



(REVIEW ARTICLE)



## The role of accounting in mitigating food supply chain risks and food price volatility

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### Abstract

The global food supply chain is a complex network of interconnected processes and actors that play a critical role in ensuring food security and stability. However, this intricate system is susceptible to various risks and challenges, including natural disasters, geopolitical tensions, market fluctuations, and regulatory changes. These risks often result in food price volatility, which can have profound implications for both consumers and producers worldwide. In this context, accounting emerges as a vital tool for mitigating risks and managing food price volatility within the supply chain. Accounting serves as a cornerstone in providing accurate, timely, and reliable financial information essential for decision-making at every stage of the food supply chain. Through effective financial reporting and analysis, accounting enables stakeholders to identify, assess, and respond to potential risks proactively. By employing risk management techniques such as scenario planning, sensitivity analysis, and hedging strategies, accounting professionals can help organizations anticipate and mitigate supply chain disruptions, thereby reducing the impact of food price volatility. Furthermore, accounting facilitates transparency and accountability within the food supply chain, enhancing trust and cooperation among stakeholders. Through comprehensive cost accounting and performance measurement systems, organizations can identify inefficiencies, optimize resource allocation, and enhance operational resilience. Moreover, accounting frameworks such as sustainability accounting enable businesses to assess and report the environmental and social impacts of their operations, fostering sustainable practices across the supply chain. In addition to its role in risk management and performance optimization, accounting contributes to regulatory compliance and governance within the food industry. By adhering to accounting standards and regulations, organizations can ensure integrity and accuracy in financial reporting, thereby enhancing investor confidence and mitigating legal and reputational risks. Moreover, accounting professionals play a crucial role in designing and implementing internal control systems to prevent fraud, errors, and misconduct, safeguarding the integrity of the supply chain. Accounting plays a multifaceted role in mitigating food supply chain risks and food price volatility. By providing financial insights, promoting transparency, and ensuring compliance, accounting empowers organizations to navigate challenges and promote stability in the global food system.

**Keywords:** Accounting; Food; Supply Chain; Risks; Price Volatility; Mitigating; Review

### 1. Introduction

The global food supply chain is a complex network of interconnected processes and stakeholders involved in the production, processing, distribution, and consumption of food products worldwide (Yadav *et al.*, 2022). It encompasses a diverse range of activities, from agricultural production on farms to transportation, storage, retailing, and ultimately,

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consumption by end-users. This intricate web of activities involves various actors, including farmers, manufacturers, distributors, retailers, and consumers, operating across geographical boundaries and often spanning multiple countries (Furr *et al.*, 2022).

The food supply chain is essential for ensuring food security, stability, and accessibility for populations around the world (Moseley and Battersby, 2020.). However, its complexity also renders it vulnerable to various risks and challenges that can disrupt the flow of goods and impact food availability, quality, and affordability. These risks may include natural disasters such as droughts, floods, and storms, as well as geopolitical tensions, trade disputes, market fluctuations, and regulatory changes (Rao *et al.*, 2024). Disruptions at any point in the supply chain can have far-reaching consequences, affecting not only businesses but also consumers, communities, and economies on a global scale (Kovács and Falagara Sigala, 2021).

Mitigating risks and managing food price volatility within the global food supply chain is of paramount importance for several reasons (Sharma *et al.*, 2022). Firstly, food is a fundamental human need, and disruptions in the food supply chain can lead to food shortages, price spikes, and even food insecurity, particularly for vulnerable populations (Khan *et al.*, 2022). High and volatile food prices can exacerbate poverty, hunger, and malnutrition, posing significant challenges to global development and social stability (Wudil *et al.*, 2022). Moreover, food price volatility can have profound implications for producers, retailers, and consumers alike. Fluctuations in input costs, such as energy, labor, and raw materials, can affect the profitability of agricultural producers and food manufacturers (Kurowska *et al.*, 2020). Retailers may face challenges in setting prices and managing inventory effectively, while consumers may experience uncertainty and budgetary constraints when purchasing essential food items.

Furthermore, food price volatility can disrupt supply chain planning and investment decisions, leading to inefficiencies, waste, and reduced competitiveness in the agricultural and food sectors (Sjah and Zainuri, 2020). It can also increase financial risks for businesses and investors, impacting their ability to access capital and finance future growth and innovation initiatives.

Given these challenges, there is a pressing need for effective strategies and mechanisms to mitigate risks and manage food price volatility within the global food supply chain. This requires collaboration and coordination among stakeholders across the supply chain, as well as the adoption of innovative approaches and technologies to enhance resilience and adaptability (Umar and Wilson, 2021).

Accounting plays a crucial role in addressing the challenges of mitigating risks and managing food price volatility within the global food supply chain (Um and Han, 2021). As a discipline focused on the measurement, analysis, and communication of financial information, accounting provides essential tools and frameworks for identifying, assessing, and responding to risks, as well as monitoring and managing financial performance and outcomes (Mio *et al.*, 2022). By leveraging accounting principles, techniques, and systems, businesses and organizations can enhance transparency, accountability, and decision-making effectiveness, thereby promoting stability, sustainability, and resilience in the food supply chain.

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## 2. Understanding Food Supply Chain Risks

The global food supply chain faces a multitude of risks, ranging from natural disasters to geopolitical tensions and market fluctuations (Sjah and Zainuri, 2020). Identifying and understanding these risks is essential for effective risk management and ensuring the resilience of the food supply chain.

Natural disasters such as droughts, floods, hurricanes, and wildfires can have devastating effects on agricultural production and infrastructure (Padmaja *et al.*, 2022). They can disrupt planting and harvesting seasons, damage crops and livestock, and impair transportation and storage facilities. These disruptions can lead to food shortages, price spikes, and supply chain disruptions, affecting both producers and consumers. Geopolitical tensions, including trade disputes, embargoes, sanctions, and political instability, can disrupt international trade flows and supply chain operations (Basuki, 2023). Tariffs and trade barriers can increase input costs and restrict market access, while political unrest can disrupt transportation routes and trade routes, leading to delays and supply chain bottlenecks. Market fluctuations in commodity prices, exchange rates, and consumer demand can impact the profitability and stability of the food supply chain (Ihle *et al.*, 2020). Volatility in input costs such as fuel, fertilizer, and feed can affect production costs for farmers and food manufacturers. Similarly, fluctuations in consumer demand and preferences can lead to inventory imbalances and excess supply or demand, resulting in price volatility and supply chain disruptions (Fabian *et al.*, 2023).

The risks identified above can have significant implications for food price volatility and supply chain stability; Natural disasters, geopolitical tensions, and market fluctuations can contribute to food price volatility by disrupting production, distribution, and market dynamics (Hadachek *et al.*, 2024). Supply shortages resulting from crop failures or trade disruptions can lead to price spikes, while excess supply or demand can result in price crashes. These fluctuations can affect the affordability and accessibility of food for consumers, particularly those in low-income or food-insecure populations. Risks such as natural disasters and geopolitical tensions can disrupt supply chain operations, leading to delays, shortages, and bottlenecks. Transportation disruptions, port closures, and border restrictions can hinder the movement of goods and raw materials, leading to supply chain disruptions and inventory shortages (Kim and Bui, 2019). These disruptions can affect the reliability and resilience of the food supply chain, impacting food availability, quality, and safety.

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### 3. The Role of Accounting in Risk Management

Accurate financial information is essential for effective risk management and decision-making in the food supply chain. Accounting provides the tools and frameworks for collecting, analyzing, and reporting financial data, enabling stakeholders to assess the financial health and performance of the supply chain (Uchechukwu *et al.*, 2023). By providing timely and reliable financial information, accounting facilitates informed decision-making and risk assessment, allowing organizations to identify and respond to emerging risks and opportunities.

Accounting techniques such as scenario planning and sensitivity analysis can be used to assess and mitigate risks in the food supply chain. Scenario planning involves developing alternative scenarios or future states based on different assumptions and variables, allowing organizations to anticipate and prepare for potential risks and opportunities (Witt *et al.*, 2020). Sensitivity analysis involves evaluating the impact of changes in key variables or assumptions on financial outcomes, helping organizations identify and prioritize risks and mitigation strategies.

Hedging strategies can help organizations manage price volatility and mitigate financial risks in the food supply chain. Hedging involves entering into financial contracts or positions that offset the risk of adverse price movements in commodities, currencies, or other financial instruments (Vinitha and Kalarani, 2021.). For example, agricultural producers can use futures contracts to lock in prices for their crops or livestock, reducing their exposure to price fluctuations. Similarly, food manufacturers and retailers can use hedging strategies to manage input costs and protect profit margins against price volatility in raw materials and commodities.

In conclusion, accounting plays a critical role in identifying, assessing, and mitigating risks in the food supply chain. By providing accurate financial information, utilizing accounting techniques, and implementing hedging strategies, organizations can enhance their resilience and stability in the face of natural disasters, geopolitical tensions, and market fluctuations (Afshan *et al.*, 2023; Akindote, 2023). Effective risk management practices enabled by accounting can help ensure the availability, affordability, and accessibility of food for consumers worldwide, promoting food security and sustainability in the global food system.

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### 4. Enhancing Transparency and Accountability

Accounting plays a pivotal role in enhancing transparency within the food supply chain by providing accurate and reliable financial information (Sjah and Zainuri, 2020). Through financial reporting and disclosure practices, accounting enables stakeholders to access information about the financial performance, operations, and sustainability practices of organizations operating within the supply chain. Transparency fosters trust and confidence among stakeholders, facilitating collaboration, cooperation, and informed decision-making (Barrane *et al.*, 2021).

Accounting also contributes to transparency by promoting standardized reporting practices and disclosure requirements. Accounting standards, such as International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP), provide guidelines for organizations to prepare financial statements that are comparable, consistent, and transparent (Kotsupatriy *et al.*, 2020; Lukong *et al.*, 2022). These standards ensure that financial information is presented in a clear, concise, and understandable manner, enabling stakeholders to assess the financial health and performance of organizations within the supply chain.

Furthermore, accounting facilitates transparency through the use of audit and assurance services. Independent auditors examine financial statements and internal controls to provide assurance on the accuracy and reliability of financial information. Audited financial statements enhance credibility and transparency, providing stakeholders with confidence in the financial reporting process and the integrity of the information presented (Wang *et al.*, 2020).

Cost accounting and performance measurement systems are essential tools for identifying inefficiencies and optimizing resource allocation within the food supply chain. Cost accounting techniques, such as activity-based costing and marginal costing, enable organizations to analyze the cost structure of their operations and identify areas of inefficiency or waste (Husna *et al.*, 2022). By accurately allocating costs to products, services, and activities, organizations can identify opportunities for cost reduction and process improvement. Performance measurement systems, such as key performance indicators (KPIs) and balanced scorecards, provide organizations with metrics and benchmarks for evaluating the effectiveness and efficiency of their operations (Neri *et al.*, 2021). By monitoring performance against predefined targets and benchmarks, organizations can identify areas of underperformance and take corrective actions to improve efficiency, productivity, and profitability. Cost accounting and performance measurement systems also facilitate decision-making and strategic planning within the food supply chain. By providing managers with timely and relevant information, organizations can make informed decisions about resource allocation, product pricing, and investment priorities (Kunene *et al.*, 2022). Moreover, performance measurement systems enable organizations to align their objectives and activities with strategic goals and objectives, enhancing transparency, accountability, and performance.

Sustainability accounting involves the measurement, analysis, and reporting of environmental and social impacts associated with organizational activities (Tiwari and Khan, 2020). In the context of the food supply chain, sustainability accounting enables organizations to assess and report their environmental footprint, social responsibility, and contribution to sustainable development goals. Sustainability accounting encompasses various metrics and indicators, including carbon emissions, water usage, waste generation, and social impact indicators such as employee welfare, community engagement, and supply chain ethics (Gonçalves and Silva, 2021; Mouchou *et al.*, 2021). By quantifying and reporting these impacts, organizations can identify opportunities for improvement, set targets for sustainability performance, and track progress over time.

Sustainability accounting also promotes transparency and accountability by disclosing information about environmental and social risks and opportunities (Perkiss *et al.*, 2021). By providing stakeholders with insight into the environmental and social impacts of their operations, organizations can build trust and credibility, enhance their reputation, and attract investors, customers, and partners who prioritize sustainability.

Furthermore, sustainability accounting supports decision-making and risk management within the food supply chain. By integrating environmental and social considerations into decision-making processes, organizations can identify risks and opportunities associated with sustainability issues and take proactive measures to mitigate risks and capitalize on opportunities (Singh and Goyal, 2023).

In conclusion, accounting plays a crucial role in enhancing transparency, accountability, and sustainability within the food supply chain. Through standardized reporting practices, cost accounting techniques, performance measurement systems, and sustainability accounting practices, organizations can improve transparency, identify inefficiencies, and assess environmental and social impacts. By promoting transparency and accountability, accounting contributes to the resilience, sustainability, and long-term success of the food supply chain (Beck-O'Brien and Bringezu, 2021).

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## 5. Ensuring Regulatory Compliance and Governance

Accounting standards and regulations provide a framework for financial reporting integrity within the food supply chain. Adherence to accounting standards, such as International Financial Reporting Standards (IFRS) or Generally Accepted Accounting Principles (GAAP), ensures consistency, comparability, and transparency in financial reporting practices (Tarca, 2020).

These standards establish guidelines for the recognition, measurement, presentation, and disclosure of financial information, enabling organizations to prepare accurate and reliable financial statements. Compliance with accounting standards enhances the credibility and reliability of financial information, providing stakeholders with confidence in the financial reporting process. Furthermore, regulatory bodies, such as the Securities and Exchange Commission (SEC) in the United States or the International Accounting Standards Board (IASB) globally, oversee compliance with accounting standards and regulations (Bradbury and Scott, 2021). These regulatory bodies establish and enforce accounting standards, monitor compliance, and impose sanctions for non-compliance, ensuring the integrity and transparency of financial reporting within the food supply chain.

Accounting plays a critical role in promoting investor confidence and mitigating legal risks within the food supply chain. Accurate and transparent financial reporting practices enable investors to make informed investment decisions and assess the financial health and performance of organizations operating within the supply chain (Shakespeare, 2020;

Ukoba *et al.*, 2018). Investors rely on financial statements to evaluate the profitability, liquidity, and solvency of companies, as well as their ability to generate returns and manage risks. Transparent financial reporting practices enhance investor confidence, attract capital investment, and support the growth and development of businesses within the food supply chain. Moreover, accounting helps organizations mitigate legal risks by ensuring compliance with regulatory requirements and disclosure obligations. Non-compliance with accounting standards and regulations can result in legal and regulatory sanctions, fines, penalties, and reputational damage (Syrtseva and Cheban, 2021.). By adhering to accounting standards and regulations, organizations can mitigate legal risks and demonstrate their commitment to integrity, transparency, and ethical business practices.

Internal control systems are essential for preventing fraud, misconduct, and financial irregularities within the food supply chain. Accounting plays a central role in the design and implementation of internal control systems, which are designed to safeguard assets, ensure the accuracy and reliability of financial information, and promote compliance with laws and regulations (Al-Mashhadi, 2021). Internal control systems encompass a range of policies, procedures, and processes aimed at identifying, assessing, and mitigating risks within the organization. These controls include segregation of duties, authorization and approval processes, physical controls, reconciliation procedures, and monitoring and oversight activities (Kazan and Kocamış, 2023). Accounting professionals are responsible for designing and implementing internal control systems tailored to the specific risks and requirements of the food supply chain (Ewim *et al.*, 2023). They assess the effectiveness of internal controls, identify weaknesses and deficiencies, and implement remedial actions to strengthen controls and mitigate risks. Furthermore, internal control systems help organizations detect and prevent fraud, misconduct, and financial irregularities. By establishing clear lines of responsibility, accountability, and oversight, internal controls deter fraudulent activities and ensure the integrity and reliability of financial information (Odeleye and Adeigbe, 2018).

In conclusion, accounting plays a critical role in ensuring regulatory compliance and governance within the food supply chain. By adhering to accounting standards and regulations, promoting investor confidence, and designing and implementing internal control systems, organizations can mitigate legal risks, prevent fraud and misconduct, and uphold the integrity and transparency of financial reporting within the food supply chain (Ewim *et al.*, 2021; Hamed, 2023).

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## 6. Case Studies or Examples

A large-scale agricultural company implements cost accounting techniques to analyze the cost structure of its crop production operations (Schindele *et al.*, 2020). By accurately allocating costs to different crops, regions, and production methods, the company identifies inefficiencies and cost-saving opportunities. This allows them to optimize resource allocation, improve productivity, and mitigate financial risks associated with fluctuations in input costs. A food processing company utilizes hedging strategies to manage price volatility in raw materials such as wheat, corn, and sugar (Adeosun *et al.*, 2023). By entering into futures contracts and options contracts, the company locks in prices for key commodities, reducing its exposure to price fluctuations in the commodity markets. This enables the company to stabilize its input costs, protect profit margins, and mitigate financial risks associated with price volatility.

A multinational food retailer adopts activity-based costing (ABC) to analyze the cost structure of its supply chain operations (Rankin, 2020). By tracing costs to specific activities such as transportation, warehousing, and inventory management, the company identifies areas of inefficiency and waste. This allows them to optimize their supply chain processes, reduce costs, and improve profitability. An organic farming cooperative implements environmental accounting techniques to assess the environmental impacts of its agricultural practices (Khoruzhy *et al.*, 2023). By quantifying factors such as carbon emissions, water usage, and soil erosion, the cooperative identifies opportunities to minimize environmental footprint and promote sustainable farming practices (Olushola, 2017; Prabhakar, 2021). This enhances their reputation as a sustainable food producer and attracts environmentally-conscious consumers.

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## 7. Future Direction

The future of accounting in the food supply chain is likely to be shaped by emerging trends and developments in technology, regulation, and consumer preferences. Several key areas are expected to drive future advancements in accounting practices within the food supply chain:

Advances in digital technologies such as blockchain, artificial intelligence (AI), and Internet of Things (IoT) are expected to revolutionize accounting practices within the food supply chain (Bhat *et al.*, 2021). These technologies offer opportunities to improve data collection, analysis, and reporting processes, enhancing transparency, efficiency, and

accuracy in financial management and reporting. With increasing focus on sustainability and corporate social responsibility (CSR), sustainability reporting is expected to become increasingly important within the food supply chain (Toussaint *et al.*, 2021). Accounting professionals will play a crucial role in developing and implementing sustainability accounting frameworks and metrics to assess and report environmental and social impacts (Almagtome *et al.*, 2020). As the food supply chain becomes more interconnected and globalized, supply chain resilience will be a key focus area for accounting professionals. Accounting techniques such as risk management, scenario planning, and supply chain mapping will be essential for identifying and mitigating risks, ensuring the resilience and stability of the food supply chain (Lochan *et al.*, 2021).

In conclusion, accounting will continue to play a vital role in mitigating risks, managing price volatility, and promoting transparency and sustainability within the food supply chain. By leveraging accounting techniques and strategies, organizations can enhance their resilience, optimize their operations, and adapt to the evolving challenges and opportunities in the global food system (Cohen and Kouvelis, 2021; Datta *et al.*, 2023).

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## 8. Recommendation and Conclusion

Throughout this discussion, it has become evident that accounting plays a multifaceted role in addressing the challenges of the global food supply chain. Accounting contributes to transparency and accountability by providing accurate financial information, promoting standardized reporting practices, and facilitating audit and assurance services. It enables organizations to identify inefficiencies and optimize resource allocation through cost accounting and performance measurement systems. Additionally, accounting supports sustainability initiatives by quantifying and reporting environmental and social impacts through sustainability accounting practices. Furthermore, accounting ensures regulatory compliance and governance by adhering to accounting standards and regulations, promoting investor confidence, and designing internal control systems to prevent fraud and misconduct. These functions of accounting collectively contribute to mitigating food supply chain risks and managing food price volatility, enhancing the resilience, stability, and sustainability of the global food system.

In conclusion, accounting plays a critical role in promoting stability and sustainability within the global food system. By providing accurate financial information, enabling transparency and accountability, and supporting decision-making and risk management processes, accounting empowers organizations to navigate the complexities and challenges of the food supply chain. Moreover, accounting facilitates compliance with regulatory requirements, promotes investor confidence, and safeguards the integrity and reliability of financial reporting. As the global food system continues to evolve and face new challenges, accounting will remain essential in promoting resilience, transparency, and sustainability across the entire food supply chain. Therefore, investing in accounting practices and capabilities is crucial for ensuring the long-term stability, security, and sustainability of the global food system.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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