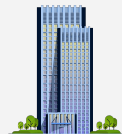
Extending Open Banking With BRI Group & Beyond

Digital Design, Total & Immersive Experience

Supported by

Cloud Infrastructure
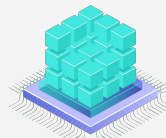
Blockchain Technology

Immersive Collaborations
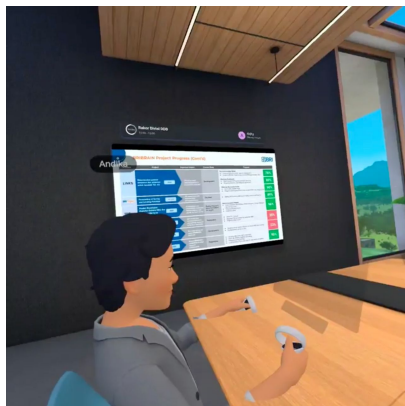
Branding Awareness: Virtual Concert, Podcast
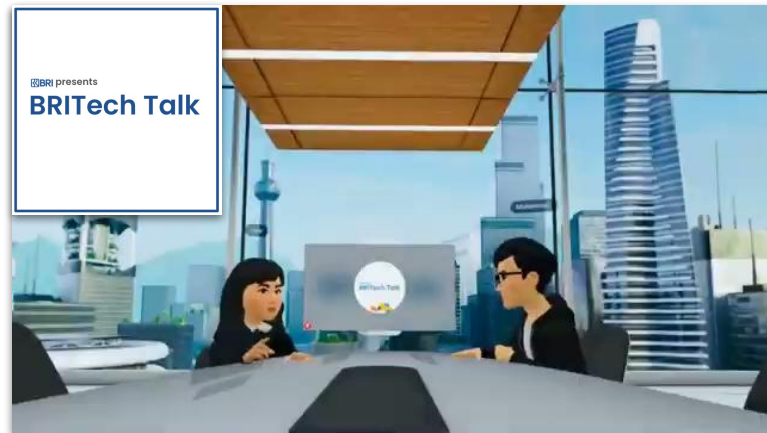
03

BRIBRAIN: Towards AI Banking of The Future

BRIBRAIN:
Solving The Most Complex Banking Problems With Big Data & AI

BRI

"The Most Valuable Banking Group In Southeast Asia & Champion of Financial Inclusion"

Speed and innovation | Personalization | Omnichannel Experience | Profitability

Business Layers

BRIBRAIN

Front Office
- Branch
- Customer analytics
- Call center
- Customer care
- Customer marketing
- Digital

Mid Office
- Retail & commercial banking
- Transaction banking & exchanges
- Wealth & private banking
- Cards & Investment, etc.
- Collection & Recovery
- Payment & Processing
- Collateral Management

Back Office
- Reg. Reporting
- Compliance Reporting
- Service Optimization
- Fraud Prevention
- Risk
- IT/Data
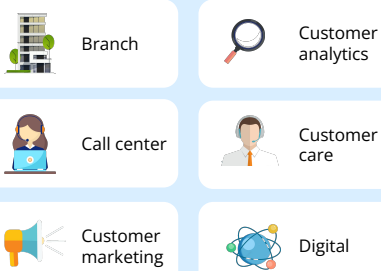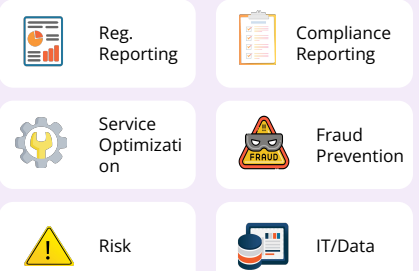
Main Capabilities

Customer Engagement | **Credit Underwriting** | **Fraud & Risk Analytics** | **Smart Services and Operations**

Technology

- **Machine Learning**
- **Natural Language Processing**
- **Computer Vision**
- **Explainable AI**
- **Knowledge Graph**
- **Location Intelligence**

25

Data

Approve → **Get Limit**

User → **Loan application** → **Scoring**
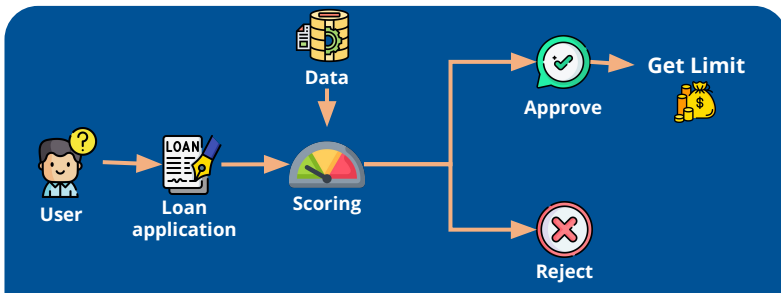
Reject

The system outputs the score for approve or reject within range of 0 – 100

0 ————————————————— 100
High Risk (Bad User)   **Low Risk (Good User)**
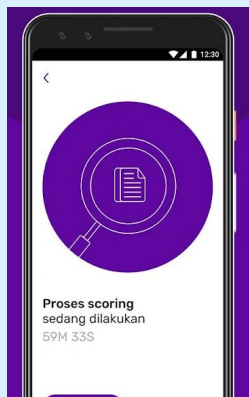
Process Scoring   **Get Limit**

ceria

Digital lending application for transaction financing through e-commerce or online travel sites user will get a chance of getting up to Rp 20 million facility within 30 minutes.

Business Problem and Objective

Problem

Accept user for loan without any credit scoring

Possibility of increasing Non-Performing Loan (NPL)

Objective

Make predictions to divide users into good and bad in loan applications to reduce the occurrence of NPL

Expected Business Impact

After CERIA users get a limit, only **83%** of users make transactions in the first 30 days after getting the limit.

After the first 30 days, the probability of a user transacting is very small.

95% approval rate or above for digital lending applications

Customer Due Diligence (CDD)

Identification | Verification | Monitoring

RRI
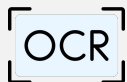
OCR
To extract key parts of data from the ID document in order to compare to the ID's barcode or MRZ (passports)

Fraud Detection
To ensure that the ID document and the selfie are genuine, contain the correct security features (e.g., watermarks, microprint) and have not been manipulated

Liveness Detection
To prevent spoofing and presentation attacks when a fraudster uses a photo or video (deepfake) instead of a genuine selfie

AML Screening
To check the user against regional watchlists, politically exposed persons (PEPs), sanctions and adverse media in order to limit money laundering schemes

Face Matching
To compare the image on the ID document to the selfie which ensures that the person presenting the ID is the same as the ID owner
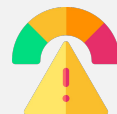
Risk Engines
To better assess the risk profile of would-be customers using a variety of fraud signals to corroborate the digital identities of your users.

BRIBRAIN: Customer Engagement
BRILINK Agent Recommendation

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Definition & Daily Activity

PAB **BRILink Agent**

BRILink Agent

- ✓ Branchless banking
- ✓ Serves banking transactions & PPOB
- ✓ EDC & BRILink Mobile as a devices

Pembina Agen BRILink (PAB)

- ✓ Acquire new potential agent
- ✓ Manage agent to reach BEP, Jawara, Juragan
- ✓ Educate EDC & BRILink mobile features

Business Process Existing

1 PAB mencari nasabah potensial untuk dijadikan agen brilink

2 Beberapa calon agen dipilih secara random oleh atau berdasarkan intuisi PAB

3 Agen yang diakuisisi banyak tidak perform (<20%) pada tahun pertama

4 Target produktivitas (bep, jawara juragan, dan fbi) susah tercapai

Current Problem

Directionless marketing activity

Lack of knowledge of potential agents

Hard to reach target

50% ~50% inactive agents (0 transaction)

Only 2% agent reach Juragan after acquired

No visibility of marketing activities

BRIBrain **Roles** Towards BRILink Agent Lifecycle

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Ada sekitar **29.235** agen berpotensi untuk dinaikkan kelas dari pemula menjadi jawara dan dari jawara menjadi juara dalam **enam bulan** ke depan

Upgrade
Rule-Based

Ada sekitar **208.441 tid** yang dapat dikunjungi oleh PAB sehingga transaksinya dapat kembali aktif dan menjadi **BEP**

Terdapat potensi nasabah existing sebanyak **229.449** untuk diakuisisi oleh PAB menjadi agen BRILink baru dengan asumsi 50% agen baru tsb akan perform/ mencapai BEP

Acquisition
Machine Learning

Activation
Rule-Based

AgenBRILink
Layanan Transaksi Keuangan Tanpa Kantor

BRIBRAIN

Informasi Detail

N NURHAYATI
NHR4047

Status Kunjungan   Belum
Aktivitas   Akuisisi

Score
0   20   40   60   80   100
90

Sangat Direkomendasikan

Keterangan
Nasabah ini direkomendasikan untuk diakuisisi menjadi agen BRILink karena memiliki berada di lokasi padat penduduk dan portofolio nasabah yang bersangkutan bagus.

Terakhir Kunjungan   12 Desember 2021

Informasi Personal
No. Telepon

as a features

Location Scoring

Location scoring sebagai pelengkap rekomendasi akuisisi, aktivasi, dan upgrade dengan mempertimbangkan data Geospatial (kepadatan penduduk dan potensi wilayah)

BRILink Agent Recommendation
How does it work?

Data Source

- Profile
- Saving Portfolio
- Loan Portfolio
- Transaction History
- Agent Location
- Potential Location

Stored in BRI Big Data

Customer

BRILink Agent

Data Analytics

BRI Big Data

Scoring Engine

Score Category

Score	
80-100	🙂
60-79	
40-59	
20-39	
0-19	🙁

Recommendation

Recommended **potential acquisition** of BRILink agents

Existing agent **recommendation for Terminal Activation**

Agent **recommendation** with potentials **to upgrade**

Follow-up recommendation to PAB

Evaluation

Recommendation → Follow Up → Realization → Performance

This evaluation will actually be able to measure the performance of marketers more precisely

PAB Report Performance

BRILink Agent Recommendation
Identify Potential Agent from Various Features

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Grouped into four categories, BRIBrain creates a recommendation engine to get potential agents.

Lending

Lending Payment Amount

Lending Outstanding

Saving Credit Amount

Saving Debit Amount

Credit Frequency

Saving

Location

Number of BRI Branch & ATM nearby

Point of Interest
(traditional market, harbor, etc.)

Density
(divided into urban, suburban, and rural areas)

Business Sector
(grocery store, counter, etc.)

Customer Age

Demography

BRI BRAIN

BRILink Agent Recommendation
CRISP-DM Model Development Stage

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Data

Business Understanding	The main business goal is to provide PABs list of potential customers who are suitable to be acquired as new BRILink agents.
Data Understanding	Customers' demographic, portfolio, transactional, and geospatial data are utilized to analyze highly potential customers.
Data Preparation	Data preparation is performed to improve the data data quality and to ensure the data is ready to be used for training.
Modelling	The ML model is developed by using LightGBM, that utilizes Gradient Based One-Side Sampling (GOSS) and Exclusive Feature Bundling (EFB).
Evaluation	The developed ML models are evaluated using precision, recall, and AUC (Area Under the ROC Curve) metric.
Deployment	The developed ML model is deployed in a web mobile application. The development of this web mobile application is described in the subsequent section.

Source: http://cs.unibo.it/~danilo.montesi/CBD/Beatriz/10.1.1.198.5133.pdf

Modelling with Light Gradient Boosting Machine (LGBM)
Combination of XGBOOST with GOSS and EFB

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Why LightGBM ?

LGBM will help process **10-20x faster** because it reduces the amount of data and bundle sparse features

Highly Time Efficient
Gradient Boosting Machine with same accuracy as conventional GBDT

Reduce Data Size
LightGBM reduce data size using GOSS and reduce features size using EFB

GOSS
Training Sample Selection

eg. Eliminate samples with very small transactions and deposits

EFB
Sparse Feature Bundling

eg. result feature of One Hot Encoding
As features
PEK_WIRASWASTA, PEK_PNS, etc. are combined into 1 again during calculation

LightGBM Diagram Process

Tree Based
Using "tree" representing the base model / function

Ensemble
Combination of multiple "weak" ML models that can generate "strong" prediction

Histogram Data
Determine split with histogram-based solution to reduce computing cost without losing too much accuracy

Gradient Boosting
Minimize errors / residuals of ensemble models through gradient-based training

additional algorithm

Gradient-based One-side Sampling (GOSS)
Reduce data size by sampling based on pseudo-residuals (select top instance then performs random sampling on the instances with small gradients)

Exclusive Feature Bundling (EFB)
Bundle sparse features togethers to reduce number of features

lighten the burden of calculating GBDT so that the time is shorter

Source: Ke, G., Meng, Q., Finley, T., Wang, T., Chen, W., Ma, W., … Liu, T.-Y. (2017). Lightgbm: A highly efficient gradient boosting decision tree. *Advances in Neural Information Processing Systems, 30*, 3146–3154.

BRILink Agent Recommendation
Putting AI Prediction into User Interaction

Every AI recommendation provided by BRIBrain has been visually adjusted according to user needs and Usability Testing has been carried out

1

2

3

Potential agent location suggestions presented by maps

AI explainability makes it easier for users to understand the AI model created

the results of visits to agents can be used as input which will become a new feature in the next model
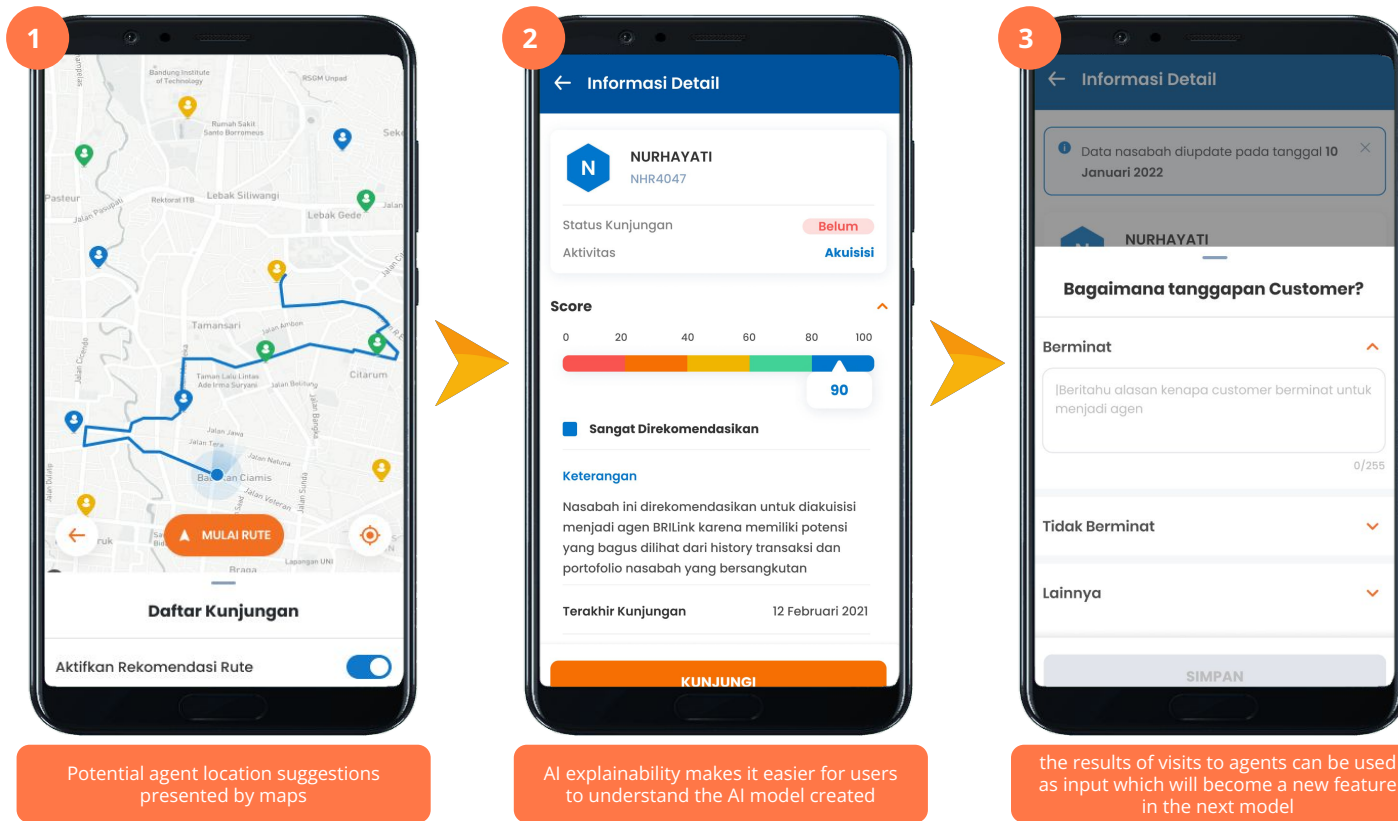
BRILink Agent Recommendation
User Validation through Piloting by Petugas AgenBRILink (PAB)
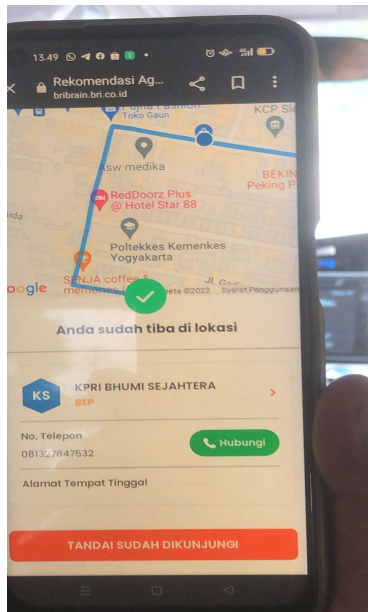

Bandung

Denpasar

Jakarta 3

Result

- Avg. success rate of acquisition: **80-90%**
- Geolocation Accuracy**: 0 - 100 meters**

BRIBRAIN Academy
Nurturing Best Big Data & AI Talent in Finance

BRI

Business Services

Credit Underwriting
Optimize the credit underwriting mechanism since the credit review until credit evaluation

Customer Engagement
Improve the assessment for the merchant and wholesale agents from acquisition to churn prevention

Smart Services & Operations
Establish smart services & operations for supporting customer needs

Fraud & Risk Analytics
Optimize fraud detection and analyze risk across transactions and channels

BRIBRAIN
A C A D E M Y
Center of Excellence

Advanced Research & Development

Explainable AI
Explain the interpretability of the decisions resulted from AI
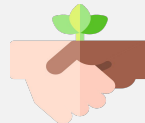
Bias & Fairness
Eliminate the bias & enhance the fairness of data

Graph ML
Developing ML based on Graph representation

- ☐ **BRIBRAIN Academy is a collaborative research and training initiative that aims to excel BRI Artificial Intelligence (AI) capabilities**
- ☐ **BRIBRAIN Academy Outputs:**
  - ■ **Academic Publications**
  - ■ **Innovative Solutions**
  - ■ **AI Specialist**

From Mobile First to AI First
Towards Human-Centered AI Banking of The Future

BRI

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AI FIRST - 2021
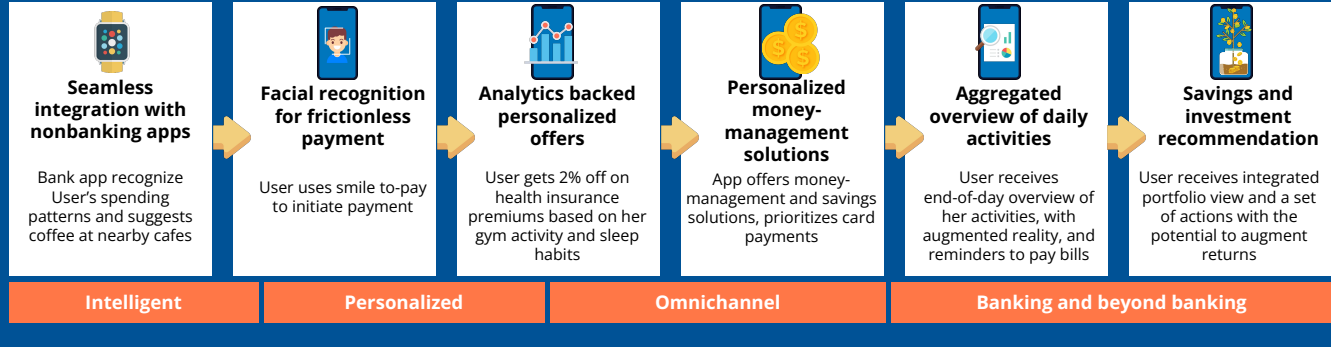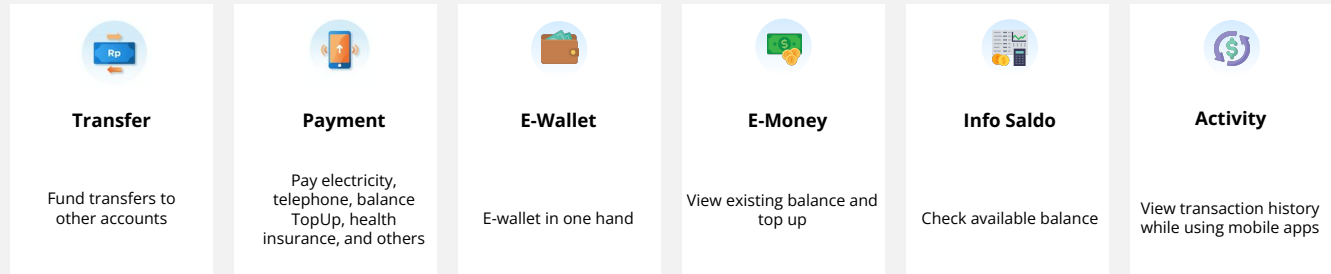Reimagined customer engagement through intelligent products, services, and operations.

Mobile First - 2017
Accelerates business and customer engagement through mobile experiences

How AI transforms banking apps for an individual customer

Seamless integration with nonbanking apps

Bank app recognize User's spending patterns and suggests coffee at nearby cafes

Facial recognition for frictionless payment

User uses smile to-pay to initiate payment

Analytics backed personalized offers

User gets 2% off on health insurance premiums based on her gym activity and sleep habits

Personalized money-management solutions

App offers money-management and savings solutions, prioritizes card payments

Aggregated overview of daily activities

User receives end-of-day overview of her activities, with augmented reality, and reminders to pay bills

Savings and investment recommendation

User receives integrated portfolio view and a set of actions with the potential to augment returns

Intelligent	Personalized	Omnichannel	Banking and beyond banking

Common banking apps journey for an individual customer

Transfer

Fund transfers to other accounts

Payment

Pay electricity, telephone, balance TopUp, health insurance, and others

E-Wallet

E-wallet in one hand

E-Money

View existing balance and top up

Info Saldo

Check available balance

Activity

View transaction history while using mobile apps

Thank you.

Appendix.