

Understanding Mental Model of Displaced Commercial Risk Using System Dynamics

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Abstract

Islamic banking as an intermediary institution faces unique challenges in the form of Displaced Commercial Risk (DCR)—the risk of customer funds moving to conventional banks due to the inability to compete in providing returns. This study aims to develop a dynamic model of DCR management using the System Dynamics approach to understand the complex interactions between variables such as conventional interest rates, Islamic profit sharing, branch growth, and customer satisfaction. Data were collected through interviews with Islamic bank management, customers, regulators, and financial statement analysis. The results of the Causal Loop Diagram (CLD) modelling identified four feedback mechanisms: (1) Loop R1 (The negative impact of return differentials on client retention in Islamic banking), (2) Loop B1 (the effect of branch expansion on market share), (3) Loop B2 (dynamics of operational costs vs. profitability), and (4) Loop B3 (the role of service quality in mitigating DCR). Simulations show that fluctuations in conventional interest rates and operational efficiency are critical factors in the stability of Islamic bank funding. This study recommends integrating competitive profit-sharing policies, branch network optimization, and technology adoption to reduce DCR. This model provides theoretical contributions to Sharia risk management based on system dynamics and practical guidance for regulators and industry players.

Keywords: *Displaced Commercial Risk, Islamic Banking, System Dynamics, Risk Management, Financial Intermediation.*

INTRODUCTION

The financial services industry, especially banking, has an intermediary function, namely carrying out business activities to collect funds from the public in the form of savings and redistributing them in the form of credit or financing and other business activities related to banking business activities (Siregar, 2025). Banks perform three primary functions: (1) intermediating savings from households to corporate and public sector productive investments, (2) facilitating money creation and payment systems, and (3) connecting capital providers (savers/lenders) with capital users (borrowers/investors) (Fry,

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1988). The development of the banking and financing sectors cannot be separated from the dynamics of economic development. On the monetary side, banks play an important role in the circulation of money in the market. As financial intermediaries, banks contribute to economic growth by carrying out intermediary functions, which later lead to investment and production activities in the sector (Atikah et al., 2018; Ulas & Keskin, 2015). The banking industry, with Islamic banking as an integral component, occupies a strategically vital position as both a financial intermediary and payment system facilitator.

The accelerated growth of Islamic banking has elevated its significance within global financial architecture (Ezwan et al., 2012). In 2023, the Global Islamic Finance industry recorded revenues of USD 4.5 billion, with USD 3.2 billion coming from commercial Islamic Banking. In Indonesia, Islamic finance also showed positive growth. In 2023, Indonesia ranked 3rd in the Islamic Finance Development Indicator (FDI) with the world's most significant Islamic financial assets (OJK, 2023). By the end of 2024, the market share of Islamic Banking in Indonesia reached 7.72% with total assets of IDR 980.30 trillion (OJK, 2024).

Banks, as dynamic financial entities, continually confront inherent risks stemming from internal and external pressures and uncertainties (Islam et al., 2013a). Islamic banks inevitably encounter multiple risks arising from the inherent complexities of their operational framework. The unique characteristics of Syrah-based contracts in Islamic banks make the structure of their financial position reports different from the structure of financial position reports in conventional banks. The evolving nature of Islamic banking has transformed its risk profile. While traditionally exposed to financing (credit) and market risks, Islamic banks now confront more complex risk categories, including investment risk. This risk emerges specifically from profit-sharing financing (such as *mudharabah* and *musharakah*), where returns depend on debtor performance, introducing volatility not present in conventional debt-based systems.

The manifestation of investment risk in Islamic banks induces Displaced Commercial Risk (DCR), whereby volatility in profit-sharing ratios motivates depositors to reallocate funds to conventional banks providing higher returns (Rismayani & Nanda, 2019b). Zainol & Kassim, (2010), further explain that DCR stems from return risk—a unique challenge where Islamic banks, despite Sharia-compliant operations, struggle to match conventional banks' deposit returns. Among all risks (e.g., operational, liquidity), DCR is the most critical for Islamic banks due to its systemic implications (Ahmed & Khan, 2007). Its management is particularly complex, as it hinges on external competitors' policies. DCR may also originate from Sharia Compliance Risk. As a cornerstone of Islamic risk management, Sharia Compliance ensures adherence to Islamic principles, fostering institutional integrity and credibility. Failure to maintain this compliance damages the bank's

reputation, accelerating customer attrition and exacerbating DCR exposure.

Displaced Commercial Risk (DCR) represents a unique challenge for Islamic banks operating within Indonesia's dual banking system. While this system offers customers complementary choices—enabling access to both interest-based (conventional) and Sharia-compliant (non-riba, fair, and halal) financial services (Hasanah et al., 2013)—it also exposes Islamic banks to competitive pressures. As newer entrants, Islamic banks inherit risks similar to conventional banks but with added complexities due to their Sharia principles. Crucially, in such a dual-system environment, policymakers must prioritize stabilizing interest rates and financial mechanisms to ensure Islamic banking's sustainable growth.

Several researchers have conducted studies on Displaced Commercial Risk in Islamic Banks. Haron & Ahmad, (2000) calculated the adaptive expectation of conventional interest rates with the number of deposits in Islamic Banks. Meanwhile, Kaleem & Isa, (2003) showed that conventional deposit interest rates affect the return on Islamic deposits for all categories. Kader & Leong, (2009) empirically demonstrated that Malaysian Islamic banks remain exposed to interest rate risk, particularly showing a positive correlation between conventional base lending rates and Islamic financing volumes - with *bai' bithaman ajil* (BBA) financing being most significantly affected. Zainol & Kassim, (2010) empirically identified the existence of Displaced Commercial Risk (DCR) through their finding of a statistically significant inverse correlation between aggregate Islamic bank deposits and prevailing conventional interest rates. The research results by Arshad et al., (2014) stated that Islamic Banks operating in a dual banking system are affected by Displaced Commercial Risk. The risk of losing deposits occurs when the profitability of Islamic banks is lower than that paid by competing banks, in this case, conventional banks, and it can be concluded that the relationship between the profitability of Islamic Banks and Displaced Commercial Risk is proven to be significant and negative.

In Indonesia, research on Displaced Commercial Risk has been conducted by several researchers, such as Hasanah et al., 2013; Hutapea & Kasri, 2010; Rismayani & Nanda, 2019b, 2019a; Rohmatur A & Septarini, 2016; Solissa, 2017. Hasanah et al., (2013) researched the displacement of commercial risk from the funding side in Islamic banks. The study results stated that Displaced Commercial Risk occurs due to floating customers. Consequently, Islamic banks must enhance customer loyalty through Sharia-compliant product innovation, thereby creating value propositions that attract and retain depositors. Hutapea & Kasri, (2010); emphasized that with increasing interest rate volatility, the margin of Islamic Banks will respond negatively while Conventional Banks respond positively. Rismayani & Nanda, (2019a) stated that third-party funds positively and significantly affect Displaced Commercial Risk. Therefore, Islamic banks need to mitigate this risk by

measuring the level of Displaced Commercial Risk so that a decrease in the rate of return on depositors can be avoided.

Along with the rapid development of Islamic banks and the development of the financial sector, which is increasingly dynamic, competitive, complex and integrated, the risks faced by Islamic banking are dynamic, and there is a mutual influence (feedback loop) between indicators and economic sectors that cannot statistically capture these dynamics. Meanwhile, until now, there has been no standard approach to comprehensively analyzing bank risk dynamics. Static models limit most risk models, so they can hardly capture rapid and discontinuous changes. Several previous researchers have conducted modelling in the banking sector using the System Dynamics approach. However, few researchers have conducted risk management modelling in Islamic banks, especially those discussing Displaced Commercial Risk. Alwani, 1980 compiled planning and control modelling into a modelling structure so that bank management can make effective decisions to achieve business goals. Anderson et al., 2011; Ishtiaq, 2015; Islam et al., 2013; MacDonald & Dowling, 1993; Pruyt & Hamarat, 2010 developed risk management modelling and stress testing of bank failure risk with system dynamics compiled planning and control modeling into a modeling structure, so that bank management can make effective decisions to achieve business goals. developed risk management modeling and stress testing of bank failure risk with system dynamics.

Thus, a systematic view of managing banking risk becomes very important (Scheffmann, 2005). Therefore, an integrated risk management model is needed to control the operational business of Islamic banks in an integrated and comprehensive manner. This model can help bank managers make effective risk management decisions and help regulators evaluate policies that have been made.

Employing system dynamics modeling, this research develops an innovative framework to analyze the complex behavioral patterns of Displaced Commercial Risk (DCR) in Indonesia's Islamic banking sector. By combining the theory of Islamic bank risk management and system dynamics, this study is expected to show how a systemic perspective can improve the structure of Displaced Commercial Risk management in Islamic banks. Modelling Displaced Commercial Risk management with System Dynamics in Islamic banks is expected to help the control system, considering that System Dynamics can analyze the feedback effects of a variable on another variable, which statistical models cannot do.

LITERATURE REVIEW

Islamic Bank Risk Profile

Islamic banks face greater risk complexity than conventional institutions due to: (1) the sophisticated nature of Sharia-compliant financial products, and (2) their distinctive operational framework (Akkizidis & Khandelwal, 2008). This dual challenge - combining unique contractual obligations with specialized financial infrastructure - results

in significantly higher risk exposure (Bacha, 2003; Iqbal & Mirakhor, 2011; Kayed & Mohammed, 2008).

Ahmed & Khan, (2007) developed a comprehensive risk taxonomy for Islamic banks, categorizing exposures into eleven distinct types: credit, market, mark-up, commodity/asset price, liquidity, operational, legal, withdrawal, fiduciary, displaced commercial (DCR), and bundled risks. In contrast, Akkizidis & Khandelwal, (2008) proposed a more condensed classification comprising seven risk categories: credit, market, equity, liquidity, rate of return, operational, and legal risks. The OJK mandates Islamic banks to evaluate ten risk categories: credit, market, liquidity, operational, legal, strategic, compliance, reputation, return, and investment risks. Islamic financial institutions are exposed to several distinctive risk categories that are institutionally absent from conventional banking paradigms, most notably fiduciary risk, rate-of-return risk, withdrawal risk, and displaced commercial risk (DCR) (Ahmed & Khan, 2007; Farooq, 2012). These Sharia-induced risk exposures emerge fundamentally from the profit-and-loss sharing (PLS) mechanisms and asset-backed transactional nature that characterize Islamic finance operations (Ahmed & Khan, 2007; Farooq, 2012).

Displaced Commercial Risk

The difference in the system used in providing customers' return rates between Islamic and conventional banks is one of the triggers for the emergence of Displaced Commercial Risk (DCR) in Islamic banks. Displaced Commercial Risk (DCR) also occurs due to competitive pressure on banks to attract and retain investors or depositors (How et al., 2005; Sundararajan, 2008). Toumi et al., (2018) conceptualized Displaced Commercial Risk (DCR) as an unanticipated loss absorbed by Islamic banks to maintain competitive returns for investment account holders. This absorption mechanism inadvertently elevates withdrawal risk, exposing banks to potential deposit outflows when returns become non-competitive. (El-Hawary et al., 2004; Touri et al., 2020).

Extant research demonstrates that return rates significantly influence customer deposit decisions in Islamic banks. Studies by Rismayani & Nanda, 2019b; Rohmatur A & Septarini, 2016; Wahab, 2016 establish that depositors prioritize competitive returns when selecting between Islamic and conventional banks. This profit-oriented behavior is further corroborated by Musri & Rama, (2015), who found that depositors across both systems are primarily motivated by financial returns rather than institutional type. Cross-cultural analyses in Malaysia Marimuthu et al., (2010) and Amin et al., (2011) reveal that banking preferences are driven by service quality, promised returns, and product diversity rather than religious affiliation. These findings align with Zainol & Kassim, (2010) discovery of a statistically significant inverse relationship between conventional bank interest rates and Islamic bank deposit volumes. When Islamic banks underperform conventional counterparts in profitability, they face elevated Displaced Commercial Risk (DCR) – a phenomenon quantitatively confirmed by

(Arshad et al., 2015) through negative correlation analysis between Islamic bank profitability and DCR exposure.

Third-party funds constitute the primary funding source for Islamic banks, representing their largest liability component. Consequently, Islamic banks' total funding capacity is directly contingent upon depositor behavior (Daher et al., 2015). This dependence creates significant exposure to Displaced Commercial Risk (DCR), particularly when return rates underperform market expectations. High deposit volumes reflect strong public trust in Islamic banking; however, suboptimal returns may trigger fund migration to conventional banks, thereby materializing DCR. Based on several previous studies, the factors that influence Displaced Commercial Risk (DCR) include the funds of the investment Account Holder (FIAH), The Total Deposits (DIB), the Islamic Rate of Return (RRI), and The Conventional Interest Rate (IR) (Arshad et al., 2014).

METHOD

In this study, a dynamic model of the triggering factors of Displaced Commercial Risk in Islamic banks will be developed using the System Dynamics approach by considering related theories, identifying risk factors that influence each other, and compiling a feedback structure (causal loop) in order to understand the risk management mechanism in Islamic banks. System dynamics is applied because it is based on the character of the financial system, which is dynamic and has a mutually influencing relationship between variables. It also includes the role of management policies to prevent further risks previously ignored in developing research variables. In developing a mental model using system dynamics, there are four general stages as a methodology: defining research questions, developing conceptualization and model formulation, then verification-validation (Atikah et al., 2018)

Developing a robust Displaced Commercial Risk (DCR) management model in Islamic banks requires various financial data and information from the relevant banks. The research data was collected through in-depth interviews with Islamic bank management, customers, and policymakers and analysis of relevant bank financial reports. In addition, the data also includes regulations and policies that have been implemented. The results of mapping these regulations and policies are then translated into input indicators. Meanwhile, the output indicators are quantitative variables—in this case, the number of Islamic bank customers—influenced by the input indicators.

The next step is to develop a causal diagram (Causal Loop Diagram) to visualize the mental model of Displaced Commercial Risk in Islamic banks. Causal Loop Diagram is a simple map of a system with all its components and their interactions. The Causal Loop Diagram explains the system's behavior to be modelled (Keovongvichith, 2012; Sterman, 2000). By understanding the structure of a system, it is possible to understand the system's behavior over a specific period. The structure of the Causal Loop represents elements that exist in the real

world and are identified as variables in the system. The relationship between structures is indicated by arrows illustrating how a variable affects another variable.

RESULT AND DISCUSSION

Based on the results of preliminary research conducted by researchers on several Islamic bank customers, it can be seen that the behavior of Islamic bank customers in Indonesia, in addition to having a motive of obedience to religious law, also has a profit motive in saving their funds in the bank. This causes Islamic bank customers in Indonesia to be sensitive to changes and differences in the level of return received. Empirical findings by Greuning & Iqbal, (2008) substantiate this phenomenon, demonstrating that Islamic banks' failure to maintain competitive profit-sharing ratios relative to conventional deposit rates induces customer migration to interest-based financial institutions. This behavioral response reflects rational depositor utility-maximization in dual banking systems. Likewise, research by Khan & Ahmed, (2001) found that Displaced Commercial Risk (DCR) is the most critical risk faced by Islamic banks compared to other risks, such as operational and liquidity risks. The reason is that this risk faces a lower rate of return on assets than expected by current investment account holders.

Suppose there is a difference in the rate of return between Islamic and conventional banks, where conventional banks offer a higher rate of return than Islamic banks. In that case, Islamic bank customers tend to move their funds to conventional banks. This condition makes Islamic banks face the problem of Displaced Commercial Risk. If not appropriately managed, this risk will become a problem for Islamic banks because there will be a withdrawal of funds in a relatively large amount that will threaten the liquidity of Islamic banks. Figure 1 shows the Mental Model of the Displaced Commercial Risk management framework in Islamic Banks.

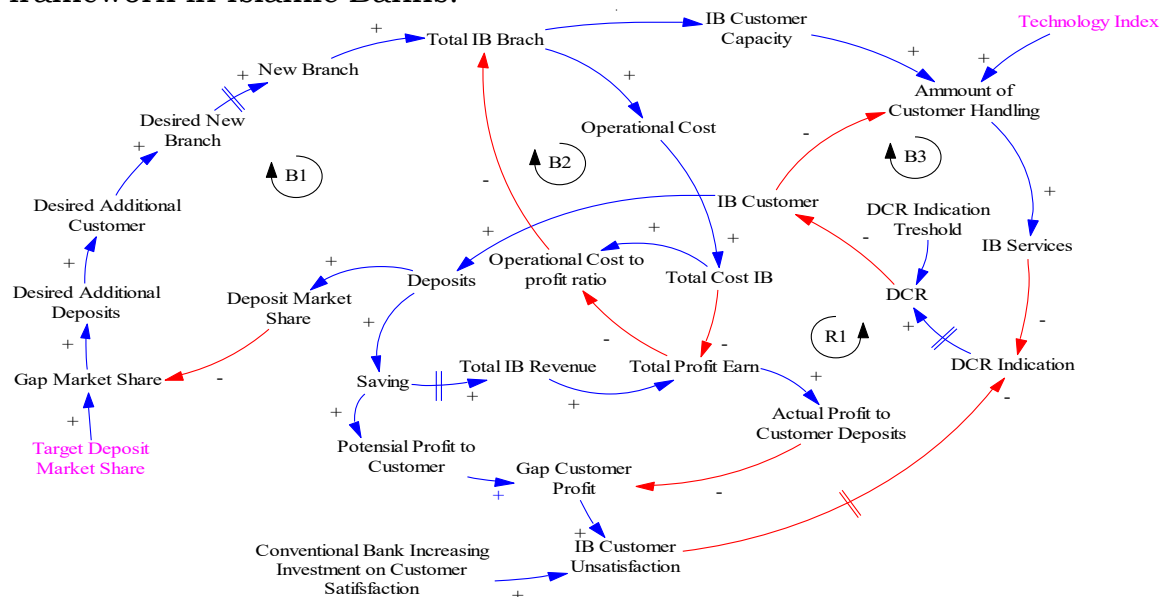


Figure 1. Causal Loop Diagram of Displaced Commercial Risk Management in Islamic Banks

In Figure 1, there are four loops with certain symbols and codes. The clockwise loop symbol with the R-code shows the reinforcement effect and the counterclockwise loop symbol with the B-code shows the balancing force. In addition, there are also blue/red arrows with two positive and negative symbols. The arrow describes the direction, and the positive or negative indicates the effect.

In the R1 loop, the dynamics that affect the DCR indication from the performance side of Islamic Banks against Conventional Banks based on the return value to customers are visible. If the interest rate of conventional banks is higher than the profit-sharing rate of Islamic Banks, then the DCR indication can increase. The flow of the formation of Loop R1 is as follows: IB Customer → Deposits → Saving → Potential Profit to Customer → Gap Profit Customer → IB Customer Unsatisfaction → DCR Indication → DCR → IB Customers. An expansion in the Islamic bank customer base elevates third-party fund volumes, consequently increasing deposit levels. However, this deposit growth exerts downward pressure on profit-sharing rates, adversely affecting customer return expectations. When conventional bank interest rates surpass Islamic banks' profit-sharing rates, customer satisfaction declines, amplifying Displaced Commercial Risk (DCR) indicators. This escalation in DCR signals directly correlates with heightened risk exposure, ultimately reducing the Islamic banking customer base through fund migration.

In Loop B1, the dynamics of increasing Islamic Bank branches to increase market share are seen so that the more branches are built; the target market share can be achieved. The flow of Loop B1 formation is as follows: IB Customer → Deposits → Deposit Market Share → Gap Market Share → Desired Additional Deposits → Desired Additional Customers → Desired New Branch → New Branch → Total IB Branch → IB Customer Capacity → Amounts of Customer Handling → IB Services → DCR Indication → DCR → IB Customers. Loop B1 can be explained as follows: if the number of Islamic Bank customers increases, the amount of Third-Party Funds will also increase, so the market share of Islamic Banks will also increase. If the number of Islamic Bank market shares increases, it will reduce the gap in the market share (comparison of actual market share and target market share). If the Market Share Gap decreases, it will increase the need for additional Third-Party Funds and the need to increase the number of Islamic Bank customers. If the desire to increase the number of Islamic Bank Customers increases, the need to add new branches also increases. The increasing need for new branches in Islamic Banks will increase the number of new branches, so the total number of Islamic bank branches will also increase. With the increasing number of Islamic Bank branches, the number of Islamic Bank customer capacity will also increase, which results in the number of customers served will increase along with the increasing number of services at Islamic Banks. If the number of

services at Islamic Banks increases, this condition will reduce the indication of DCR so that the possibility of DCR risk will also decrease. If the DCR risk decreases, this condition will increase the number of Islamic Bank customers.

In Loop B2, the financial dynamics of Islamic Banks are visible. These dynamics can indicate the capacity of Islamic banks to maintain their branches; the smaller the ratio of income and operational expenses, the more branches will be reduced. The flow of the formation of Loop B2 is as follows: Total IB Branch \rightarrow Operational Cost \rightarrow Total Cost IB \rightarrow Total Profit Earn \rightarrow Operational Cost to Profit Ratio \rightarrow Total IB Branch. The formation of Loop B2 can be explained as follows: if the number of Islamic Bank branches increases, it will increase the operational costs of Islamic Banks, and this condition will also result in an increase in the Total Costs that Islamic Banks will incur. If the total costs of Islamic Banks increase, the total profit obtained will decrease, so the ratio between operational costs and profits will increase; this condition will decrease the number of Islamic Bank branches.

In Loop B3, the dynamics that affect the DCR indication from the service side of Islamic Banking are visible. Islamic banking service delivery comprises two critical dimensions: (1) institutional Sharia compliance and (2) functional service capability, representing the intersection of ethical and operational requirements. The flow of the formation of Loop B3 is as follows: IB Customer \rightarrow Amount of Customer Handling \rightarrow IB Services \rightarrow DCR Indication \rightarrow DCR \rightarrow IB Customers. The formation of Loop B3 can be explained as follows: An expanding Islamic bank customer base necessitates proportional service capacity growth, resulting in increased service delivery volume to accommodate higher demand. If the number of services at Islamic Banks increases, the indication of the emergence of DCR will decrease, resulting in no DCR risk at Islamic Banks. This condition will increase the number of Islamic Bank Customers.

CONCLUSION

Sharia bank customers in Indonesia are still sensitive to profits, making Sharia banks vulnerable to fluctuations in conventional bank interest rates. Although this does not immediately trigger a transfer of funds in the short term, the mismatch of profit sharing with customer expectations in the long term can increase the risk of Displaced Commercial Risk (DCR).

The expansion of the branch network of Islamic banks has a dual impact. On the one hand, adding branches can increase the number of customers and third-party funds, allowing for greater financing distribution. This can increase bank profits and profit sharing with customers, reducing Displaced Commercial Risk (DCR) indications. On the other hand, this expansion will increase the bank's operating costs. Therefore, management needs to conduct a careful cost-benefit analysis before adding new branches because operating costs that are too high

can actually reduce the bank's profitability and ultimately reduce the bank's ability to provide competitive profit sharing to customers.

Empirical evidence confirms that technology adoption positively correlates with enhanced operational efficiency in Islamic banking systems. Implementing financial technology (fintech) and digitalizing business processes can improve operational efficiency and the quality of Islamic banking services. The enhancement of service quality positively influences customer satisfaction levels, consequently mitigating the likelihood of Displaced Commercial Risk (DCR) occurrence. In other words, effective digital transformation not only improves the operational performance of banks but also strengthens customer loyalty, thereby reducing the risk of funds moving to conventional banks.

Displaced Commercial Risk (DCR) poses a significant challenge to the sustainable operations of Islamic financial institutions. When DCR indications appear, Islamic banks will face the risk of massive withdrawals by customers who transfer their funds to conventional banks. This phenomenon can trigger a liquidity crisis that endangers the continuity of Islamic banks because the decline in third-party funds will reduce the bank's ability to meet its short-term obligations while limiting the capacity for financing distribution. This system dynamics analysis of Islamic bank risk management yields two key research recommendations: (1) model enhancement through incorporation of interbank transactions and Sharia-compliant product specifications across funding and financing channels, and (2) policy scenario testing within the DCR management simulation framework.

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