UNDERSTANDING THE FACTORS OF FINANCIAL INNOVATION IN INDUSTRIAL REVOLUTION 4.0 ERA

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ABSTRACT

Financial innovation is a way of creating new financial products, services or processes effectively and efficiently. This study aims to examine the factors of financial innovation termed as the antecedents and consequences of implementing financial innovation at both micro and macroeconomic levels and to assist future researchers in determining research topics related to financial innovation. This research applies a Systematic Literature Review (SLR) method using 58 relevant articles from the Scopus database, which were examined and became the study results. This study discovers 14 antecedents and 53 consequences to financial innovation since the development of the Industrial Revolution 4.0 era. Even though there are still limitations within this article, this research does provide recommendations for future studies related to financial innovation in the Society 5.0 era.

Keywords : Financial Innovation; Antecedent; Consequent

ABSTRAK

Inovasi keuangan adalah proses menciptakan produk, layanan, atau proses keuangan baru yang efektif dan efisien. Tujuan dari studi ini adalah untuk meneliti lebih jauh tentang factor-faktor dari financial innovation yang diistilahkan lain dengan apa saja anteseden dan konsekuen dari penerapan inovasi finansial dalam tingkat mikro maupun makroekonomi serta membantu para peneliti terkait financial innovation dalam menentukan topik penelitian kedepan. Metode penelitian ini menggunakan Systematic Literature Review (SLR) menggunakan literatur dari database Scopus sebanyak 58 artikel relevan yang diteliti dan menjadi hasil penelitian. Penelitian ini menemukan adanya 14 anteseden dan 53 konsekuen pada financial innovation sejak mulai berkembangnya era revolusi industry 4.0 ini. Walaupun artikel ini masih memiliki keterbatasan, namun penelitian ini memberikan rekomendasi riset sejenis kedepan yaitu adanya penelitian terkait financial innovation di era society 5.0.

Kata Kunci : Inovasi Keuangan; Anteseden; Konsekuen

INTRODUCTION

The Industrial Revolution 4.0 era was echoed in 2011. This era was once known as "Industrie 4.0" in Germany. This term was then extended to "Smart Manufacturing," "Industry 4.0," "Smart Industry," "Smart Factory," and so forth in many other countries (Cazeri et al, 2022). The World Economic Forum (WEF) explained that technology, which was the focus of the development of the 4.0 era in 2016, played an important role in the revolution (Ivaldi et al, 2022). The Industry 4.0 era is commonly described as the industrial Internet network system and physical network usage, which is on par with the industrial Internet introduced by General Electric in North America (Cazeri et al, 2021).

One of the industries influenced by the 4.0 era is the financial industry, referred to as financial innovation. Financial innovation is quite typical compared to innovations in other sectors. Unlike manufacturing, pharmaceutical, or other industries, financial innovation does not rely upon specific patents and fee structures (Bernier & Plouffe, 2019). Financial Technology (FinTech), a financial innovation which adopts technology, refers to an innovation with the technology implementation into financial services which results in new business models, financial applications, processes or products related to the financial markets, financial institutions and financial services (Vučinić, 2020). Financial innovation comprises the Internet and mobile banking, mobile platforms and applications (PayPal and Chime), online payment systems, virtual currencies, online loans, etc.

The available strategic financial resources, technology, human resources and regulation prevalently facilitate financial innovation development and adoption (Nejad, 2022). The development of payment infrastructure improves bank performance by generating more fees and revenues. Financial innovation reduces the transaction costs and time for both companies and customers, increases the quality of financial activities and improves relationships, customer loyalty, customer preferences and employee performance (Nejad, 2022). Furthermore, it also creates opportunities for companies and expands markets by attracting new customers or providing new services which meet the existing customers' needs.

Financial innovation also refers to a field which grows substantially and requires high supervision and constantly improved regulation (Bernier & Plouffe, 2019). The government's boost to financial institutions and investment in financial innovation and infrastructure is essential in improving financial innovation in developing countries (Nejad, 2022). The availability of adequate infrastructures causes developing countries to benefit greatly from technological innovations, improving financial services to isolated areas. The legislature's (lawmaker) intervention is crucial in ensuring the laws as the fundamentals of financial innovation practices (McCarthy, 2022).

Good regulation will produce good financial innovation benefits as well. Salisu & Obiora (2021) says that financial innovation provides a tough investment option that can reduce the risk of investing in crude oil (Salisu & Obiora, 2021). Mustapha (2018) also added that the development of the financial sector has become the main driver of growth in all economies, especially in developing countries. However, Bara & Mudzingiri (2016) research reveals that the role of financial innovation in economic growth in developing countries has not been actively implemented and driven. Bara & Mudzingiri (2016) also added that it is very important to create a policy or regulation that specifically regulates economic growth so that it is in line with the implementation of financial innovation.

Research conducted by Qamruzzaman & Wei (2018) revealed that there is a two-way or an antecedent causality and consequences for implementing financial innovations in both the short and long term. Due to the existence of strong antecedent and consequent relationships in the implementation of financial innovation, effective policy guidelines are needed so that the contribution of financial innovation can encourage the development of financial sector life more optimally (Qamruzzaman & Wei, 2018). The purpose of presenting this paper is to examine further the factors of financial innovation which are termed differently with what are the antecedents and consequences of implementing financial innovation at the micro and macroeconomic levels and to assist researchers related to financial innovation in determining future research topics. So that this research will obtain answers to two problem formulations, namely first, what are the antecedents of financial innovation? and second, what are the consequences of financial innovation?

LITERATURE REVIEW AND FOCUS OF STUDY

Industrial transformation from traditional to modern is currently growing rapidly. Currently, the world is in the fourth industrial revolution. Starting with the invention of the steam engine in the first revolution, continued with the discovery of electricity and the emergence of mass production in the second revolution. Then proceeded with the discovery of digitalization programs and concepts which then integrated technology and information on all lines with the industrial digitization process in the fourth industrial revolution (Machkour & Abriane, 2020).

Digital transformation and financial innovation impact various sectors. Ivaldi, et al (2022) stated that there is a relationship between bureaucracy, productivity levels, and environmental sustainability. In addition, on the organizational side, the emergence of digital technology can reduce the demand for work because various jobs can be done automatically by technology. This will make the company evaluate the organizational structure to be flexible and adapted to the needs of the digital technology era. The application of industrial digitization and financial innovation also requires adaptation of employee education so that they can carry out their duties properly. In addition, with the existence of technology, companies can integrate all of their business processes with this digital transformation (Martinčević et al, 2022). In banking, the impact of the internet is very influential starting from reduced operational costs, accelerated service time, faster managerial information, smoother communication within the organization and more comfortable interactions with prospective customers and service providers as well as better access to knowledge about financial services (Lee & Shin, 2018). On the investment side of mutual funds, financial innovation can increase investment diversification and improve investment performance of mutual funds (Azimova, 2021).

One of the impacts of the industrial fourth revolution is the emergence of financial digitalization bringing about new transformations in the financial industry (Lee and Shin, 2018). Financial Innovation (FI) is a process of developing, introducing, implementing innovations in products, business methods to technology to support the financial function (Nejad, 2022). The main goal is to increase efficiency and effectiveness by improving service quality, reducing costs and improving the quality of financial services by creating a variety of easily accessible financial products (Machkour & Abriane, 2020).

Financial institutions must innovate to address market imperfections, regulations, taxes and operating costs. Thus, financial institutions can reduce costs and increase various investment options (Domeher et al, 2022). In addition, Qamruzzaman & Jianguo (2017) stated that there is a positive and significant influence between financial innovation and economic growth, because financial innovation can encourage the supply of money in the financial system which can then encourage economic growth.

Financial technology (Fintech) is a financial innovation product that creates new mechanisms in the financial system and has a sustainable competitive advantage. Its main objective is facilitating financial services so people can easily reach and access them (Martinčević et al, 2022). Fintech was highly suitable and appropriate during the Covid-19 pandemic. It reduces face-to-face interactions and costs; is accessible to all market segments and increases its growth over years (Fabris, 2022). Five Fintech components include: (1) fintech startups which include payments, lending, crowdfunding, capital markets and insurance, (2) technology developers which include big data analytics, cryptocurrency, and social media developers, (3) government which includes financial regulation and law-making institutions, (4) financial customers consisting of individuals and organizations, and (5) traditional financial institutions such as banks with traditional systems, insurance companies, venture capital and brokerage firms (Lee & Shin, 2018).

Savchuk et al (2021) stated that the use of technology in financial innovation made a major impact on the financial sector. Financial innovation offers new opportunities for economic and social improvement, as well as new changes for organizations and institutions. Furthermore, technological developments accompanied by developments in financial innovation have changed the way the financial system operates with the various financial services offered (Gasiorkiewicz et al, 2020). In addition, Qamruzzaman & Wei (2018) explained that there is a relationship between financial innovation and financial inclusion, namely accessibility, availability, and utilization of financial services. A well-developed financial sector potentially increases economic growth.

RESEARCH METHOD

Method is a method of work that can be used to obtain something. While the research method can be interpreted as a work procedure in the research process, both in searching for data or disclosing existing phenomena (Zulkarnaen, W., et al., 2020). This research used the Systematic Literature Review (SLR) method to focus on the Financial Innovation variable. This method is used to analyze the antecedents and consequences of the financial innovation variable in the current Industrial Revolution 4.0 era. This study used the Systematic Literature Review (SLR) based on the Preferred Reporting

Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, as depicted in Figure.1, which shows the data search path and decisions for the study results.

Systematic Literature Review (SLR) research uses articles from the Scopus database. First, type "financial innovation" as the keyword in the article search and it will show 2034 articles. Next, limitations are carried out in order to get relevant articles. Limitations are done by selecting the article's "year" from 2016 to 2023 and "all open access", then choosing the subject area, namely "Economics, Econometrics and Finance" and "Business, management, and accounting", with the document type, namely "article" in the language "English" and the publication stage is "final". From the results of the limitations, 164 articles were found. The next step is to download those 164 articles through Scopus, ScienceDirect, Google Scholar, Taylor and Francis Online, and the Copernicus International Index.

Screening and selection of 164 articles are then carried out in order to find appropriate articles which correspond with the research question. The initial screening was based on the relevance of the title and abstract related to all types of antecedents and consequences of financial innovation. The next screening process is by reading the articles to get results that are relevant to the research question. Articles deemed inappropriate will be excluded. This resulted in 58 articles that match the research question, which will undergo the data analysis process.

RESULT AND DISCUSSION

Based on the research questions, the results of this study are divided into two tables: Table.1 about the antecedents of financial innovation, and Table.2 about the consequences of financial innovation.

What are the antecedents of financial innovation?

Antecedents of financial innovation are the factors that influence the existence of financial innovation in an organization, especially the factors used in the Industrial Revolution 4.0 era. The results have been mapped in Table.1.

Based on the research results from the table.1, the authors explain that financial innovation in the era of the industrial revolution 4.0 is very closely related to technology with fintech as the core of its application. Widespread globalization demands even more massive development of fintech (Svetlana Saksonova & Kuzmina-Merlino, 2017), a high level of performance pressure demands that the financial world must increasingly adapt to financial innovation (Kok Lian, 2017), and the COVID pandemic -19 is increasing financial innovation in the form of cashless transactions to prevent the spread of the COVID-19 virus (Fabris, 2022). To gain a broad market share, traditional banks and insurance institutions are more focused on their core competitive services that lead to financial innovation (Vunjak et al., 2020). The birth of new discount basket certificates as an answer when market profits are sluggish or declining is a form of financial innovation that benefits investors (Bobrikova & Harcarikova, 2017).

The level of financial innovation also needs to be regulated because it can trigger economic movements and at the same time trigger economic instability (Lauretta, 2018). Regulation can have a positive or negative effect depending on how strong the strategy is and how clear and binding the policies created by the local government are (Kok Lian, 2017; Pompella & Costantino, 2021; Katusiime, 2021). For example, macroeconomic policy has a positive effect in the short term but has a negative effect in the long term (Bernier & Plouffe, 2019; Katusiime, 2021). Ethical strategies also need to be implemented in managing multilevel financial innovation so that the principle of mutual benefit between stakeholders is maintained (Arthur & Owen, 2019). Capital investment decisions to be used to accommodate financial innovation must also be considered based on the amount of foreign banking capital requirements (Smit, et al., 2016; Murshudli, 2022). Thus understanding the antecedents of financial innovation is important in making decisions and policies related to finance.

What are the consequences of financial innovation?

The purpose of this section is to find out what the impacts of financial innovation implemented in an organization used in the industrial revolution 4.0 era. This has been described in table.2.

The existence of financial innovation in the 4.0 era also had both bad and good impacts. Fintech is considered a game changer that disrupts and can shake up traditional financial markets (Krishna Priya & Anusha, 2019). Financial innovation coupled with artificial intelligence offers new operational opportunities and enormous benefits but is also a source of risks to the financial and economic system, financial stability, national security, and consumer welfare (Gasiorkiewicz et al, 2020; Bašić & Ćurić, 2021; Vučinić, 2020). Effective control of the demand for money must also be considered (Mlambo & Msosa, 2020), because financial innovation plays a very significant role in the demand for money and its stability (Adil et al, 2020). In addition, it is necessary to promote digital banking and financial inclusion so that all elements of society are more familiar with it (Shaikh et al, 2017; Jungo et al, 2022; Nguyen & Nguyen, 2020). Promotion through a regulatory dialectic approach is also a key component of a financial innovation strategy (Kok Lian, 2017).

Financial innovation contributes significantly to bank financial performance (Chipeta & Muthinja, 2018; Osuma et al, 2019), providing opportunities for small companies to develop financial services without bank assistance with a faster process (Saksonova & Kuzmina-Merlino, 2017), financial innovation also has an impact on managing liquidity in banking (Roy et al, 2019), bank performance has increased after adopting electronic payment technology (Mustapha, 2018), financial innovation has also increased capital formation (Bernier & Plouffe, 2019). Capital adequacy not only increases a bank's financial stability but also increases the bank's operational efficiency (Lotto, 2019). The use of certain types of financial innovations in bank operations must be based on the stages of the bank's life cycle (growth, stabilization, decline) (Kolodiziev et al., 2016).

Financial innovation also relates to a country's economic growth (Bara & Mudzingiri, 2016; Qamruzzaman & Jianguo, 2017; Bernier & Plouffe, 2019; Ting, et al, 2020; Qamruzzaman & Wei , 2018; Nazir, et al, 2021; Shapoval, 2021; Jungo et al, 2022; Domeher et al, 2022). Therefore, practical policy guidelines are needed so that the contribution of financial innovation can help develop the life of the financial sector (Qamruzzaman, 2021). Financial institutions must also concentrate on various financial innovations to boost stock market performance (Owen & Owen, 2020) and minimize the financial risks that occur (Smit, et al., 2016). Financial regulations that favor the financial system without technologically advanced financial transformation will not change bank behavior (Lauretta, 2018; Bernier & Plouffe, 2019).

Financial innovation gives investors access to more portfolio choices (Felipe S. Iachan & Plamen T. Nenov, 2021). Financial innovation is also a unit that aligns with developments in global financial markets and positively affects mutual fund performance (Azimova, 2021; Alamad et al, 2021; Savchuk et al, 2021). Furthermore, the number of exchange-traded funds (ETFs) will increase due to financial innovation facilitated by industrial digitalization. Thus, the government must also act carefully in making policies, especially in taxation (Marszk & Lechman, 2021). In addition, securitization of troubled assets in the process of bank restructuring in conditions of bank instability can affect financial stability and increase systematic risk control. (Bašić & Ćurić, 2021). Institutional capacity, regulation, and technology infrastructure are essential in enhancing financial innovation (Li et al, 2022).

In the global financial order, globalization is damaging to the global financial crisis and the credit performance of financial institutions, especially banks (Vunjak et al, 2020; Qamruzzaman, 2021). However, globalization can improve the quality of the financial system, and financial performance, create bank operational efficiency and excellence, encourage bank stability, and increase the effectiveness of the hedging system (Salisu & Obiora, 2021; Abdulmalik et al, 2022; Martinčević et al, 2022; Marfo-Yiadom & Tweneboah, 2022). Globalization also increases the use of digital financial products that have a good impact on the environment, increases the green bond market, reduces bankruptcy risk, and increases the efficiency of innovation-based finance in developing countries (Ozili, 2021; Chishti & Sinha, 2022; Cicchiello et al, 2022; Li et al, 2022; Alawi et al, 2022). In addition, digital payments can affect business development, especially during the Covid-19 pandemic (Tang et al, 2021). In developing SMEs, technological developments can assist SMEs in promoting their products (Lewandowska et al, 2021). From this explanation, we can understand that the existence of a financial innovation policy in the financial work system has a big impact.

CONCLUSION

Financial innovation is the process of creating new financial products, services, or processes in finance. Financial innovation has occurred through financial instruments, technology, and payment systems advances. Financial innovation has helped transform the financial services industry, changing how we save, borrow and manage our money. Financial innovations can be divided into several categories based on updates to various areas of the financial system. Financial innovation has been driven by companies outside the financial sector, especially information technology companies.

Financial innovation can positively impact the financial system's efficiency and facilitate monetary policy operations. Financial innovation can also improve the quality of financial services and speed up the process of financial transactions. However, financial innovation can also carry negative implications, such as greater financial risk, especially if the invention is not adequately regulated. Furthermore, financial innovation can also affect financial system stability and trigger economic inequality. Thus, there is an urgency to create proper regulation and supervision to ensure financial innovations positively impact society.

This research limitations include a need for a reference article database. The references are still limited because several related articles are paid or not open access and this article is still limited to a literature review only. However, researchers suggest that this topic be investigated using empirical test methods or field findings.

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FIGURE AND TABLE

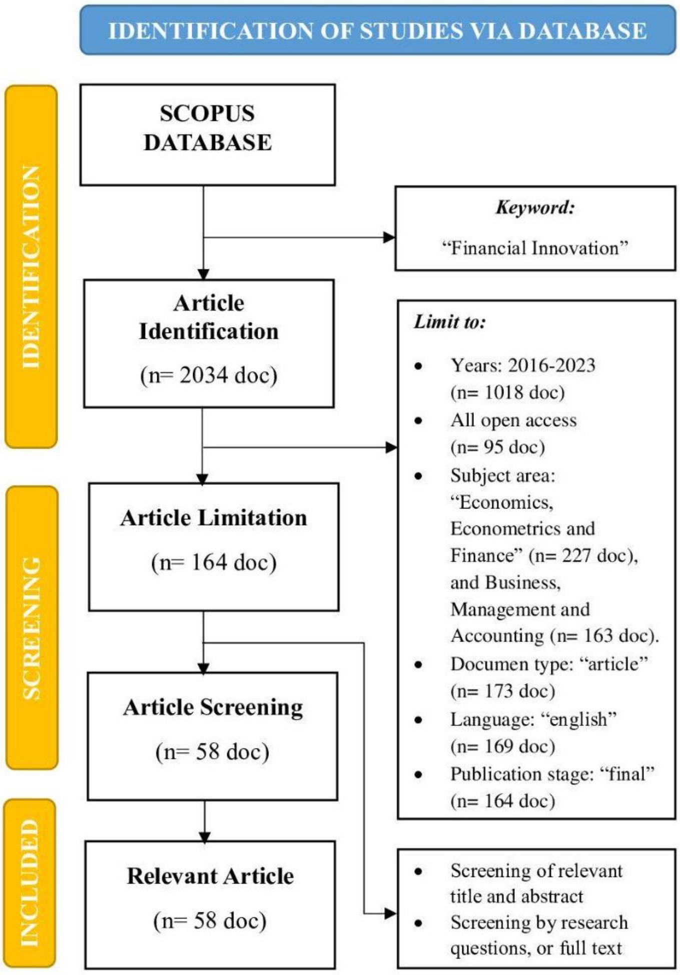

Figure 1. Flowchart PRISMA of Data Search Process
Source: Author Analysis (2023)

Table. 1 Antecedents of Financial Innovation

No	Antecedents	Source
1	Triggering financial	Lauretta (2018)
2	Economic instability	Lauretta (2018)
3	New discount basket certificates	Bobrikova & Harcarikova (2017)
4	Development of fintech	Saksonova & Kuzmina-Merlino (2017)
5	Regulation	Kok Lian (2017); Pompella & Costantino (2021); Katusiime (2021)
6	Bank's innovation strategy	Kok Lian (2017)
7	Local government policy	Kok Lian (2017)
8	Performance pressure	Kok Lian (2017)
9	Capital investments	Smit, et al. (2016)
10	Macroeconomic policy	Bernier & Plouffe (2019); Katusiime (2021)
11	Ethical strategy	Arthur & Owen (2019)

12	Policy Makers	Pompella & Costantino (2021)
13	Foreign Banking Capital	Murshudli (2022)
14	COVID-19 pandemic	Fabris (2022)

Source: Author Analysis (2023)

Table. 2 Consequences of Financial Innovation

No	Consequences	Source
1	Promotion of digital banking culture	Shaikh, et al. (2017)
2	Infusion of financial inclusion	Shaikh, et al. (2017); Jungo, et al (2022)
3	Financial regulation	Lauretta (2018) Bernier & Plouffe (2019)
4	Supervision	Lauretta (2018)
5	Financial agents' business decisions	Lauretta (2018)
6	Bank performance	Mustapha (2018)
7	Financial performance	Chipeta & Muthinja (2018); Osuma, et al (2019)
8	Develop financial services	Saksonova & Kuzmina-Merlino (2017)
9	Regulatory dialectic	Kok Lian (2017)
10	Sales revenue flows of bank	Smit, et al. (2016)
11	Insurance companies	Smit, et al. (2016)
12	Financial decision-making	Smit, et al. (2016)
13	Economic growth	Bara & Mudzingiri (2016); Qamruzzaman & Jianguo (2017); Bernier & Plouffe (2019); Ting, et al (2020); Qamruzzaman & Wei (2018); Nazir, et al (2020); Shapoval (2021); Jungo, et al (2022); Domeher, et al (2022)
14	Ensuring bank financial soundness	Kolodiziev et al (2016)
15	Life cycle stage	Kolodiziev at al (2016)
16	Increased capital formation	Bernier & Plouffe (2019)
17	Policy-makers	Nguyen & Nguyen (2020)
18	Bank operating efficiency	Lotto (2019)
19	Management of liquidity	Roy, et al (2019)
20	Energy efficiency investment	Juricic, et al (2020)
21	Financial and economic systems	Gąsiorkiewicz et al (2020)
22	Financial stability	Gąsiorkiewicz et al (2020); Bašić & Ćurić (2021); Vučinić (2020)
23	National security	Gąsiorkiewicz et al (2020)
24	Consumer well-being	Gąsiorkiewicz et al (2020)
25	Developing a vibrant financial sector	Qamruzzaman & Wei (2018)
26	Stock market performance	Owen & Owen (2020)
27	Sustainable growth	Owen & Owen (2020)
28	Effective control of money demand	Mlambo & Msosa (2020)
29	Capable of shaking up the traditional financial markets	Krishna Priya & Anusha (2019)
30	Money demand equation	Adil, et al (2020)

31	Affects investors' savings	(Felipe S. Iachan, Plamen T. Nenov, 2021)
32	Asset returns.	(Felipe S. Iachan, Plamen T. Nenov, 2021)
33	Global financial markets	Alamad, et al (2021); Savchuk, et al (2021)
34	Exchange-traded funds (ETFs)	Marszk & Lechman (2020, 2021)
35	Control of increase of a systemic risk	Bašić & Ćurić (2021)
36	Global financial crisis	Vunjak, et al (2020)
37	SME innovativeness	Lewandowska, et al (2021)
38	Digital payment	Tang, et al (2021)
39	Credit performance	Qamruzzaman (2021)
40	Profitability of mutual funds	Azimova (2021)
41	Reduces insolvency risk	Ozili (2020)
42	Financial sector efficiency	Ozili (2020)
43	Environmental quality	Chishti & Sinha (2022)
44	Green bond market	Cicchiello, et al (2022)
45	Optimizing finances systems	Li, et al (2022)
46	Develop an innovation-based economy	Li, et al (2022)
47	Resilient investment options	Salisu & Obiora (2021)
48	Renewable energy investors	Li, et al (2022)
49	Efficiency of deposit money banks	Abdulmalik, et al (2022)
50	Operational efficiency	Martinčević, et al (2022)
51	Business excellence	Martinčević, et al (2022)
52	Promoting bank stability	Marfo-Yiadom & Tweneboah (2022)
53	Financial Development in Emerging Markets	Alawi, et al (2022)

Source: Author Analysis (2023)