



# Digital Innovation and Bank Performance: A Systematic Literature Review

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**Abstract.** The massive growth in technology has encouraged banks to change their work operations from previously using traditional methods to digital innovation. These changes are carried out to improve bank performance so that they can maintain a competitive advantage and win global competition. This study was conducted to review the literature and to find out definitions, dimensions, and trend studies in current years for digital innovation and bank performance variables. The source of the data in this study was taken from the Emerald database which includes all research journals published during the period 2012 to 2022. The "PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) Flow was used as a methodology which includes identifying keywords, screening process by determining inclusion/exclusion criteria, and checking the eligibility of relevant research. The benefits of this study are expected to help in understanding and mapping the configurations of definition, dimensions, and trend study of digital innovation and bank performance in recent years.

**Keywords:** Bank Performance, Digital Innovation, PRISMA Flow.

## 1 INTRODUCTION

The rapid flow of globalization and technology changes has forced the business industry to work hard to maintain its competitive advantage [1] by adapting and changing bank operations from traditional to digital-based [2], [3]. Digitalization of work operations in banks has been proven to overcome difficulties in many ways and is generally believed to have a significant effect on business growth so that banks can work competitively and adapt to market needs [4].

Market change leads to uncertain conditions and requires banks to be resilient to maintain their existence and performance [1] so that banks have to innovate digital technology frequently [5], [3]. Das et al. [2] stated that digital innovation by banks has been carried out since the 1990s. Thus, bank digitization emerges in the latest products and services constantly.

Innovation of products and services in digital form also affected the bank's business processes including work mechanisms, social interaction, and other technical matters [5]. Digital innovation that is carried out regularly will increase the bank's value thereby

enabling it to maintain its customers. Digital innovation of banks encompasses financial services, making it easier for banks to sell their financial services in new (developing) or established markets [2]. In terms of innovation, Nwankpa et al. [6] stated that innovation essentially does not just emerge new products/services, but must also affect work processes, especially for increasing efficiency, quality, and bank financial performances.

Based on the notes above, we have described that there is a relationship between digital innovation and bank performance, while scholars who specifically examine the relationship between these two variables have also been studied by Al-Dmour et al. [1], Mbama et al. [3], Nguyen et al. [7], Mbama and Ezepue [8], and Al-Dmour et al. [9]. However, there a very few studies to discuss systematic literature reviews on variables of digital innovation and bank performance, so this study was conducted to fill this gap and to find out things related to the variables of digital innovation and bank performance, namely the definitions, commonly used dimensions, and trend study in current years.

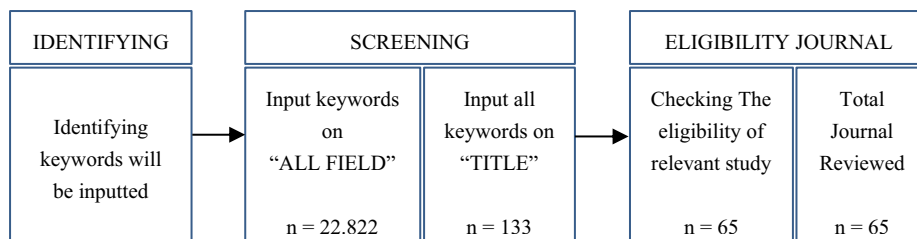


Fig. 1. Flow of Selecting Data.

## 2 METHODS

The source of the data in this study was taken from the Emerald database which includes all research journals published during the period 2012 to 2022. This study used PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) Flow which is widely carried out by scholars such as Zhao et al. [10] and Saleh et al. [11]. The PRISMA Flow method encompasses 3 steps, namely identifying keywords, screening data by determining inclusion and exclusion criteria, and checking eligibility data manually and comprehensively (see Figure 1). The details of the three steps are as follows:

1. Identifying keywords. In the identifying process, the keywords below were inputted in the "TITLE" of the reputable journal database:  
 {"digital innovation" OR "digital banking innovation" OR "digital financial innovation" OR "financial service innovation" OR "digital transformation innovation"} AND {"bank performance" OR "bank financial performance" OR "bank business performance"}.
2. Screening data process by determining inclusion and exclusion criteria, are as follows:

- a. Inclusion criteria:
    - i. English publication
    - ii. Period: 2012-2022
    - iii. Journal article only and published by a reputable journal database
    - iv. Related to digital innovation and/or bank performance topics
  - b. Exclusion criteria:
    - i. Non-English publication
    - ii. Before 2012 and after 2022
    - iii. Book, case studies, early cite, expert briefings
    - iv. Unrelated to digital innovation and/or bank performance topics.
3. Checking the eligibility of relevant journals manually.

## 3 RESULTS AND DISCUSSION

### 3.1 Definition

#### **How is digital innovation defined?**

To maintain its existence, a company does not only rely on its financial ability but is also required to innovate [9]. Due to its vital role, the company's innovations can contribute significantly to profitability (with an average of 28%) in all industries [12]. The existence of innovation indicates the company's positioning so that it can embed the company's brand and values in the collective memory of customers [13].

Innovation by definition is something new, it can be a product, object, idea or work process, or service offered to the market by the company [12], [14]. Innovation can also be defined as a change in everything that is conventionally established so that customers can understand the differences in the services and products offered by other similar companies [1]. For another definition of digital innovation, Huynh [15] defines it as an innovation that is carried out by relying on information and communication technology for business processes and products (both in the form of goods/services) produced. Meanwhile, Johansson et al. [16] state that a new product is produced based on a combination of digital and physical components.

For creating digital innovations, companies need adequate knowledge of their resources to transform previously traditional products/services into sophisticated digital products/services [17]. This knowledge is needed to find out customer preferences for all their needs [18]. In addition, it is also needed considering that there are wide differences between traditional innovation, where the goals and methods have been determined in a rigorous form, and digital innovation, which is not limited by conventional barriers [19], [20]. Digital innovation, in the view of scholars, has also developed and formed a complex ecosystem that contains customers, suppliers, and other parties that make information symmetrical in the market, thereby making the products/services produced cheap and fast [21], [22]. Besides that, digital innovation has also changed everything that is only in physical form to become entirely digital, such as digital products/services, digital marketing, and digital interactions [23].

Digital innovation is commonly divided into two types, namely radical innovation and incremental innovation [2]. The difference between these two innovations is that

in radical innovation, companies innovate radically by presenting completely new digital products/services, while in incremental innovation, companies only make minor changes by modifying existing products/services [24]. Furthermore, in the context of finance or banking, digital innovation has played an important role in providing financial services to customers [7] and has been proven to be able to improve customer experience, satisfaction, and loyalty [3], [8]. Digital innovation in bank operations has developed to include various forms of products, such as ATM (Automated Teller Machine), Mobile Banking, Mobile Money, Credit Cards, E-Banking, Contactless Cards, etc [3], [9], [12], [25]. In terms of operational process activities, digital innovation has also included many things such as credit score data integration of prospective borrowers, access to the capital market, using the KYC (Know Your Customer) process to prevent money laundering, etc [9].

### **How is Bank Performance defined?**

Theories relating to company performance are taken from the Resources-based view (RBV) theory, which has discussed how to utilize existing resources to achieve company goals and to review whether organizational activities and marketing have been carried out efficiently and effectively [26]. The resources owned by the company should ideally be well managed so that the company's profitability can be maintained and customer satisfaction can be achieved properly [27] so that competitive advantage can be maintained and exist in the long term [26].

Company performance is usually always measured by financial performance, but in several cases, some scholars classify non-financial performance such as CSR (Corporate Social Responsibility) for measuring company performance [28]. The financial performance is stated in financial statements. Company financial statements can provide a view for all stakeholders to assess how healthy the company's condition was at the time was released [29]–[31]. Assessment of financial performance is also important as a tool for shareholders to evaluate managers and force them to accelerate their performance growth [32].

In the banking context, the performance aspect is also a concern for stakeholders to measure how healthy the bank operation is [33]. Assessment of bank health can also be seen by assessing the various risks that surround it [34], where according to Oino [35] besides profitability, liquidity risk factors and loan portfolio must be an integral part of measuring bank performance.

## **3.2 Dimensions Commonly Used**

### **What are the dimensions commonly used for digital innovation?**

In the previous study, dimensions for measuring digital innovation have not been carried out much, and only Al-Dmour et al. [1], Mbama et al. [3], Rönnbäck and Eriksson [14], and Wei et al. [17] have formulated it. Wei et al. [17] formulated the dimensions of digital innovation into 4 statements, including:

1. The company always launches the latest products/services in digital form.

2. The company does not hesitate to experiment with launching new products/services in the market.
3. Companies rely more on digital products/services than traditional products/services.
4. Digital products/services offered by the company are a market leader or trendsetter.

Then the dimensions of measuring digital innovation also offered by Rönnbäck and Eriksson [14] are as follows: (1) companies always develop the latest systems or programs, (2) the products/services provided by the company rely on the existence of information technology, (3) the use of information technology greatly affects the continuity of the company's core business. While Al-Dmour et al. [1] offer digital innovation measurements as follows: (1) companies always produce product/service innovations regularly, (2) companies are always able to adapt by carrying out digital innovations to meet customer needs, (3) the company invests large amounts of money for the needs of developing digital innovation, (4) the company always strives to be the first leader in terms of digital innovation, (5) companies always rely on technology in terms of digital innovation. Then Mbama et al. [3] derived the dimensions of digital innovation to digital innovation for customer service and ongoing research.

#### **What are the dimensions commonly used for bank performance?**

Many scholars have formulated variables of bank performance. Generally, bank performance is measured using profitability ratios, as the study conducted by Ahsan and Qureshi [36] and other researchers. However, there are also measurements for considering other variables such as efficiency, liquidity, bank health (Non-Performing Loans) and CAMELS (Capital adequacy - Assets quality - Management - Earnings - Liquidity - Sensitivity to Market Risk). Details of the distribution of dimensions for measuring bank performance are described in Table 1.

### **3.3 Current Study Trends on Digital Innovation and Bank Performance**

In conducting this study, 65 articles were selected after going through the method presented in the previous section. Of all the selected articles (n=65), 16 articles discuss digital innovation, 44 articles discuss bank performance and 5 articles discuss both. For digital innovation, the topic of selected articles is related to business models [15], [37], innovation performance [18], [20], and other topics. Meanwhile, for bank performance, the topic of selected articles discussed corporate governance [38]–[42], bank risk [34], [43]–[46] and intellectual capital [27], [47]–[50], and other topics.

For publication trends during 2012-2022 in articles discussing digital innovation, the highest number of publication periods was in 2022 (6 articles) and the lowest publication period was in 2013-2015 (zero publications). For articles on bank performance topics, the highest number of publications was in 2022 (15 articles) and the lowest was in 2013 (zero publications). Then for articles on digital innovation and bank performance topics, the highest number of publications was in 2018 and 2022 (2 articles/year) and the lowest was in 2012-2017 and 2019 (zero publications) (see Figure 2).

**Table 1.** The Configuration of Dimension for Measuring Bank Performance.

No	Scholars Name	Dimension
1	Awo & Akotey [51]; Gafrej & Boujelbéne [52]; Ledhem [53]; Tuan Ibrahim et al. [29]; Vo et al. [54]	ROA, 28, 36-39
2	Chouaibi et al. [55]; Doan et al. [26]; Wongsansukcharoen et al. [56]	ROE
3	Ajili & Bouri [38]; Akkas & Asutay [47]; Ben Abdallah & Bahloul [57]; Ben Slama Zouari & Boulila Taktak [58]; Haddad & Alali [43]; Jabari & Muhamad [59]; Jamal Zeidan [60]; Luu et al. [61]; Mousa & Kamel [62]; Nawaz & Haniffa [49]; Onuoha [63]; Shakil et al. [42]; Siddique et al. [45]; Soewarno & Tjahjadi [27]; Weber [64]; Yahaya et al. [46]	ROA, ROE
4	Weqar et al. [50]	ROA, ATO
5	Ayadi et al. [40]; Hidayat et al. [34]	ROA, ROE, NIM
6	Mondal & Ghosh [48]	ROA, ROE, ATO
7	Majeed & Zainab [31]	ROA, ROE, LDR, LAR, LDR, DAR, DER
8	Alam et al. [65]	ROE, NPL, NPG
9	Kirimi et al. [66]	ROA, ROE, NIM, EPS,
10	Kamau et al. [44]	NPAT
11	Nguyen et al. [7]	NFCI
12	Butt et al. [67]	EPS
13	Al-Malkawi & Pillai [39]; Eklof et al. [30]	Tobin-Q ratio
14	Ledhem & Mekidiche [68]	CAMELS
15	Haddad et al. [69]	NIM, LDR, LAR, ROA
16	Orazalin et al. [70]	ROA, ROE, NIM, LDR, LAR, CRR, CAPAD, AAG
17	Orazalin & Mahmood [41]	CRR, AAG, NIM, ROA, LDR, LAR
18	Oino [35]	Profitability, Liquidity & Loan Portfolio
19	Al-Dmour et al. [9]	ROI, Profitability, Market Share, Stock Prices, Customer Service, Customer Satisfaction, Customer Loyalty
20	Mbama et al. [3]	Customer retention, NPS, sales, market share, profitability, and growth.
21	Mbama & Ezepue [8]	ROE, NIM, CIR, NPS

Note: ROA (Return on Assets), ROE (Return on Equity), ATO (Asset Turn Over), NIM (Net Interest Margin), NPAT (Net Profit After Tax), LDR (Loan to Deposits Ratio), LAR (Loan to Assets Ratio), DAR (Debt to Asset Ratio), DER (Debt to Equity Ratio), NPG (Net Profit Growth), EPS (Earning Per Share), NFCI (Net Fee Commission Income), CRR (Capital Reserves Ratio), AAG (Annual Asset Growth), CIR (Cost to Income Ratio), NPS (Net Promoter Score).

Furthermore, of the 65 articles, the most study sampled regions were in the Asian region (35 articles), and the lowest was in the American region (3 articles) (see Figure 3).

Furthermore, if it is derived for each article, in articles on digital innovation, the region with the highest sample was Europe, namely 6 articles, 3 of them from Sweden [14], [16], [22] (see Table 2). For articles discussing bank performance, the region that was the highest sampled was Asia, namely 27 articles, 6 of them came from the Gulf countries [34], [38], [39], [43], [47], [52] (see Table 3). Then in the articles discussing digital innovation and bank performance, the region with the highest sample was Asia (3 articles) [1], [7], [9] (see Table 4).

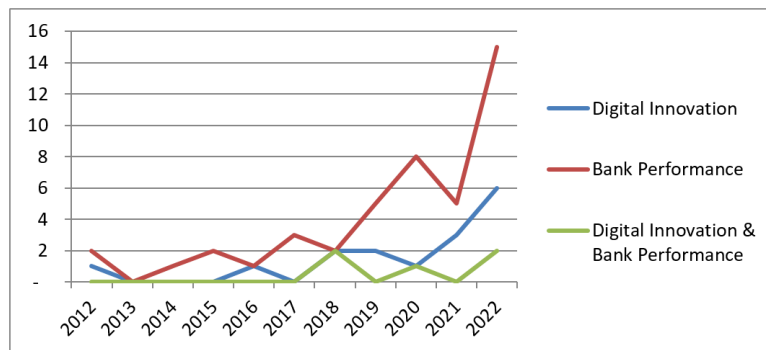


Fig. 2. Publication Trend during 2012-2022.

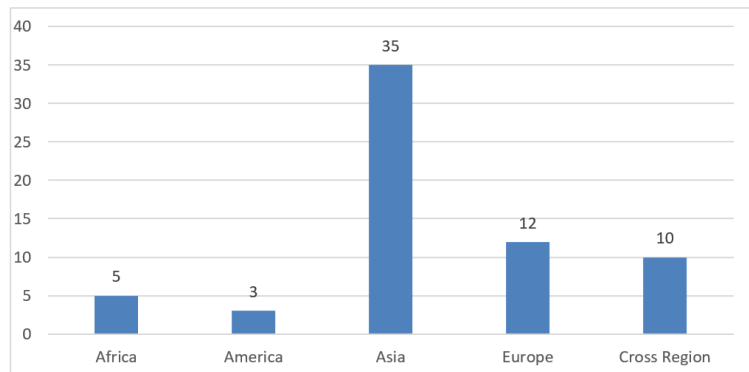


Fig. 3. Regions of Literature (All Articles).

Table 2. Regions of Literature (Digital Innovation).

REGIONS	TOTAL
Africa	1 Articles
America	2 Articles
Asia	5 Articles
Europa	6 Articles
Cross-Region	2 Articles
<b>TOTAL</b>	<b>16 Articles</b>

**Table 3.** Regions of Literature (Bank Performance).

<b>REGIONS</b>	<b>TOTAL</b>	
Africa	4	Articles
America	1	Articles
Asia	27	Articles
Europa	4	Articles
Cross-Region	8	Articles
<b>TOTAL</b>	<b>44</b>	<b>Articles</b>

**Table 4.** Regions of Literature (Digital Innovation & Bank Performance).

<b>REGIONS</b>	<b>TOTAL</b>	
Africa	0	Articles
America	0	Articles
Asia	3	Articles
Europa	2	Articles
Cross-Region	0	Articles
<b>TOTAL</b>	<b>5</b>	<b>Articles</b>

## 4 CONCLUSIONS

This study is a systematic literature review for discussing digital innovation and bank performance which aims to find out the definitions, dimensions, and study trends in current years of these two variables. The observed study is articles published in reputable journal databases from 2012 to 2022. The method used in this study is PRISMA Flow which has been widely used by scholars encompassing the identification of keywords, the screening process by determining inclusion/exclusion criteria, and checking the eligibility of relevant research.

After filtering the data based on this method, 65 articles were selected, consisting of 5 articles that discuss digital innovation and bank performance. 16 articles discussing digital innovation and 44 articles discussing bank performance. The benefits of this study are expected to help understand and map the configurations of definition, dimensions, and current study trends of digital innovation and bank performance.

This study has several limitations. The observation period is limited to 10 years, the selected literature is only journal articles (not including books, proceedings, brief reports, dissertations, etc.), and the resources observed only came from one reputable journal database.

## 5 ACKNOWLEDGMENT

We would like to thank all our lecturers at Universitas Pendidikan Indonesia who have provided all their suggestions to improve this article.



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