

## Data Warehouse in Financial Technology Peer-to-Peer Lending Business: A Literature review

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**Abstract.** The present research paper analyzes the utilization of technology used by peer-to-peer lending Company in Indonesia, the specific data warehouse of the company, its methods, and the effect of business running strategies on the condition of cash flow, OPEX, and the company's business condition as a business company of peer-to-peer lending. To be able to answer this question of the company analysis, a deep literature review is being obtained to analyze, observe, and understand the pattern of answers that can be concluded about the condition of each sector of discussion inside this peer-to-peer lending business company. This research is important to establish knowledge on how a data warehouse is beneficial in the operation of a peer-to-peer lending business. Since this research uses a systematic literature review, it also aims in analyzing trends of past research products that have been made before through the graphic of bibliometric coupling-based approach.

**Keywords:** Data Warehouse, Financial Technology, P2P Lending, Operational Expenditure, Cash Flow

## 1. Introduction

In 2023, peer-to-peer lending became a popular strategy for companies in Indonesia, with one such company gaining trust and recognition by being registered with OJK and a member of AFPI. This ensured its prominence and trustworthiness among borrowers and lenders. The company's success rate, measured by TKB90, reached 100%. In line with the era of Society 5.0, where technology is paramount, the company launched its own digital application to facilitate peer-to-peer lending transactions. The app offers various funding products with different interest rates and time periods, allowing funders to choose according to their preferences. The longer the funding period, the higher the yield obtained. This reflects the company's commitment to integrating technology and meeting customer needs (POJK tentang Layanan Pinjam Meminjam Uang Berbasis Teknologi Informasi, 2016).

These research questions serve as a guide in the search for relevant literature sources. RQ1 aims to determine the extent to which technology is utilized in the operations of the peer-to-peer lending company. RQ2 is concerned with the condition of the peer-to-peer lending company after using a data warehouse. Lastly, RQ3 seeks to identify the method implemented by the company and its impact on the company's cash flows and OPEX.

- **RQ1:** To what extent does technology have a part in the operation of this peer-to-peer lending company?
- **RQ2:** What is the condition of this peer-to-peer lending company after applying data warehouse technology?
- **RQ3:** What method do they implement, and how does it influence the condition of peer-to-peer lending company cash flows and OPEX?

The study highlights the crucial role of rigorous financial management practices, especially in monitoring cash flow and operational expenditure (OPEX) stability. Practitioners should maintain disciplined financial recording and reporting mechanisms for business sustainability and optimal resource allocation, emphasizing the necessity for robust financial controls in the evolving fintech landscape.

In the context of business intelligence, a data warehouse is a central repository of data used for analysis and decision-making (Inmon, 2005). It provides a "single version of the truth" by integrating data from various sources and organizing it consistently (Kimball et al., 2013). In the peer-to-peer lending context, a data warehouse offers insights into operations, customer behavior, and financial performance (Hu, 2016).

Furthermore, data warehouses play a critical role in Industry 5.0, integrating advanced technologies with human expertise in manufacturing (Kagermann et al., 2013). They enable analytics and business intelligence capabilities (Zhu et al., 2014), helping understand the impact of different methods on cash flows and operating expenses in peer-to-peer lending (Inmon, 2005).

Answering RQ1-RQ3 provides valuable insights into technology, data management, and financial practices in peer-to-peer lending in the Industry 5.0 era.

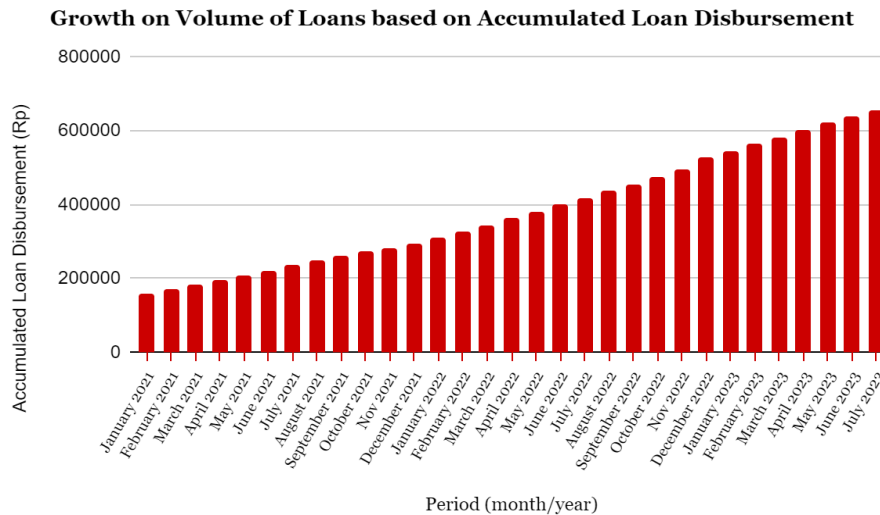


Fig. 1: Growth on Volume of Loans based on Accumulated Loan Disbursement

The growth of investors in Indonesia's peer-to-peer lending platforms has been significant since the industry gained legal clarity and simplicity (Kurniawan et al., 2023). Official statistics from the Indonesian Financial Services Authority (OJK) show stable increases in loan disbursements from January 2021 to July 2023, indicating the industry's reliability and its role in meeting increasing financial needs.

Data warehouse utilization is crucial in the peer-to-peer lending industry due to its highly data-driven nature. Effective usage can provide insights into borrower behaviour, loan performance, and risk indicators, enhancing decision-making and business performance. This study aims to examine the effectiveness of data warehouse utilization in Indonesia's growing peer-to-peer lending sector to optimize operations and improve financial health.

Understanding data warehouse concepts is essential for both borrowers and investors in peer-to-peer lending platforms to build trust and loyalty. This research also serves as a valuable reference for future researchers and contributes to the development of educational and employment prospects.

## 2. Literature Review

The peer-to-peer lending business can be categorized as promoting better community access to financial service products via online channels. The main benefits of information technology-based money lending and borrowing services, like those provided by this business, include the parties' ability to access agreement documents in electronic form online for their purposes, the availability of legal counsel to facilitate transactions online, risk assessment of the parties, the ability to send collection information online, the ability to inform parties of the status of their loans online, and the provision of escrow accounts and virtual accounts in electronic form (Inmon, 2005).

The Fintech Indonesia platform offers a social funding service aimed at assisting individuals in securing funds for investment or initiating new ventures (Fintech Indonesia, n.d.). Employing sophisticated algorithms, the platform facilitates the identification of potential investors or borrowers (POJK tentang Layanan Pinjam Meminjam Uang Berbasis Teknologi Informasi, 2016). Moreover, it enables borrowers to conveniently track the performance of their investments through its application interface (Fintech Indonesia, n.d.). This approach resonates with concepts discussed in Kimball and Ross'. (2013), work on data warehousing and dimensional modeling. When assessing the role of technology in the company's operations, it's clear that it plays a vital part. The company relies heavily on its digital platform for peer-to-peer lending, showcasing its high level of technological reliability.

## **2.1. Data Warehouse**

According to Inmon. (2005), a data warehouse is a collection of subject-oriented, integrated, time-varying, and non-volatile data designed to support decision-making processes. It is primarily used for querying and analyzing transaction processes, containing historical transaction data and data from other sources. Unlike traditional databases, data warehouses are read-only and serve as the foundation for decision support systems (DSS) and executive information systems (EIS). While physically a database, data warehouses differ significantly in design from traditional databases, with normalization not being the preferred approach (Lane, 2002; Poe et al., 2001).

Data warehouses act as centralized repositories that store data from various sources to provide valuable business insights. They are crucial components of business intelligence, emphasizing data storage and organization for analysis purposes. Recently, real-time data warehousing has gained prominence, allowing for continuous data integration and almost instantaneous updates. This real-time updating is particularly beneficial for businesses requiring up-to-the-minute insights, such as stock trading platforms or e-commerce websites (Reddy, 2019).

## **2.2. The Company's Data Warehouse**

Based on the official website of Asetku.co.id, since its inception, the number of accumulated users has reached 14,770,641. Until now, active borrowers who can be classified as customers with loyalty to this peer-to-peer lending have reached 855,404 Users.

Meanwhile, the approximate calculation of the total nominal amount of loans this year is Rp 1,954,085,550,000. However, if the calculation is estimated since this company was first established, the number of loans has reached Rp58,639,934,622,382 according to the data written on the company's official website. In contrast to the figures in the outstanding loan category, the total nominal amount is Rp 911,645,558,558T (Martin, 2023).

## **2.3. Method of the Peer-to-Peer Lending Business**

In the peer-to-peer lending system, borrowers must submit various documents, including financial statements and loan motivations. Loan approval is not guaranteed, and denied applications require corrections. Approved loans are visible to all lenders, who can then invest based on the borrower's information. Investors receive returns based on the loan's interest rate (Milne & Parboteeah, 2016). P2P lending companies often offer protection funds to mitigate investor risk. These funds act as reserves if borrowers fail to repay, providing a safety net for investors (Jessica, 2022). According to OJK data, P2P lending interest rates should not exceed 0.8 percent per day or fall between 15-24 percent per month, which is higher than traditional bank rates (A. Basha et al., 2021).

## **2.4. Cash Flows and OPEX**

Cash flow, a vital aspect of any company's financial health, refers to the inflow and outflow of cash over a specific period. Positive cash flow signifies that income surpasses expenses, while negative cash flow indicates the opposite (Almeida et al., 2004).

Operating expenses (OPEX) are costs directly associated with producing goods and services and are listed in the balance sheet's liabilities section. Proper management of operating expenses is crucial for maintaining profitability (Fernández & Stol, 2015).

Analyzing these expenses helps predict their impact on revenue and assess the company's future viability. While reducing operating costs can boost short-term profits, it may hamper long-term growth if done at the expense of essential activities like marketing (Finochietto et al., 2022).

## **2.5. Data Warehouse in Financial Technology Business**

Data warehouses serve as indispensable resources for fintech businesses, particularly in the realm of peer-to-peer lending (P2PL). They offer a comprehensive framework for managing and extracting insights from complex datasets in today's data-driven financial landscape (Elmaghraby & Losavio,

2019). Integration of data from various sources is facilitated by data warehouses, enabling platforms to analyze borrower patterns, transaction histories, and market trends. This comprehensive understanding of lending operations enhances decision-making and risk assessment (Amini et al., 2020).

Furthermore, data warehouses enable advanced analytics through predictive modeling and machine learning, allowing P2PL platforms to refine lending strategies and credit assessment models (Kou et al., 2020). In terms of regulatory compliance, data warehouses play a crucial role by providing a centralized data repository. This ensures adherence to data privacy laws and simplifies auditability, thereby offering a regulated environment for data management (Amini et al., 2020). Data warehouses offer various benefits to companies, including:

- Speed: Facilitating fast data retrieval and analysis for informed decision-making (Farooq, 2012).
- Data quality and consistency: Integrating information from multiple sources into a single source of truth, enhancing data quality and consistency (Alhyasat & Al-Dalahmeh, 2013).
- Business intelligence support: Providing better access to information for process improvement and strategic decision-making.
- Cost savings and revenue increase: Enabling data-driven decisions, leading to business growth (Al-Debei, 2011).
- Enhanced predictive capabilities: Analyzing business data for market predictions and strategic planning (Al-Debei, 2011).

For P2PL companies, data warehouses offer benefits across various aspects, including comprehensive data collection, smarter risk assessment, regulatory compliance, investor insights, operational efficiency, and scalability (Editor, 2016; Feyen et al., 2021). The increasing usage of fintech platforms, driven by their ability to reduce financial service costs, improve accessibility and quality of financial services, and create new financial landscapes, reflects their growing popularity in today's fast-paced society (Lee & Shin, 2018).

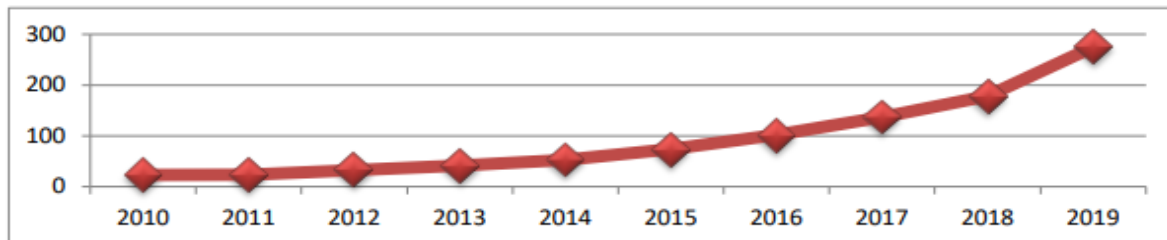


Fig. 2: Increase Rate Analytic of Fintech Companies in Indonesia

Fintech companies in Indonesia are also increasing Indonesian fintech only engaged in two verticals, namely digital payments (e-money) and online lending (peer-to-peer). It has now expanded to include aggregators, innovative credit scoring, financial planning, equity crowdfunding, and project financing. The growth of fintech companies in Indonesia is compiled by the Indonesian Fintech Association. OJK also opens space for companies to conduct fintech-based activities, but OJK only licenses fintech companies engaged in lending and payment. The significant increase in the use of fintech is driven by the needs of the community in seeking funding for business and consumption. A high working-age population, rapidly growing internet penetration, the number of mobile phone users and fast-growing social media have helped accelerate the growth of fintech in Indonesia (Noor et al., 2020).

## 2.6. Similar Research

Researchers analyze earlier studies to gather reliable information regarding the data warehouse of the peer-to-peer lending industry. Study by A. (2018) provides detailed insights into the systematic operations of peer-to-peer lending companies, including loan types, fintech credit activities, and

platform usage by borrowers and investors. It also explores techniques for ensuring stable profits for P2P companies.

According to Taujanskait & Milius. (2022), P2P lending is a rapidly expanding financial technology trend that has the potential to disrupt traditional retail banking by moving personal loan processes online. Maulana et al. (2022) analyze how the expansion of data warehouses in the peer-to-peer lending industry affects Indonesia's economic growth. Despite higher interest rates, public interest in obtaining loans through P2P platforms influences the growth of data warehouse systems in the industry.

Wang et al. (2014) found that data warehouses are essential for enabling analytics by serving as a central repository for data. Setyaningsih et al. (2019), suggest that the ease of bureaucracy and less stringent terms compared to traditional banking institutions make P2P lending an attractive option for borrowers. Djaakum. (2019), reveals how the use of the technology acceptance model (TAM) influences the stability of cash flows and operational expenditure (OPEX) in the peer-to-peer lending business, highlighting the influential role of technology in the financial industry.

### **3. Methodology**

#### **3.1. Approach and Type of Research**

In this study, descriptive methods are used to gather data, and both document- and internet-based methods are used to conduct the research (document-based methods) (Bakry, 2017). Both primary and secondary materials are in doubt. Where is document-based data collecting done through library studies on various books on the internet? Internet-based techniques can be improved to gather data or information pertinent to the study's topic. This strategy involves looking up information online, such as in online newspapers, journals, and publications, as well as past study reports.

Several keywords, including data warehouse, cashflows, OPEX, and procedure in the peer-to-peer lending business enterprise, are used to find this material. Data from books, journals, documents, articles, online newspapers, and research reports from prior studies are examined as part of the data analysis process in the beginning. Qualitative data analysis is the method that has been used. To determine how the peer-to-peer lending system is implemented, the data is compiled based on known facts and then compared to one another. This qualitative analysis approach also attempts to provide a methodical and factual justification of the findings that have been investigated through literature study, method observation, cash flow analysis, operational expenditure analysis, and data warehousing of this peer-to-peer lending firm.

#### **3.2. Data Collection Techniques**

The data that has been collected is secondary data, which means in this writing. The author does not carry out direct observation (research) but rather refers to existing sources, which are processed through library research. Literature Study, namely the collection of data generated from various media (in the form of books, journals, scientific works, magazines, theses, documents, and expert opinions) that are relevant and related to the research topic. To plan the literature review to construct a reliable method to fulfill the needs of the result analysis of this research paper. Records for identification will be searched from the Scopus database with search terms as follows

#### **3.3. Research Strategy**

Researchers focus on strategies to obtain reliable data on data warehousing in peer-to-peer lending. This literature review selects a specific range of years from the Scopus database to analyze the increasing research on the topic. Using keywords like "Data Warehouse" and "Peer-to-peer Lending Business," researchers identify relevant studies, focusing on financial technology development patterns. The search also includes terms like "OPEX" and "Cash Flow" in the abstract. Articles in English published from 2010 to 2023 are considered. Bibliometric analysis is employed to describe journal publication results. This analysis aims to provide a comprehensive understanding of publication trends, collaborations

between authors, and development in respective subject areas.

Table 1: Search Term in Scopus

Field Tag	Article Type	Language	Year	Subject Area
Title, Abstract, and Keywords	Review Articles, Research Articles,	Limit to English and Indonesia	2010 until 2023	Computer Science, Business Managements and Accounting, Economics Econometrics and Finance
TITLE-ABS-KEY (machine learning AND)	(LIMIT-TO (ARTICLE TYPE , "Articles Res")) OR (LIMIT TO (ARTICLE TYPE "Research Art"))	LIMIT-TO (LANGUAGE, "English") OR (LANGUAGE, "Indonesia")	(LIMIT-TO ( PUBYEAR , 2023 ) OR LIMIT-TO ( PUBYEAR , 2022 ) OR LIMIT-TO ( PUBYEAR , 2021 ) OR LIMIT-TO ( PUBYEAR , 2020 ) OR LIMIT-TO ( PUBYEAR , 2019 ) OR LIMIT-TO ( PUBYEAR , 2018 ) OR LIMIT-TO ( PUBYEAR , 2017 ) OR LIMIT-TO ( PUBYEAR , 2016 ) OR LIMIT-TO ( PUBYEAR , 2015 ) OR LIMIT-TO ( PUBYEAR , 2014 ) OR LIMIT-TO ( PUBYEAR , 2013 ) OR LIMIT-TO ( PUBYEAR , 2010 ) )	(LIMIT-TO (SUBJAREA , "COMP" ) OR LIMIT-TO ( SUBJAREA , "BUSI" ) ) OR (SUBJAREA , "ECON".

When it comes to inclusion and exclusion in the process of obtaining data on the Scopus database which is research related to data warehouse peer-to-peer lending business in financial technology development, criterias are made. This is done to make it easier for researchers to sort and maintain research from year to year that are valid to be analyzed and reviewed.

Table 2: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Journal year $2023 \geq 2010$ Limit to Review Articles, Research Articles	Data warehouse in architecture Data warehouse in data mining
Language English & Indonesia Data warehouse-related Financial technology-related Peer-to-peer lending-related	Data warehouse in DBMS-related

Furthermore, after considering research products such as articles and journal, a specific diagram which helps researchers are being made in order to sorting out researches which meets all the criteria, based on the search terms in scopus as well as inclusion and exclusion criteria which being focused in as the guidance to choose the proper, suitable, and appropriate paper of researches that has been made by the past researchers. The diagram is called a PRISMA flow chart, PRISMA is a tool and guide used to assess systematic reviews and/or meta-analysis. PRISMA helps authors and researchers in preparing a quality systematic review and meta-analysis. PRISMA is composed of a checklist that contains guidance on what items must be present and carefully explained in a systematic review and meta-analysis.

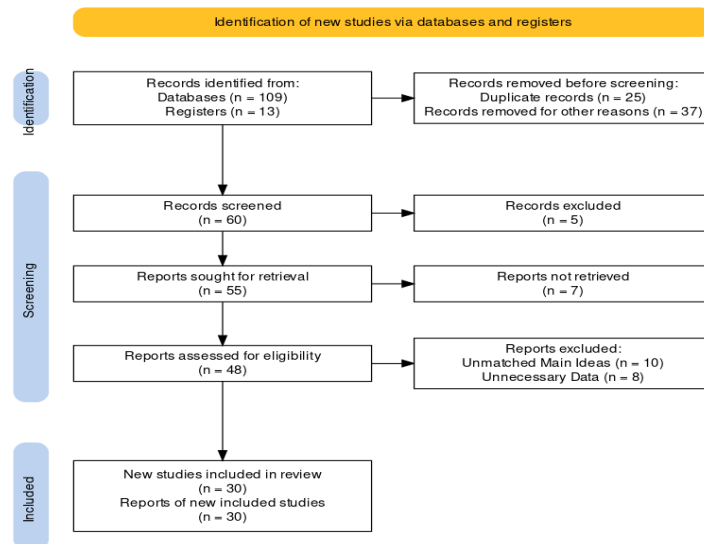


Fig. 3: PRISMA Flow Chart

### 3.4. Data Extraction Process

To finalize the methodology approach, researchers utilize Vos Viewer to analyze bibliographic data. This software generates a bibliographic map, allowing researchers to visualize patterns and connections between past research studies. Data is imported into Vos Viewer from a stored RIS document, and researchers choose the visualization process based on their needs. For this systematic literature review, the option of creating maps based on bibliographic data is selected. Vos Viewer uses colors to represent research measurements and years of study, with relation lines connecting concepts for deeper analysis by researchers. Using the Systematic Literature Review (SLR) methodology provides a structured way to identify relevant studies, evaluate their quality, and synthesize findings. This approach has been promoted in various fields as a method to ensure that the review process is transparent, replicable, and comprehensive, ultimately reducing biases that can be introduced during the selection of studies (Kitchenham & Charters, 2007).

For example, in the context of your study on Peer-to-peer Lending, adopting the SLR might have ensured that all pertinent facets of the P2P lending business were systematically addressed, providing a cohesive understanding of the landscape. In the pursuit of understanding the role of data warehouses in the financial technology peer-to-peer lending business, leveraging bibliographic coupling analysis becomes essential. Bibliographic coupling occurs when two works reference a common third work in their bibliographies. It offers a way to identify and cluster documents based on shared references, which is especially useful in understanding the evolution and interrelation of research topics (Kessler, 1963).

The utilization of VOS Viewer to create bibliographic maps offers a visual representation of the relationships between different research articles, authors, and topics. By presenting the data in a visual format, VOS Viewer allows for easy identification of the most influential articles, the interconnectedness of topics, and emerging trends in the domain of data warehousing within the FinTech P2P lending landscape (van Eck & Waltman, 2009).

### 3.5. Report and Analysis Method

To answer the research questions, we employ an SLR methodology combining bibliographic coupling analysis, VOS Viewer bibliographic map, and PSALSAR Framework analysis. Bibliometric analysis helps identify citation patterns, journals cited, and authors referencing the journal, offering insights into research impact and emerging areas. It supports trend analysis and aids in understanding research fields' current state and potential for further exploration. Additionally, it measures publication and author impact through citation data. This method facilitates productivity comparison among research groups

and assesses journal quality and impact based on publication and citation data.

#### **4. Results and Discussion**

Financial technology, or FinTech, merges financial services with technology, transforming traditional business models to facilitate remote transactions and quick payments. Initially, payments required in-person transactions and carrying cash, but FinTech has made transactions more convenient and efficient. It addresses issues like time constraints and reluctance to visit physical locations, making payment systems and transactions cheaper and more effective. FinTech's emergence aligns with the lifestyle changes of tech-savvy individuals leading fast-paced lives, similar to its application in the peer-to-peer lending sector.

**RQ 1: To what extent does technology have a part in the operation of this peer-to-peer lending company?**

Table 3: Studies of Technology Implementation in Peer-to-Peer Lending by Business Data Warehousing Role

Study	Year	Methodology	Data Warehousing Role	Findings
Maulana, Komarudin, Gunawan, & Yusuf.	2022	Quantitative Analysis using loan & economic growth statistic	Growth of data warehouses of peer-to-peer lending business does influence the economic growth in Indonesia.	Peer-to-peer platform have higher interest rates than loans funneled through traditional banking.
Djaakum, C. S.	2019	Quantitative Descriptive Study	Data warehouse implicates technological development of Fintech movement in Indonesia in relation with Technology Acceptance Model (TAM).	The adoption of the TAM in order to achieve a favorable state of condition in the field of cash flow configuration and stability of the OPEX of the peer-to-peer lending business had an unavoidable impact on the development of the financial industry.
Octavini, N. A., & Puspitasari, A. D.	2023	Qualitative Descriptive Study	Data warehouses that are being implemented in P2P lending do play a great role in maintaining P2P system development time by time.	Data warehouse helps Peer-to-peer lending business to be more easy-accessible than conventional banks.
Al-Okaily, A., Al-Okaily, M., Teoh, A. P., & Al-Debei, M. M.	2022	Structural Equation Modeling applying the partial least Squares Approach		
Setyaningsih, T., Murti, N. W., & Nugrahaningsih, P	2019	Quantitative Research	Data warehouses apply a simpler yet more developed-technological systematic concept.	The ease of bureaucracy and the less complicated terms compared to traditional banking institutions are the most important indicators of the belief that P2P lending is a chance for borrowers.
Taujanskaitė, K., & Milčius, E.	2022			
Putri, B. M., & Wibisono, H.	2022	Quantitative Research with Descriptive Approach	Quality of data in a data warehouse can never be separated from any form of risk management.	Only solvency risk can affect a P2P lending company's level of profitability.

Zakiyah, T.	2021	Quantitative Research	Data warehouses makes it easier for MSME's owner to get loans from P2P lending business.	The primary component of this peer-to-peer lending company operation is technological advancement.
Safitri.	2019	Quantitative Research by data of OJK	Data warehouses record numbers of lenders and borrowers from month to month.	With more accounts being opened by both lenders and borrowers, fintech in Indonesia has grown dramatically month over month.
Agustina, A.	2022	Quantitative Research	Data warehouses change some aspects in Fintech business operations.	Fintech adaptation surely gave many significant impacts to the lifestyle and behavior of business development in general.

Table 4: Studies of Technology Implementation in Peer-to-Peer Lending by Scope of Analysis

Study	Year	Research Objectives	Methodology	Data Sources	Scope of Analysis
Kagermann, H., Wahlster, W., & Helbig, J.	2013	Obtain knowledge of industry 5.0 and its relation with technologies in the sector of financial (Fintech).	Qualitative Research	Data of German manufacturing Industry companies, Industrie 4.0 Working Group	Industry 5.0 is the integration of cutting-edge technology including robotics, artificial intelligence, and the Internet of Things.
A, E. O.	2018	Investigate lending business model and its platforms	Qualitative Research	Committee on the Global Financial System & Financial Stability Board	<ul style="list-style-type: none"> <li>• Both the borrower's and the investor's sectors of peer-to-peer lending use lending platforms.</li> <li>• Fintech credit activity</li> <li>• Types of loans</li> </ul>
Djaakum, C. S.	2019	Acknowledge kinds of technologies developed to the sector of Fintech, specifically P2P	Quantitative Descriptive Research	Survey Questionnaires	Examine the fact that P2P lending is well received by users and relation of Fintech to TAM.
Octavini, N. A., & Puspitasari	2023	Investigate difference between Fintech Peer-to-peer Lending	Quantitative	Cluster Random Sampling	Fintech dominance Instead of traditional banks, peer-to-peer lending banks.

		banks and conventional banks			
Annas, M., & Anshori, M. A.	2021	Observing Problem-possibility of Peer-to-peer Lending business	Qualitative Literature Review	Secondary Data Analysis	Possibility of borrowers failing to pay loans which affect the overall system of Peer-to-peer Lending business.
Putri, B. M., & Wibisono, H.	2022	Investigate further regarding the concept of solvency risk in Peer-to-peer Lending business	Quantitative Research	Financial Statement of Companies throughout 2019-2020	How much the level of profitability of the peer-to-peer lending industry is influenced by solvency risk.
Yeo, E., & Jun, J.	2020	Investigate competition of Peer-to-peer Lending business in segmented market	Bryant–Diamond–Dybvig (BDD) model	Internal Company Data	Analyze the consistency of profitability in the peer-to-peer lending industry on a certain market sector.
Havrylchyk, O., Mariotto, C., & Rahim, T. U.	2016	Explore drivers of the expansion of online lenders	Quantitative Research (SARAR)	Loan book data from Lending Club and Prosper Marketplace	In areas where conventional banking is more centralized, online lender growth has lagged.
Safitri.	2019	Investigate the numbers of lenders and borrowers	Quantitative Descriptive Analysis	Financial Services Authority (OJK) fintech data	Examine the effects of increased numbers of lenders and borrowers to economic growth.

Table 5: Studies of Technology Implementation in Peer-to-Peer Lending Business by Peer-to-peer Lending Operation Scope

Study	Year	Research Objectives	Methodology	Data Warehousing Scope	Peer-to-peer Lending Operation Scope
Kimball, R., & Ross, M.	2013	Investigate concept of data warehouse	Quantitative and Qualitative	• Integrates data from various sources to provide a single version of truth	Indirect relation regarding the importance of data systems to the operation of P2P Lending business.

				<ul style="list-style-type: none"> <li>• Enhances business intelligence capabilities</li> </ul>	
Zhu, F., Jiang, L., Wang, J., & Chen, G	2014	Information about a data warehouse that is supposed to assist top management in making decisions.	Survey Questionnaires	Providing a central repository for data and enabling analytics	Ability of a data warehouse set to be applicates in Fintech Peer-to-peer Lending business.
Maulana, Komarudin, Gunawan, & Yusuf.	2022	Investigate impact of growth in data warehouse to Fintech P2P Lending business & its platforms	Quantitative Analysis	Growth of Data Warehouses influence the increase of economic growth in Indonesia	Fintech Peer-to-peer Lending business has higher interest rate than loan funnelled on conventional banks.
Octavini, N. A., & Puspitasari, A. D.	2023	Find out whether P2P Lending can complement bank lendings in financial service activities	Qualitative Descriptive Analysis	Data warehouses makes Fintech easily accessible	Fintech Peer-to-peer getting more superior than conventional banks.
Al-Okaily, A., Al-Okaily, M., Teoh, A. P., & Al-Debei, M. M.	2022				
Alhyasat, E. B., & Al-Dalahmeh, M.	2013				
Perera, Asanka, & Boralugoda.	2021	Investigate the concept behind data warehouse	Questionnaires and Logistic Regression	The data warehouse is composed of dimension tables and fact tables.	The fact table has duplicate information for analytical purposes, which is helpful for the Fintech Peer-to-Peer Lending industry.

**RQ 2: What is Condition of this peer-to-peer lending company after applied data warehouse technology?**

Table 6: Studies of P2P Company's Condition after Applying Data Warehouse

Study	Year	Methodology	Data Warehouse Implementation	Condition of Peer-to-peer Lending Company
Setyaningsih, T., Murti, N. W., & Nugrahaningsih, P.	2019	Quantitative Research	Due to its data warehouse structure, P2P lending is perceived as a significant prospect for borrowers.	It is preferable over conventional banks because of its straightforward regulations and less complicated working environment.
Al-Okaily, A., Al-Okaily, M., Teoh, A. P., & Al-Debei, M. M.	2022	Qualitative Descriptive Analysis	A data warehouse can hold a lot of historical information.	Useful and beneficial as in simpler steps by lending loans (in the P2P sector).
Agustina, A.	2022	Quantitative Research	Future-forecast on business conditions by the data obtained.	The adoption of fintech undoubtedly has a tremendous impact on people's lifestyles and corporate growth practices in general.
Taujanskaitė, K., & Milčius, E.	2022	Quantitative Research	P2P lending is a trend in financial technology data warehouses that is rapidly growing.	Able to replace conventional banks.
Maulana, Komarudin, Gunawan, & Yusuf.	2022	Quantitative Analysis	The development of data warehouses for peer-to-peer lending has an effect on Indonesia's economic development.	The interest rates on loans obtained through peer-to-peer platforms are greater than those obtained through traditional banks.
Zakiah, T.	2021	Quantitative Research	The primary component of this peer-to-peer lending company operation is technological advancement using the system of data warehouses which minimize the use of unnecessary data and helps to make company's decisions.	More opportunity for people in many sectors of life due to easier access to loans.

Table 7: Studies of P2P Company’s Condition after Applying Data Warehouse by Data Analysis Techniques and Key Findings

Study	Year	Research Objectives	Sample Size	Data Analysis Techniques	Key Findings
Darmansyah, D.	2014	Investigate the trends and patterns of Peer-to-peer Lending business growth	376.261 observation points between January 2007 and December 2013 represent a total funded loan volume of \$3.2 billion.	Cross Sectional Regression	Online lenders have expanded into areas with a weak branch network. This shows that because they have less brand loyalty, borrowers are more likely to turn to online lenders if they live far from a real bank branch or if they had a bad branch experience because of lengthy wait periods.
Safitri.	2019	Observe the 18 months of OJK’s as the Fintech sector development	Financial Services Authority (OJK) fintech data January 2018 - August 2019	Quantitative & Collect Secondary Data	An evolution in the financial sector is taking place in Indonesia as a result of the emergence of a new service model known as fintech, which combines economics and technology to produce a range of products that improve the lives of consumers. The main factors influencing Indonesia's extremely quick development of fintech are lifestyle changes and readily available technology.
Havrylchyk, O., Mariotto, C., & Rahim, T. U.	2016	Assessing the effect of the operational cost ratio, the net interest margin, the loan to deposit ratio, the non-performing loan, and the capital adequacy ratio on the return on assets.	There were about 32 banking companies listed on Bursa Efek Indonesia (BEI) in 2012.	Purposive Sampling	The Loan to Deposit Ratio does not have a negative or adverse effect on Return on Asset. Additionally, the rise of online lenders has lagged in areas with more ware.

Table 8: Studies of P2P Company’s Condition after Applying Data Warehouse by Data Warehouse Integration, Performance Metrics, and Key Findings

Study	Year	Research Objectives	Data Collection Methods	Data Warehouse Integration	Performance Metrics	Key Findings
A, E. O.	2018	Investigate lending business model and its platforms	Secondary	Making business's decisions, reducing risk of credit.	Loan contract, Financial Conditions, Platforms Dilemma and its Solution.	Platforms' growth and reputation will ultimately depend on their capacity to lower credit risks and maintain a lean organizational structure, which could potentially benefit from a diversification of the available services.
Maulana, Komarudin, Gunawan, & Yusuf.	2022	Investigate impact of growth in data warehouse to Fintech P2P Lending business & its platforms	Non-probability sample from the population of all P2P lending enterprises registered with OJK and the number of digital payments	Able to maintain numbers of information and data in a system.	Proliferation of Peer-to-peer Lending business, Income growth, and Economic Expansion.	P2P lending and digital payments have a significant impact on Indonesia's economic development, accounting for 88.88% collectively.
Yeo, E., & Jun, J.	2020	Investigate competition of Peer-to-peer Lending business in segmented market	Specific Sampling Model (with criteria)	Make the overall system of Fintech Peer-to-peer Lending become simpler and easy-accessible.	Market Segmentation, Comparison of Risk, Lending Platforms.	A proper separation of the banking industry's and P2P platforms focusing more on borrowers with low credit ratings and banks focusing more on the high-credit market segment and safeguarded deposits are vital for sustainable P2P lending.

**RQ 3: What method do they implement and how does it influence the condition of peer-to-peer lending company cash flows and OPEX?**

Table 9: Studies of Method Implement & Its Influence to P2P Company’s Cash Flows and Opex

Study	Year	Methodology	Method Implemented	Influence on Cash Flows	Influence on OPEX
Finochietto, M., Santos, R., Ochoa, S. F., & Meseguer, R.	2022	Quantitative Research	Cash Flow Forecasting Model	Reducing marketing promotional activities for the sake of operating profits of cash flows may pay off in the short term	Keeping the stability of the OPEX to maintain overall Peer-to-peer Lending business.
Zhuang, Y., Nie, J., & Wu, W.	2022	Quantitative Research	Activity Based Costing	Value of cash in peer-to-peer is considered the focus of the overall operation.	Operating Expenses must be recorded continuously to be able to see OPEX pattern of the business itself
Darmansyah, D.	2014	Quantitative Research	Activity Based Costing	Cash flow needs to be stable on a Peer-to-peer Lending business so that companies, lenders, and borrowers will have their own advantage themselves.	Businesses needs to stay focus on its operational efficiency, including lending business

In the peer-to-peer lending industry, strategies like finance diversification and collaboration with insurance providers mitigate lender risks, ensuring the security of principal funds. Operational cash flow remains stable, with transactions limited within reasonable bounds. For instance, funding starts at a minimum of Rp1 million with a maximum annual interest rate of 22%. Operational cash flow security, including financial transaction data collection, is tightly maintained to prevent disruptions. This stability is vital, given the company's recognition as The Most Promising P2P Lending Platform Startup at the Finfest 2018 event. The Risk Team has implemented precautionary measures and risk modeling, supported by policies from the Financial Services Authority (OJK) in response to COVID-19. These measures include operational adjustments, travel restrictions, and limitations on internal and external meetings, aiming to stabilize operations, including data warehouse strategies, operational expenditures, and cash flow management, amidst external uncertainties.

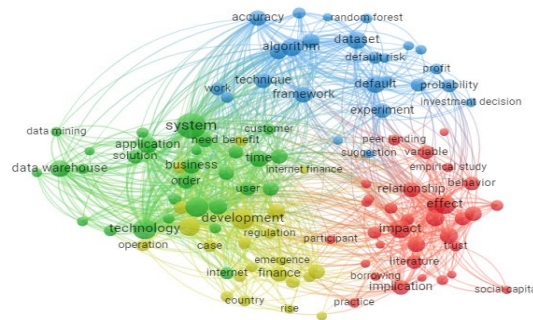


Fig. 4: Bibliography Coupling

The systematic literature review revealed limited research on the intersection of peer-to-peer lending, data warehouses, and operational expenditure (OPEX) within lending businesses. However, notable studies like "Accelerated Growth of Peer-to-Peer Lending and Its Impact on the Consumer Credit Market: Evidence from Lithuania" by Taujanskait et al. (2022), and "An empirical study on data warehouse systems effectiveness: the case of Jordanian banks in the business intelligence era" by Al-Okaily et al. (2022), provided valuable insights. These studies highlighted trends, patterns, and the importance of data warehouses in fintech lending. Additionally, the analysis of bibliographic coupling uncovered areas of disagreement, particularly regarding the rivalry between banks and peer-to-peer lending businesses, signaling the need for further investigation. This comprehensive perspective enriched our understanding of major references and trends in the literature, providing actionable insights for practitioners in the P2P lending sector.

Table 10: RQ 1, RQ 2, RQ 3 Key Findings

Research Question	Key Findings
RQ1: To what extent does technology have a part in the operation of this peer-to-peer lending company?	The study underscores the crucial role of Fintech in P2P lending, stressing the importance of adopting fintech innovations to optimize processes, enhance risk assessment, and improve customer experiences. Failure to embrace fintech solutions could result in stagnation or decline in competitiveness.
RQ2: What is the condition of this peer-to-peer lending	The study's observation of a stable data warehouse in

company after applied data warehouse technology?	P2P lending businesses highlights operational excellence and underscores the importance of stakeholder collaboration. Practitioners should prioritize maintaining the data warehouse's health and efficiency, focusing on user-friendly interfaces, and streamlined data management to enhance user experiences and build trust and loyalty.
RQ3: What method do they implement and how does it influence the condition of peer-to-peer lending company cash flows and OPEX?	The study emphasizes the importance of rigorous financial management, particularly in monitoring cash flow and operational expenditure (OPEX) stability. Practitioners must maintain disciplined recording and reporting mechanisms for business sustainability and optimal resource allocation, highlighting the need for robust financial controls in the evolving fintech landscape.

This study highlights the importance of technology integration, collaborative data warehouse management, and financial oversight for P2P lending. Past studies (A, 2018; Taujanskait & Milius, 2022; Maulana et al., 2022) offer insights into lending models but often rely on specific data sources. In contrast, this study incorporates diverse sources, enriching the analysis. However, limitations include potential biases and language restrictions in the review process.

#### 4.1. Implications for Theory & Practice

Table 11: Theory and Practice Further Implications

Implications for Theory	Implications for Practice
<p><b>Shaping of Academic Thought:</b> This study addresses gaps in peer-to-peer lending knowledge, providing empirical evidence on previously unexplored topics like OPEX, cash flow, and P2P lending models.</p>	<p><b>Operational Excellence Through Fintech:</b> Practitioners in P2P lending must view fintech as essential to their operations, as it can enhance user experiences, streamline processes, and improve efficiency.</p>
<p><b>Foundation for Further Research:</b> This research identifies contentious areas for future studies, offering a foundation for specialized research. Scholars can explore these areas further using mixed methods or qualitative approaches for richer insights.</p>	<p><b>Strategic Focus on Data Warehousing:</b> Organizations must prioritize maintaining and upgrading the data warehouse for informed decision-making. Leveraging stored data for actionable insights can drive strategic directions.</p>
<p><b>Reinforcement of Bibliometric Techniques:</b> The deployment and discussion around bibliometric techniques reinforce their utility in academic research. As these techniques gain traction, this research can be referred to as a methodological guide for novice researchers.</p>	<p><b>Robust Financial Controls:</b> In a domain where financial trust is paramount, the emphasis on cash flow and OPEX stability cannot be understated. Institutions should integrate advanced financial analytics tools and hire financial strategists to ensure optimal resource allocation and risk management.</p>
<p><b>Chronological Mapping of Ideas:</b> The chronological study of references paves the way for</p>	<p><b>Evolving Customer-Centric Strategies:</b> The study sheds light on the importance of trust and</p>

<p>understanding the evolution of ideas in the field. This understanding is critical for scholars to see the journey of thought processes, methodologies, and findings over time.</p>	<p>loyalty in the P2P lending business. To foster this trust, businesses should evolve their strategies to be more customer-centric, offering seamless, transparent, and quick services.</p>
	<p>Competitive Advantage through Continuous Innovation: In the dynamic fintech landscape, continuous innovation is essential for P2P lending businesses to stay competitive. This means updating tech infrastructure, refining lending protocols with data insights, and embracing global best practices.</p>

#### 4.2. Suggestion for Potential Avenue

Future research in Peer-to-Peer (P2P) lending could explore the impact of emerging technologies like artificial intelligence and blockchain on lending processes. Understanding how these technologies enhance efficiency and security in P2P lending platforms is crucial for further advancements in the field.

Further research could delve into lenders' risk assessment strategies in P2P lending, exploring the types of information used and the accuracy of these assessments. Additionally, global-scale studies could shed light on how P2P lending platforms operate across diverse regulatory environments, economic conditions, and cultural contexts. Lastly, investigating the social and economic impacts of P2P lending, including its effects on traditional banking systems and financial inclusion, could provide valuable insights. Pursuing these research avenues can deepen our understanding of P2P lending and inform industry practitioners and policymakers in navigating its evolving landscape.

### 5. Conclusion

The systematic literature review on peer-to-peer lending business reveals its multifaceted nature, covering internal and external factors, impacts, and solutions. Utilizing SLR methodology and various analysis techniques, the study explores Scopus-indexed articles from 2010 to 2023, shedding light on the role of data warehouses in P2P lending operations. Through RQ1, it emphasizes technology's integral role in P2P lending, driven by fintech advancements. RQ2 highlights the stable state of data warehouses, crucial for operational efficiency and stakeholder collaboration. RQ3 underscores proper cash flow and OPEX stability, essential for business sustainability. The study's contributions include a comprehensive analysis, bibliometric mapping insights, and emphasis on operational stability, financial diligence, and fintech's influence. Applications range from strategy enhancement to regulatory implications and technology development, setting a foundation for future research and industry innovation.

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