

## RESEARCH ARTICLE

# Innovation Framework for Financial Excellence: Banks, FinTech and the Regulators

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## Abstract

Financial innovations like peer-to-peer payment and digital currency, mostly introduced by FinTech companies, are perceived as disruptions to Financial Institutions (FIs). For banks, transformation to digital banking helps initially but quickly intensifies the challenge to change with speed and scale given the diversity of such disruptions. Who are banks competing with? What will banking be competing on? Interesting questions like these, which were not even relevant a decade ago, are pushing banks to innovate about the products, services, branches, and operations, if not the very core model of banking. For example, applying pay cuts into the profit margin but emerging innovation of Blockchain raises the questions of whether banks should accept Bitcoin or re-invent the trade finance service.

Consumers do seem to benefit initially as competition encourages banks to lower the service fees and design new products in the quest of enhancing customer experience. Nevertheless, all comes with a price, for instance digital frontier becomes a fertile ground for fraud and Regulators may jump in at calculated moment. This helps to level the competition or curtail intrusion into the space of customer privacy. Reluctantly, however, regulators, FinTech companies and banks now enter the impossible trinity, or what economists call the trilemma, which is the core issue our research focuses on.

This paper develops an empirical framework for banks to embrace disruptive innovation from FinTech start-ups and associated legal or regulatory changes and to create competitive advantage through strategic use of enterprise data that are originated in the bank or acquired by the bank. Lab works in multiple North American banks have been first anonymized to protect the interest of all engaged parties and then harmonized to mature the empirical models based on first-hand evidence in three directions: Customer Experience Enhancement,

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Digital Product Design and Fraud Management. Foundation of the framework, however, builds on research works in digital banking, social engineering, data science, decision modeling, fraud detection algorithms, digital currency, and regulations adaptive to societal transformations enabled by application of artificial intelligence and Internet of Things. Rather than locking in rigid industry trend, often heavily depend on hence limited by technology, the framework focuses on translating theory or strategy into product and actionable steps that have direct and measurable impact. Data is the key enabler. Data monetization is a good example. Results from Banking Labs work are the proof, and the value will be even more pronounced as expected results come by to validate and optimize the framework and its implementation.

**Key Words:** *Innovation; Big data; Blockchain; Compliance and regulations; FinTech; Financial institutions; Customer experience enhancement; Digital product design; Online fraud detection*

## 1. Background

What will banks become in the next decades? Well, probably banks may be in a very different shape of form. For instance, banks may get into the business of making money with data, and in direct competition with virtual reality gaming vendors. Banks may also become “branch-less” and transform branch outlets into customer engagement portals. This may sound far stretched for some, especially those who are accustomed to viewing from the perspective of traditional banking as primarily a vendor of financial services, like deposit, credit, investment, and trade finance. But we cannot attribute to any industry the innocence it does have. Digitalization transforms banks into technologically savvy service providers. Robotics and AI augmented branches or channels are just around the corner, probably much closer than we expect.

Thinking of phones, how we use phones today. What if you told your friends, for example, in 1999, that much of the banking happens on mobile devices in a little more than a decade? Your friends may look at you with genuine disbelief. Well, here we are in 2017, which bank does not offer a Smart Phone App? It started as disruptive technological innovations, and then it catches the imagination of sufficiently large percentage of consumers. What’s relevant is that how customers use phones has been changing not only the very fabric of telecommunication but also how customers live, work, study, and of course, do banking. Talking about small phones, a big question has been unwillingly forgotten but deserves a well-informed answer. Where is Nokia now in the telecommunication landscape? It failed to change or change quickly enough to be relevant, and slip-slopped from the top to become a case of failure in MBA course books.

Questions deserving attention are: Why did Nokia fail to embrace the changes? And is this a failure or an exception? In other words, is the telecommunication industry an exception? Much akin to phantom pain in the medicine science, this comes from a body, part that is no longer available. Sadly, the failure of Nokia is not an isolated case according to our research, but one is hard to pin down without leveraging theoretical and mathematical models, or even philosophical concepts and instruments. The danger of not learning the lesson is to repeat the failure. The underlying pattern is repeating itself and has been seeding the decline if not demise of many giants, manifested by many top performers in various industries again and again, one after another. More importantly, however, learning the lesson is not sufficient, nor

is willingness to change itself. Focusing on the new trinity of banks, FinTech and the regulators, this paper develops an enablement framework to work with the innovations and changes, not only to prevent failures but to succeed harnessing the power of data.

## 2. Research

Oftentimes, taking banking for instance, if the disruption from FinTech is not sufficiently respected by taking effective steps to change accordingly, then neither seeing the changes nor willing to change will prevent catastrophic failures. Bank of England Governor, Mark Carney [1], a Canadian economist who began his career at Goldman Sachs then served as the Governor of the Bank of Canada from 2008 until 2013 before moving on to England, has openly praised the promise of FinTech, but emphasized that “The challenge for policymakers is to ensure that FinTech develops in a way that maximizes the opportunities and minimizes the risks for society”. As of July 2023, publicly traded Fintechs represented a market capitalization of \$550 billion [2], a two-times increase versus 2019. The questions then become, what, why, and how. The framework in this paper goes deep into answering such questions, and then develops empirical models to strategize and implement the changes.

Our research starts by taking a comprehensive study of “The Nokia Phenomenon”, for lack of a better term, across industries from North America to Europe, and then to Japan, China and India, and concludes that fundamentally such failures start from a flaw in seeing, appreciating and embracing changes, and changing accordingly. The trajectory of changing has a life of its own, and the lifecycle can be modeled. Succeeding within the new trinity defined in this paper depends on strategic execution of the enablement framework, which has been and will continue to be validating and refining with our labs work. The enablement framework is delivered as a suite of products that can be deployed on top of the enterprise data platform, for example, the Enterprise Data Lake, or comparable operational data hubs. Quoting the terminology of agile delivery methodology, the labs work delivers the minimal viable products, or MVP, which can go scale up to substantial size in large programs.

Research has also included review of existing and anticipated – and of which the implications to banks – legislation, regulation, and compliance programs in multiple jurisdictions. Bank-fintech partnerships come under closer scrutiny from US bank regulators [3]. Again, all the findings are related back to how banks can successfully strategize and embrace changes through data. Review goes beyond the financial industry to data science, decision heuristics, behavior modeling, theory and practice of social engineering.

## 3. The Framework

Driven by research questions, the framework presents the empirical model as a manual for change, borrowing the connotation of ancient text, titled the Book of Change. The scope, however, is the trinity of the regulator, banks and FinTech companies. Serving the customer is the single point of focus enabled by strategic use of data. The framework targets FinTech innovation in selected directions, for instance, customer experience, and product design and fraud detection. However, the framework will evolve to be a brain-alike engine to tap into the potential of AI-augmented new banking model, where exponential amount of data can accumulate in applications of futuristic Internet of Things technologies. Data feeds into the framework, for example from the customer stream perspective, to model the persona. Persona

modeling is inevitably data science and mathematical modeling, not a simple exercise of spreadsheet charting or divide and conquer from marketing perspective. The prerequisite are datasets, sufficiently large and trustworthy, timely and readily available.

To illustrate the intricate dependency within the trinity, let's extend—hopefully without overly stretching—the analogy, this “brain” cannot function without a “body” to host the data, and of which, the below mentioned business layer of an enterprise data lake, or comparable data platform can be perceived as the “heart”. Metaphorically, people refer data as blood, with good reasons. All data go through the “heart”, which regulates the circulation and usage of the data. Now, which organ corresponds to the regulator? Good question, but this paper will not go as far as drawing direct comparisons, and all analogies borrowed from medical science or social engineering are to illustrate the points.

Taking one point for example, the framework enables the decision makers to see through The Eye of Data. So why is this important? According to evolutionary research, the puzzling “Cambrian Explosion” [4] occurred about 540 million years ago. It is also called the “Big Bang” of evolution because with the addition of an eye, however small or minimally functional, the number of animal species exploded exponentially within 10 million years. Please note that 10 million years are relatively a short period in the evolution history amounts to billions of years. While it is still debatable what caused the rapid increase of animal species, this paper relates to how to embrace changes.

The capacity to see is critical, especially through data. This is just one of the aspects of the framework. Quantitatively seeing the reality of constant changes with simplicity is one of the key enablers to embrace changes for growth on one hand, and to mitigate risks on the other. Relating to the trinity defined in this paper, seeing and appreciating the FinTech innovations and changes of regulations are critical first steps towards success, and designing new digital products and detecting online fraud are good examples.

Enabling the banks to see is nothing but a starting point of the framework. However, rather than losing the decision makers in theoretical details, the framework develops simplification and executable products out of complicated and mathematically challenging data science, data models, and algorithms and technologies. At the top level, the enablement framework consists of five categories of components and can be assembled into a 5-Step process. The starting point is Machine Learning Ops (MLOps), the foundation building block for FinTech-RegTech-BigTech Banks collaboration. For each use case, the framework uses nine questions that sit within an empirical model, referred to as the 9-Questions Model, to drive the assembly of components to form a coherent and cohesive process. Full details will be explored in the actual presentation forth, but the five categories can be summarized as seeing, modeling, building, using, and enabling.

#### **4. Labs Work**

It would be hard to imagine the chaotic banking situation, according to Andrew Beattie [5], in that time, the average life for an American bank was five years, after which most bank notes from the defaulted banks became worthless. In fact, Smith's ideas did not benefit the American banking industry at least not in the beginning till the emergence deposit insurance came to the rescue, which triggered financial innovation in like treasury securities, and with which to

create a liquid market. Risk management came to play, and derivatives eventually entered the banking, Monopoly happened, and panics recurred.

Labs work is implemented in multiple banks but focused on three directions: Customer Experience Enhancement, Digital Product Design and Fraud Management. Detecting fraud is limited to digital channels, primarily online and mobile, but connecting data points collected from other branches, call centers and other customer interaction portals. This has been conducted in partnering North American banks. Technological start-ups in financial service have been partnering with a multinational bank to design digital products. Preliminary results are presented from lab works in the respective partnership in the subject of alternative trade finance. Customer experience enhancement is a large scale undertake in collaboration amongst consulting companies, banks and FinTech product vendors. While each lab focuses on one subject, multiple reference points are examined to validate the other research, which develops the cohesive enablement framework.

Labs work validates the theoretical model of the framework and develops the constituent components as enablement products. Some of the products are configured to embrace a category of FinTech innovations, for instance, mathematical models for fraud detection and image recognition of customer signature. The framework, however, focuses on strategic use of data enabled by technology and innovations. The foundation part of the framework builds on top of a data platform, for instance, an Enterprise Data Lake or equivalent. The focus, however, is not on the technological construction of the data platform, but the data it hosts and curates. In another word, the lab work is not about building up the data platform but drive value out of the data. In another word, the data platform is a pre-requisite for strategic use of the data. The business layer rather than the technology layer is the basis of the enablement, for example, visibility into the data, trust in the data and insight out of the data are the key determinants of driving value with the enablement framework. Towards the strategic use of data, substantial research has been done couple with lab works to recommend on the architecture and design, the process and policy, the governance and operation, the sustainment and scaling of the business layer on top of the technological data platform.

The lab works continue to develop the enablement framework with focuses on selected direction or targeted FinTech innovation or regulatory changes. Once again, the lab works are implementation of the empirical framework based on theoretical model. Each implementation is one instance. Collectively, the framework is developed to enable banks to embrace innovation and changes through data. Failure patterns and success criteria are examined with lessons learned from the industry and evidence collected in the labs. Deliverables, mostly in the form of products, may be commercialized in a comparable fashion of FinTech products but for a complementary purpose. The designs of the selected products can be filed for patents. Intellection Property is open to negotiations between researchers and partnering banks and FinTech companies.

## 5. Results, Discussions, and Future Work

Results from research and lab works are discussed individually first within the focused direction, for instance, digital product design or pertaining subject, for instance, building the single of truth through data. The discussion then elevates to connect the key enabling points across subjects and across streams of works. Thinking of the framework as frames of a house, the framework itself is not the house. Given a use case, for instance, if enhancing customer

experience is for the business purpose, a house can be built up purposely to serve the customer. What matters is, not only the windows, roof, furniture, heating system and so on, but the infrastructure underneath the house and facilities that connect the house to the surrounding communities.

The discussion may touch relevant points of all the above, but will focus on the framework, and constituent components. Components are not just building blocks, but integrated processes with which the components function together. Most importantly, the discussion will examine with evidence from lab works on how to connect disparate data points to derive insights, and in turn to make informed decisions. Cases of success and failure, or positive and negative cases, straight through and alternative paths, will be in the scope for discussion. Discussions analyze the theoretical underpinning as well as strategic use of data to enable banks to embrace financial innovation and changes from regulators.

Results have validated the 9-Question Empirical Model and the 5-Step Process. The categorized building blocks from the lab works, or minimal viable products of the framework, are presented by breaking down the design and development, and with data feeding into the components, fluctuation of customer journey, product design and fraud patterns are analyzed to measure and predict the success of failure simulating how banks embrace targeted FinTech innovations in the corresponding direction or subject. Predictive models are provided to embrace the impact of existing and upcoming changes in legislation, regulations and compliance. For example, with newly enacted digital signature rules to onboard customers without face-to-face identification verification, the KYC process will be revamped with innovative image recognition and document processes FinTech implementations. What will subject the customer for privacy invasion? What weakens the process for potential fraud? What data points will be collected for the fraud detection? These are good questions but must be answers on a case-by-case basis.

Expected results come in by the day, and the future works of the research will focus more broadly on artificial intelligence augmented products and services by embracing innovations and changes in a large scale. Lab works may patent some critical designs and commercialize key products of the enablement framework for interested banks in large programs, for instance, embracing digital currency and partnering with international online trading platforms.

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