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Synthesis of Risk Management in Industrial Integration and Downstream for Global Economic Resilience: A Systematic Literature Review

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Abstract. This research aims to analyze the role of risk management in industrial integration and downstream processes in building economic resilience in the midst of global dynamics. The methodology used includes a Systematic Literature Review (SLR) using the PRISMA 2020 framework, which combines 11 reputable scientific articles related to the research subject. The analysis process was carried out through data extraction, variable grouping, and thematic synthesis to identify patterns of relationships between key variables, namely industrial integration, downstreaming, risk management, and resilience. The results show that industrial integration and downstream contribute to resilience through increased production capacity, system coordination, and adoption of digital technologies. The phenomenon of digitalization has been empirically demonstrated to improve sustainability, strengthen resilience, and optimize risk management, in addition to improving supply chain performance. Nevertheless, the efficacy of integration and downstream processes is affected by many risks, including geopolitical instability, regulatory hegemony, market consolidation, and fragmentation of policy frameworks. In addition, elements such as technological advancement, capital investment, institutional integrity, and governance mechanisms serve as reinforcing factors, while dependence on energy resources and deficiencies in coordination serve as weakening factors. The conclusion of this study confirms that industrial resilience is not only determined by integration and downstreaming, but by the system's ability to manage risks strategically and adaptively. This research contributes to expanding the perspective of strategic management and risk management in the context of sustainable downstreaming-based industrialization.

Keywords: Industrial integration, downstreaming, risk management, economic resilience, digitalization.

I. Introduction

In the past two decades, the dynamics of the global economy have been characterized by the increasing complexity of relations between countries, the fragmentation of supply chains, as well as the simultaneous pressures of health crises, geopolitical conflicts, and climate change, which demand each nation to not only pursue economic growth but also build an industrial system that is resilient to external shocks. Industrial integration and downstream process enhancement have been recognized as important strategies to add domestic value, advance the structural complexity of the economy, and reduce dependence on unpredictable global markets.

Based on research by Adams and Kaffo Fotio (2022), it is shown that economic integration has ambivalent effects that can directly reduce carbon emissions, but indirectly increase environmental degradation through urbanization, industrialization, financial sector development, and renewable energy consumption. These findings indicate that integration without adequate risk management can actually give rise to new systemic vulnerabilities, as the net effects of economic integration tend to undermine environmental quality if mediation factors are not properly controlled. Furthermore, Ghebrihiwet and Kinda (2021) emphasized that the success of downstream is largely determined by factors such as energy availability, domestic demand, raw materials, and technological capacity, where in developing countries the availability of raw materials is a key factor while in developed countries domestic demand plays a dominant role, but the research has not integrated the increasingly relevant global risk dimension in modern economic conditions. Olujobi (2021) also shows that government dominance through strict regulation in the downstream petroleum industry can create market distortions, hinder private investment, and lead to inefficiencies in product distribution, and that inappropriate subsidy policies can worsen conditions by creating opportunities for corruption and reducing incentives for investors, but this study has not examined how regulatory risks interact with other risks in affecting performance industry simultaneously. Thus, although the literature on industrial integration and downstream has developed significantly, there is still significant fragmentation both conceptually and empirically, particularly in linking the risk dimension holistically, where most research is still sectoral and focused on one particular type of risk without developing a comprehensive approach.

The research gap becomes even more critical when various cutting-edge studies show that risks in the industrial system are multidimensional and interrelated, so they cannot be understood in isolation. Türkes

(2025) proved through the Structural Equation Modeling (SEM-PLS) approach to 420 supply chain practitioner respondents that digitalization has a significant positive influence on sustainability, resilience, risk management, and supply chain integration, with risk management acting as the main mediator that strengthens the relationship between digitalization and supply chain performance, but the approach used is still partial because it places digitalization as an independent variable without integrating them within the broader risk framework as part of a strategic risk management system. Olaizola et al. (2022) show that Industry 4.0 through the use of Artificial Intelligence, Big Data, and Machine Learning is able to improve operational efficiency, optimize production processes, and enable more accurate failure prediction and identification of abnormal conditions in downstream industries, but the research is still conceptual and does not provide strong empirical evidence regarding the interaction between technology and strategic and systemic risks in the downstream industry. The context of industrial downstreaming, as well as not linking technology-based operational risks with broader global risks.

Meanwhile, Li et al. (2026) used a quantile regression panel approach in 94 countries and found that geopolitical risks have different impacts depending on the level of economic development of a country, where in developed countries geopolitical risks can actually encourage the acceleration of renewable energy adoption due to adequate institutional and financial capacity, while in developing countries these risks tend to hinder the energy transition process due to limitations institutional and financial. Qin et al. (2024) also highlight the trade-off between economic growth and environmental sustainability in the resource-based sector, where economic growth based on resource-intensive sectors has a negative impact on the environment so green policies are needed to maintain a balance, but these studies have not directly examined how global risks interact with the downstream process of the industry. Yu et al. (2024) show that the concentration of downstream markets in the dairy industry can create an imbalance in the distribution of value that negatively impacts the productivity of the upstream sector through price pressure mechanisms and unbalanced profit distribution, although there are some positive effects such as increased technical efficiency, but negative impacts remain more dominant in the long term, thus confirming the importance of market risk in determining the success of integration industry. Robi (2024) also identifies that the lack of policy integration between the industrial sector and urbanization and the centralization of power can lead to policy fragmentation that hinders industrialization in Africa, suggesting that institutional quality and institutional risk are key factors in determining the success of industrial integration. Thus, there is no single framework that comprehensively integrates the four types of risks operational, regulatory, market, and geopolitical in the context of industrial integration and downstreaming, so the current literature is still fragmented between technical and strategic approaches to risk management.

This research is very important to be carried out because the current global economic conditions are characterized by unprecedented uncertainty, as revealed by Yang et al. (2026) that foreign investment, technology, and the quality of human resources are the main determinants in increasing the economic resilience of ASEAN countries to global shocks such as the COVID-19 pandemic and the global financial crisis. However, the study is still aggregative and does not specifically examine the role of industrial integration and downstream processes in forming resilience, and the approach used is still limited to the direct relationship between variables without considering the complex interactions between multidimensional risks. Lyu et al. (2026) through a quasi-natural experiment approach with the Difference-in-Differences (DID) method showed that the integration of informatization and industrialization is able to improve the ESG performance of companies through green innovation mechanisms, improved corporate governance, and information transparency, with a more significant impact on high-tech companies, non-state-owned companies, and low-growth companies, but this study has not integrated Digitalization in a broader risk framework because digitalization tends to be positioned as a technical solution part of a strategic risk management system. Therefore, the need for an integrated risk management model is urgent to fill the gap between theory and practice, as well as to provide guidance for policymakers and industry players in building systems that are resilient to global economic fluctuations, where the model must be able to integrate different types of risks and take into account the role of technology and internal capacity in increasing economic resilience. This research will systematically synthesize the existing literature, identify patterns of relationships between variables, map the gaps that still exist, and propose a direction for the development of a holistic conceptual model, thus making a theoretical contribution in integrating three domains that have been running separately, namely industrial integration, downstreaming, and risk management.

Based on this, this research was formulated to answer three main research questions:

RQ1. How does industrial integration and downstream processes contribute to resilience in the context of the global economy?

RQ2. What are the most prominent risks in industrial integration and downstream processes, and how is risk management positioned in the literature?
RQ3. What factors strengthen or weaken the relationship between industrial integration, downstreaming, and resilience?

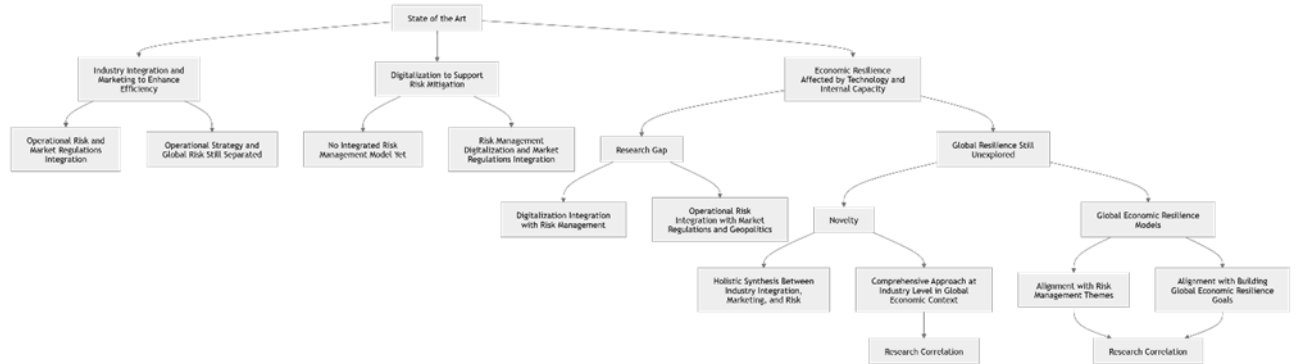


Figure 1. Diagram of State of The Art, Research Gap, Novelty, Originality, and Research Correlation

II. Research Method

This research method uses a Systematic Literature Review (SLR) design with a quantitative-descriptive approach that focuses on a structured synthesis of the risk management related literature in industrial integration and downstream processes to achieve global economic resilience. This design follows the PRISMA 2020 flow, which includes the stages of identification, screening, eligibility, and inclusion as visualized in the diagram presented. The research sample is in the form of scientific articles indexed in the Scopus database with a publication year range of 2021–2026 and predetermined inclusion criteria, namely articles that are relevant to the keywords integration industrialization, global economic resilience, and downstream industry, and meet quality standards (Q1). From a total of 178 initial articles, an elimination process was carried out based on duplication, topic incompatibility, and absence of abstracts, until 11 articles were obtained that met the final criteria as an analysis unit.

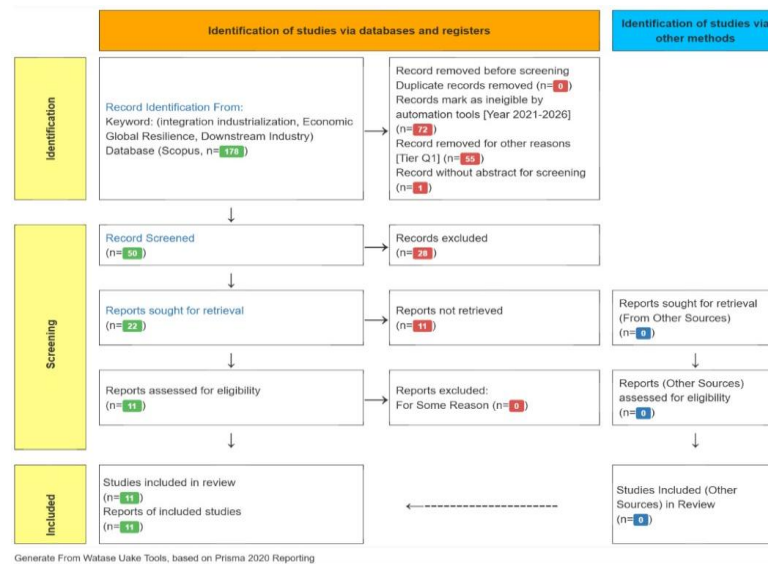


Figure 2. Prisma Reporting

The research instrument used is in the form of a data extraction form that is systematically designed to capture important information from each article, including research variables, theories used, analysis methods, and main findings. The data collection procedure was carried out through a systematic search on the Scopus database using a combination of keywords that had been determined, followed by a head-based and abstract-based filtering process, as well as a full feasibility assessment of articles that passed the initial stage. The entire process is done in a transparent and documented manner to ensure replication by other researchers.

The analysis methods used are thematic analysis and narrative synthesis, which aims to identify patterns of relationships between variables, research gaps, and theoretical and practical contributions from each study. In addition, a simple quantification approach is also carried out on the distribution of publications per year to see the trend of research development. With this approach, the results of the analysis are not only descriptive but also able to provide a strong conceptual mapping related to the role of risk management in supporting industrial resilience through the downstream process.

III. Research Results

1. Distribution and General Characteristics of Studies

The results of the synthesis show that the total number of studies included in the final analysis is 11 articles that have passed all stages of selection based on the PRISMA 2020 protocol. All articles are from the Scopus database with a range of years of publication between 2021 to 2026, which shows a focus on the current literature. The temporal distribution shows an increase in the number of publications in the period 2021–2025, with peaks in the number of articles in 2024 and 2025 compared to previous years. The studies covered a wide range of geographic contexts, including developing and industrialized countries, providing cross-regional data coverage. Based on the type of research, the majority of articles use quantitative approaches, while a small percentage use qualitative and mixed-method methods. The main topics raised include industrial integration, downstreaming, risk management, and economic resilience. Each article has a different focus on examining the relationship between these variables, either directly or through mediation and moderation variables. Overall, the entire study presented empirical or conceptual data that were relevant to the research theme.

2. Research Variables Used in Studies

The results of the data extraction showed that the variables used in the 11 studies could be classified into several main groups. The independent variables that most often emerge include industry integration, risk management capabilities, industry policies, and downstream strategies. The dominant dependent variables are economic resilience, industrial performance, and business sustainability. In addition, there are mediating variables such as organizational capability, operational efficiency, and innovation, which are used in some studies to explain the indirect relationship between variables. The moderation variables identified included external environmental conditions, the level of digitalization, and government policy support. Some studies also include additional variables such as supply chain complexity and market uncertainty as contextual factors. Each article uses a different combination of variables according to their respective research objectives. These variables were measured using various indicators, both based on the Likert scale and secondary data. Overall, there were variations in the operationalization of the variables used in each study.

3. Methodological Approach in Analyzed Studies

Based on the results of the synthesis, the methodological approach used in the 11 studies showed significant variations. Most of the research uses quantitative methods with analytical techniques such as Structural Equation Modeling (SEM), linear regression, and data panel analysis. Some studies use qualitative methods with a case study approach to explore the phenomenon in depth. In addition, there are studies that use the mixed-method method to combine quantitative and qualitative data. The data collection techniques used include questionnaire surveys, interviews, and secondary document analysis. The sample size in quantitative research varies, ranging from tens to hundreds of respondents, depending on the context of the study. Qualitative studies generally use a limited number of cases but with a high depth of analysis. Some articles also use secondary data from industry reports or official databases. In general, the methods used in these studies are adjusted to the objectives of each research. There was no single dominant method used exclusively in all studies.

4. Key Findings Related to Industrial Integration and Downstream

The results of the synthesis show that all studies present data related to industrial integration and downstream processes in various sectors. Some studies report that industry integration is measured through indicators such as coordination between sectors, supply chain integration, and collaboration between organizations. The downstream process in these studies is measured through product added value, output diversification, and resource-based industry strengthening. The data presented show that there is a variation in the level of implementation of industrial integration in various countries and sectors. Some articles report a high level of integration in the manufacturing sector, while others show a lower level of integration. The

downstream process also shows differences based on the level of economic development of a country. These studies present numerical and descriptive data related to these indicators. Not all studies use the same indicators in measuring integration and downstreaming. However, all articles provide relevant data related to both concepts.

5. Findings Related to Risk Management in an Industry Context

In all the studies analyzed, risk management was one of the important variables measured by various indicators. Data shows that risk management is measured through dimensions such as risk identification, risk analysis, risk mitigation, and risk monitoring. Some studies use additional indicators such as adaptation to uncertainty and organizational flexibility. The results presented in the article show variations in the level of implementation of risk management across different organizations. Some studies present an average score or risk management index based on survey results. Other studies use qualitative data to describe risk management practices within specific organizations. In addition, there are articles that use secondary data to measure risk based on market volatility or supply chain disruptions. Each study uses a different approach to measuring and presenting data related to risk management. The data presented are empirical and descriptive in the absence of uniform measurement standards. Nevertheless, all studies provide information that can be compared in general.

6. Findings Related to Economic Resilience and Industrial Performance

The results of the synthesis show that the economic resilience variable is measured through various indicators in each study. The indicators used include resilience to crises, recovery speed, performance stability, and operational sustainability. Some studies use financial performance indicators such as profitability and revenue growth as a proxy for resilience. Other studies use non-financial indicators such as customer satisfaction and operational efficiency. The data presented showed variations in the level of resilience between sectors and countries. Some articles report high resilience index values in certain sectors, while others show lower values. In addition, there were variations in the resilience measurement methods used in each study. The data presented are quantitative or qualitative depending on the research method. All studies provide data that describe the state of economic resilience or industry performance in their respective contexts. There is no single standard in the measurement of these variables.

7. Distribution of Publication Trends by Year

Based on the data presented, there is a trend of increasing the number of publications in this research topic from year to year. The number of articles was relatively low in the period before 2015, then gradually increased until it peaked in 2024 and 2025. The data shows that the number of publications in recent years is higher than in the previous period. This trend illustrates the increasing academic attention to the topic of industrial integration and economic resilience. The distribution graph shows fluctuations in the number of publications in several years, but in general it shows an increasing trend. This data is obtained from search results using predetermined keywords. Each year shows a different number of articles with a certain variation. Not all years have the same number of publications. This data only shows the distribution of the number of publications without further interpretation.

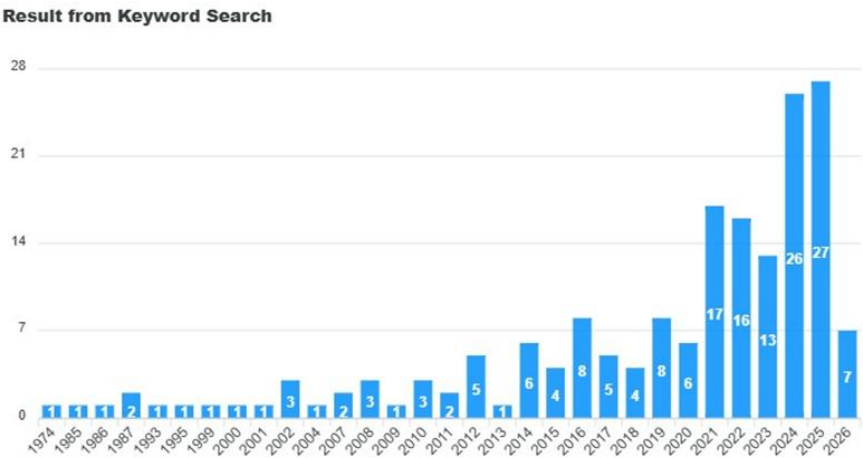


Figure 3. Publication Trend Data by Year

8. Summary of Data in the Form of a Synthesis Table

No	Aspects	Key Data
1	Total Initial Articles	178
2	Article After Screening	50
3	Articles for Retrieval	22
4	Final Article	11
5	Year Range	2021–2026
6	Dominant Method	Quantitative (SEM, Regression)
7	Key Variables	Industry Integration, Risk Management, Resilience
8	Data Source	Scopus
9	Articles from Other Sources	0
10	Publication Distribution	Increase (peak 2024–2025)

Table 1. Synthesis Data

The table above presents a summary of the main data obtained from the literature synthesis process. The data includes the number of articles at each stage of selection, the year range of publication, and the general characteristics of the research. In addition, the table also shows the most frequently used methods in the studies analyzed. The main variables used in the study are also summarized in the table. All data presented are the result of direct extraction from the analyzed articles.

IV. Discussion

Based on the collection of journals that have been reviewed, the main findings of this study are that resilience in industrial integration and downstream processes is not shaped by a single factor, but by a combination of production capacity, policy integration, digitalization, good governance, and risk management ability at various levels. Studies on economic integration in Africa show that integration does have a direct effect that can improve environmental quality, but it also indirectly encourages urbanization, financial development, industrialization, and changes in energy consumption patterns that can actually reduce the quality of the environment if not balanced with adequate control mechanisms. On the other hand, cross-border studies on steel downstream confirm that the emergence of downstream industries does not occur automatically just because of the availability of natural resources, but is largely determined by the availability of energy, raw materials, domestic demand, and technological capabilities. The literature on industrial digitalization also shows a consistent pattern, namely that integration between computerization and industrialization can improve environmental, social, and corporate governance performance through green innovation, good corporate governance, and information transparency; So that modern downstreaming is not enough to be understood simply as a physical transformation from raw materials to value-added goods, but also as a digital transformation and governance. At the supply chain level, digitalization has been shown to strengthen sustainability, resilience, risk management, integration, and performance, although the magnitude of these influences varies between groups of industry players and does not always directly lead to higher performance. Meanwhile, studies in the ASEAN region confirm that foreign investment, talent or expertise, and technology tend to strengthen economic resilience, especially in already resilient economies, while the digital economy shows a diverse influence between the short and long term. Overall, this synthesis shows that resilient downstream is downstream that is supported by adequate production structures, strong policy integration, wellfunctioning digitalization, and active risk management, rather than downstream that relies solely on the exploitation of natural resources.

1. Answer to Research Question 1: How does industrial integration and downstream processes contribute to resilience in the context of the global economy?

The contribution of industrial integration and downstream to resilience occurs through four main pathways, namely deepening production capacity, strengthening coordination between parts of the system, improving the quality of governance or management, and expanding the ability to adapt to shocks. The study of Ghebrihiwet and Kinda (2021) shows that the development of the downstream steel industry requires electricity, coal imports for smelting, iron ore production, steel demand, and technological capacity, so that the resilience of the downstream industry is rooted in an adequate material and technological foundation. The study of Lyu et al. (2026) shows that the integration between computerization and industrialization improves environmental performance and corporate governance through green innovation, good corporate management, and information transparency, which means the integration of digital industries strengthens the resilience of enterprises not only through efficiency but also through better governance qualities. At the supply chain level, Türkes (2025) found that digitalization has a positive effect on sustainability, resilience, risk management, integration, and performance, while the relationship between supply chain integration and supply chain knowledge was 0.578 and the relationship between supply chain integration and supply chain performance was 0.544 indicating that integration between actors is an important pathway for risk reduction and performance improvement. In addition, in developed actors, digitalization strongly encourages sustainability, integration, risk management, resilience, and performance, although in some segments of influence these influences are not completely evenly distributed. At the macro level, the study of Yang et al. (2026) shows that foreign investment, talent or human resources, and technology have an increasingly greater positive effect on higher levels of resilience, signaling that economies that already have a foundation of adaptability are better prepared to transform economic integration into resilience. Even while the digital economy has not always been strong in the short term, the study shows that in the long term, digital integration remains a structural driver of resilience. So, the answer to the first question (RQ1) is that industrial integration and downstream contribute to resilience when they both strengthen production capacity, improve information flow, improve coordination between actors, and increase the ability of systems to absorb and respond to shocks.

2. Answer to Research Question 2: What are the most prominent risks in industrial integration and downstream processes, and how is risk management positioned in the literature?

The most prominent risks in industrial integration and downstream are regulatory risks, geopolitics, market structures, policy fragmentation, and digital transformation failures. In a study on the deregulation of the downstream petroleum sector in Nigeria, regulatory risks appear to be particularly dominant due to excessive government control, pricing, subsidies, and institutional overlap that make the industry unattractive to private investors as well as weaken the efficiency of the downstream sector. Geopolitical risks are seen strongly in the study of Li et al. (2026) which show that geopolitical risks actually accelerate the transition of renewable energy in developed countries, but hinder developing countries due to institutional and financial limitations, while in the poorest countries the negative impact is exacerbated by energy dependence. Market structure risks arise in Yu et al. (2024) study on the concentration of the downstream dairy market, where the concentration of the downstream market proved to be unfavorable to the growth of the total productivity factor upstream as producer margins were depressed and technological advances were hampered, although there were some positive effects on conditions of a certain scale. The risk of policy fragmentation is very clearly mapped by Robi (2024), who shows that urban-industrial policy fragmentation in Africa is driven by authoritarian centralization thereby weakening conceptual integration, policy coordination, and infrastructure integration. The risks of digital transformation are also real, as Lyu et al. (2026) note that digitalization can bring hidden costs and does not always automatically improve performance, while Türkes (2025) points out that technology is indeed important but not enough without leadership that supports innovation and an organizational culture that is open to change. Thus, these studies place risk management not as an additional function behind the downstream process, but as the core of management that determines whether industrial integration will result in sustainable efficiencies or create new vulnerabilities.

3. Answer to Research Question 3: What factors strengthen or weaken the relationship between industrial integration, downstreaming, and resilience?

The relationship between industrial integration, downstreaming, and resilience can be strengthened or weakened by various factors. Factors that strengthen this relationship include: technology, investment, human resources, political stability, good governance, and cooperation between industry players. Instead, this relationship can be weakened by dependence on energy, market concentration (controlled by a few

players), excessive regulation, and fragmented policies. The first reinforcing factor is digitalization that is integrated with industrial processes, the study of Lyu et al. (2026) shows that the integration of computerization and industrialization improves environmental performance and corporate governance, while Türkes (2025) found that digitalization simultaneously promotes sustainability, resilience, risk management, integration, and performance. The second reinforcing factor is foreign investment, talent/experts, and technology, which in studies in the ASEAN region show an increasingly strong positive influence on countries or conditions that are already relatively resilient, so that the initial readiness of the system greatly determines how much benefit can be obtained from integration. The third reinforcing factor is political stability and institutional capabilities—the study of Li et al. (2026) shows that political stability becomes especially important in the poorest countries, while developed countries are better able to turn geopolitical pressures into accelerating energy transitions due to their better institutional resilience and financial maturity. On the other hand, the first mitigating factor is dependence on energy, which in the study of Li et al. (2026) repeatedly appears as a source of weakening of energy resilience and transition. The second weakening factor is market concentration, as the study of Yu et al. shows that market dominance in the downstream sector can hinder productivity progress in the upstream sector through pressures on profit margins and barriers to innovation. The third weakening factor is overly dominant regulation, as seen in the study by Olujobi (2021), and the fourth weakening factor is the fragmented policies in the relationship between urban and industrial as explained by Robi (2024). So, the answer to the third question (RQ3) is that the success of industrial integration and downstream in achieving resilience is highly dependent on the surrounding conditions: this relationship will be strengthened if there is digital readiness, good governance, investment, experts, and policy coordination, but it will weaken if the system is mired in energy dependence, market concentration, overregulation, and fragmented policies.

4. Significance of research results and contributions to the scientific field

The results of this study are important because the literature that has been reviewed together shows that industrial resilience can no longer be explained only from the perspective of growth, efficiency, or added value, but must be seen as the result of the interaction between industrial integration, downstream transformation, risk exposure, and governance capacity. The study of Adams and Kaffo Fotio (2022) confirms that economic integration can improve one side of the system, but it can also worsen the other side through urbanization, financial development, industrialization, and energy change, so resilience should not be understood narrowly as output growth. The study of Ghebrihiwet and Kinda (2021) shows that downstream requires specific structural prerequisites, so the success of downstream must be assessed as a systemic capacity, not just an industrialization policy decision. Study of Lyu et al. (2026). And Türkes (2025) then expands that discussion by showing that digital technologies serve as a link between industrial integration and long-term sustainability. The contribution of this research to the scientific field of management, especially strategic management, risk management, and operations management, lies in the unification of previously scattered discourses. Some studies talk about governance and ESG, others about industrial downstreaming, others about geopolitical risk, policy integration, or supply chain resilience. While this research brings it together in the framework of “risk management for industrial integration and downstream to resilient”. From a scientific perspective, this is significant because it helps shift the focus of analysis from the question of “how to build downstreaming” to “how to build downstream that is resistant to shocks”. From the academic side, the added value of this research lies in its ability to map reinforcing factors, weakening factors, and types of risks more systematically based on cross-contextual evidence. From a practical perspective, these results are important because they show that downstream that is not supported by governance, technology, coordination, and risk mitigation has the potential to generate new vulnerabilities instead of new resilience.

5. Research implications

The theoretical implication of this study is the need to position risk management as a central component in the design of industrial integration and downstream policies, not just as a post-disruption mitigation tool. This is supported by Türkes' (2025) findings that risk management is closely related to integration and performance, as well as by the study of Li et al. (2026) which affirm that without institutional capacity, geopolitical risk can hinder the transition and reduce energy security in developing countries. The managerial implication is that companies and supply chain managers need to build digital visibility, cross-actor communication, and proactive risk controls, because integration between actors has proven to be a powerful path to reduce risk and improve performance. The public policy implication is that countries that encourage downstream need to ensure that policies do not stop at production incentives, but

also build energy security, policy coordination, governance transparency, and reduction of regulatory distortions. This is very evident in the studies by Olujobi (2021) and Robi (2024) which show that regulatory dominance and policy fragmentation can actually paralyze the effectiveness of downstream industrial development. The long-term development implication is that investment in talent, technology, and digital infrastructure must be seen as an investment in resilience, not just an investment in efficiency. ASEAN studies clearly show that technology, investment, and human capital strengthen resilience, especially in economies that are better prepared to absorb shocks. The implication for the study of downstream the resource sector is that success indicators need to be expanded from economic added value to indicators that also include robustness, governance quality, coordination capacity, and adaptive recovery. In other words, this research encourages a more mature policy and research agenda: downstream is no longer measured only by industrial output, but also by the ability of systems to remain functional in the event of disruption.

6. Research limitations

The first limitation of this study comes from the heterogeneity of the study design that is the basis of the synthesis. The literature collection includes macro panel studies, quasi-natural experiments with DID, SURVEY-BASED PLS-SEM, DOCTRINAL LEGAL STUDIES, THEMATIC INTERVIEWS, and quantile regression studies, so that the synthesis results are conceptually strong but cannot be read as a uniform statistical meta-analysis. The second limitation is the very wide difference in geographical and sectoral contexts, ranging from Africa, China, ASEAN, Romania, Nigeria, to crossanalysis of 94 countries, so direct generalizations to one sector or one specific country must be done carefully. A third limitation is that not all studies address the four core elements simultaneously, namely industrial integration, downstreaming, risk management, and resilience. There are studies that are strong on downstream but weak on the risk dimension, some are strong on resilience and digitalization but not specific to downstreaming, and there are also those that emphasize more policy or legal issues. The fourth limitation is the heterogeneity of results even in seemingly similar studies; For example, digitalization does not always automatically improve performance in all practitioner segments, and the digital economy is also not always consistently influential across short-term models. The fifth limitation, which also explicitly appeared in Olujobi's (2021) study, is the limitations of data and access to information, especially for sensitive and highly regulated sectors. Therefore, the contribution of this research is strongest at the level of conceptual synthesis and mapping of interconstructive relationships, while further research is still needed to test an integrated model that directly links industrial integration, downstreaming, risk management, and resilience in one more focused empirical design.

V. Conclusion

Based on the results of a synthesis of all the literature that has been analyzed, this study shows that industrial integration and downstream processes have a strategic role in shaping economic and industrial resilience, but these contributions are conditional and are strongly influenced by other supporting factors such as technology, governance, institutional capacity, and risk management. Studies that have been analyzed consistently show that downstream cannot succeed by relying solely on the availability of natural resources, but requires energy support, domestic demand, and adequate technological capacity. In addition, digital integration between informatization and industrialization has proven to be able to improve the company's sustainability performance through green innovation mechanisms, improved governance, and information transparency. At the supply chain level, digitalization also strengthens resilience, risk management, and integration, which simultaneously improves overall system performance. However, the study also found that risks such as geopolitical uncertainty, regulatory dominance, market concentration, and policy fragmentation can weaken the effectiveness of industrial integration and downstream in creating resilience. Thus, the main findings of this study confirm that industrial resilience is not only the result of the integration and downstream process, but is the outcome of a complex interaction between structural, institutional, and managerial factors.

The contribution of this research to the scientific field, especially strategic management, risk management, and industrial policy, lies in its ability to integrate various perspectives that were previously fragmented into one comprehensive conceptual framework. This research expands the understanding that downstream is not only related to increasing economic added value, but also closely related to the system's adaptive capacity to external shocks. In addition, this research places risk management as a central element in the industrial integration process, not just an additional function, thus making an important contribution to the development of risk management theory in the context of industrialization and downstreaming. These

findings also provide a strong conceptual foundation for the development of advanced quantitative research models, particularly in examining the relationship between digitalization, industrial integration, risk management, and resilience. From a practical perspective, this study implies that the success of downstream is highly dependent on technological readiness, governance quality, and the ability to proactively manage risks. Thus, this research not only contributes to the development of theory, but also provides strategic direction for decision-making at the organizational and public policy levels.

VI. Further Research Suggestions

Future research is suggested to develop an empirical model that directly examines the relationship between industrial integration, downstreaming, risk management, and resilience within a single, integrated analytical framework. This is important because most of the literature analyzed still addresses these variables partially, so it does not provide a complete picture of the causal relationships between variables. In addition, further research needs to consider the use of advanced quantitative methods such as Structural Equation Modeling (SEM) or panel data analysis to test the conceptual models that have been generated from this research. The use of primary data in certain industrial sectors, such as mining, manufacturing, or energy, can also provide more specific and contextual insights. Further research is also recommended to examine the role of moderation variables such as digital maturity, institutional quality, and governance in strengthening or weakening the relationship between downstream and resilience. In addition, a longitudinal approach can be used to understand the dynamics of changing industrial resilience in the long term, especially in the face of global shocks such as economic crises or geopolitical conflicts. Thus, further research is expected not only to strengthen the validity of the findings, but also to expand the contribution of this research in the development of management science and industrial policies that are more adaptive and sustainable.

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