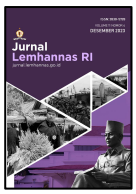

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Resilient Food Security through ERM and Prophet Yusuf's Approach

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Abstract

Purpose: This research examines the alignment between Prophet Yusuf's historical food security strategies and modern Enterprise Risk Management (ERM) frameworks to inform contemporary food security policies.

Study Design/Methodology/Approach: A qualitative analysis of historical texts, including interpretations by scholars such as Al-Qurtubi (2008) and Al-Tabari (2009), was conducted to extract key components of Prophet Yusuf's strategies. These components were then compared with current ERM principles to assess their applicability in today's policy context.

Findings: The analysis reveals that methods such as predictive risk assessment, strategic grain storage, sustainable resource management, waste reduction, and contingency planning closely mirror modern ERM practices. Integrating these historical strategies can enhance the resilience and effectiveness of current food security policies.

Originality/Value: This study bridges historical analysis and modern risk management, offering a unique perspective on the relevance of ancient practices in addressing contemporary food security challenges. It provides actionable insights for policymakers seeking to incorporate proven strategies into modern frameworks, thereby strengthening national and regional food security resilience.

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INTRODUCTION

Strengthening community capacity and participation plays a crucial role in enhancing resilience frameworks within Islamic governance perspectives. The Food and Agriculture Organization (FAO) defines global food security as a condition where all individuals have physical, social, and economic access to sufficient, safe, and nutritious food FAO, 2024). However, achieving this objective becomes increasingly complex as interconnected challenges such as climate change, population growth, and geopolitical instability threaten the sustainability of global food systems, necessitating strategic risk management approaches.

Climate change disrupts agricultural productivity by increasing temperatures, altering precipitation patterns, and intensifying extreme weather events. According to IPCC (2024), these environmental changes reduce global crop yields, escalate food prices, and exacerbate soil degradation and water scarcity, particularly in developing regions. Elevated carbon dioxide levels and increased heat stress further impact livestock and fisheries, diminishing essential nutritional sources (FAO, 2024).

Population growth intensifies pressure on food production, presenting long-standing challenges even before environmental concerns became a dominant issue. Projections estimate a global population increase to 9.7 billion by 2050 (United Nations, 2024), requiring a 70 per cent rise in food production. Existing agricultural inefficiencies, water scarcity, and land degradation already present obstacles to global food security. Without substantial technological advancements, meeting future food demands will become increasingly difficult (WFP, 2024).

Geopolitical instability exacerbates food security concerns by disrupting agricultural production and global supply chains. Political conflicts, economic downturns, and trade restrictions cause food shortages and price volatility, placing millions at risk (Hendrix & Brinkman, 2024). Economic uncertainty and food inflation further reduce access to basic nutrition, particularly in low-income nations (World Bank, 2024).

Enterprise Risk Management (ERM) offers a structured framework for identifying, assessing, and mitigating risks in food security governance. ERM enables governments, international organisations, and food producers to implement proactive strategies, strengthening food system resilience, mitigating vulnerabilities, and ensuring sustainable food availability. Aligning global food regulations with ERM principles becomes essential to minimise supply chain disruptions and improve food accessibility (FAO, 2024).

ERM emphasises strategic foresight, preparedness, and risk mitigation, principles that align with Prophet Yusuf's food security approach, as described in Surah Yusuf (Qur'an 12:46-49). His interpretation of Pharaoh's dream provided a crisis management model, predicting seven years of abundance followed by seven years of famine. This structured strategy incorporated predictive planning, resource optimisation, and long-term preparedness, ensuring economic and societal stability in Ancient Egypt.

Predictive risk assessment formed a fundamental aspect of Prophet Yusuf's model, anticipating future challenges and implementing pre-emptive measures. This approach

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aligns with modern ERM frameworks, which prioritise scenario analysis and percentage-based risk management to prevent disruptions before they materialise (Donner, Mamès, & de Vries, 2024; IPCC, 2024). Additionally, strategic food storage played a vital role in mitigating risk, ensuring a stable food supply by stockpiling surplus grain during years of abundance. Governments and international agencies apply similar buffer stock strategies to stabilise markets and prevent food shortages (FAO, 2024).

Resource optimisation contributed to agricultural sustainability, integrating water management, soil conservation, and controlled food consumption to prevent resource depletion (Al-Maraghiy, 2001). Modern food security frameworks adopt similar sustainability measures, including precision agriculture, efficient irrigation techniques, and agroforestry, balancing food production with environmental conservation (World Bank, 2024).

Equitable food distribution policies reinforced economic stability, preventing hoarding and speculative pricing to mitigate social unrest and economic disparity (Shihab, 2002). Governments currently adopt similar approaches through food subsidy programmes, social safety nets, and market regulation policies, ensuring that vulnerable populations maintain access to essential food supplies, particularly during crises (WFP, 2024).

Prophet Yusuf's governance model extends beyond historical narratives, offering valuable insights for contemporary food security policymaking. Scholars regard his risk mitigation approach as a best practice for policymakers, seeking sustainable and equitable economic solutions (Hendrix & Brinkman, 2024). Additionally, his long-term crisis management strategies align with Sustainable Development Goal (SDG) 2: Zero Hunger, contributing to a global framework for tackling food security challenges (FAO, 2024).

This study explores how Prophet Yusuf's risk management principles integrate with ERM strategies to enhance food security resilience and sustainability. Specifically, this research seeks to address the following questions: 1) How do ERM principles enhance food security resilience in response to climate change and geopolitical instability?; 2) To what extent can Prophet Yusuf's risk management model be adapted to contemporary global food policies?; 3) What challenges arise in integrating historical governance principles with modern risk management frameworks, particularly in policy implementation and economic sustainability?.

This study contributes to academic discourse by embedding Prophet Yusuf's governance principles within ERM frameworks to formulate contemporary food security strategies. Evaluating historical governance models within a structured ERM framework enables a deeper understanding of long-term resilience planning, fostering sustainable food security policies that address current global challenges.

Literature Review

Integrating Enterprise Risk Management (ERM) into food security policies establishes a structured framework for mitigating risks associated with climate change,

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economic instability, and geopolitical tensions. The Committee of Sponsoring Organizations of the Treadway Commission (COSO) defines ERM as a systematic approach to identifying, assessing, and mitigating uncertainties that disrupt food production and distribution systems (COSO, 2017). Islamic risk management principles align with this framework by emphasising strategic planning, resource preservation, and ethical governance to achieve long-term economic and social stability (Dusuki & Bouheraoua, 2011).

Ensuring food security resilience requires an adaptive risk management approach that integrates conventional and Islamic ERM frameworks. Conventional ERM models prioritise risk quantification and financial mitigation strategies, whereas Islamic-based ERM incorporates *Maqasid Syariah* principles to align risk mitigation efforts with social welfare and sustainability objectives (Ahmad Shukor, A. S. A., Aldizar, A., Alhazami, L., & Mareta, S., 2024; Chapra, 2008). Resilience theory, introduced by Cumming et al. (2005), defines resilience as a system's ability to maintain core functions despite external shocks, making it highly relevant to food security governance. However, complex methodologies and sectoral trade-offs complicate resilience measurement, reinforcing the need for an adaptive ERM model that integrates quantitative and qualitative risk assessment methods.

A comparative analysis between conventional and Islamic ERM frameworks highlights key differences in approaches to food security risks. Conventional ERM relies on statistical modelling, financial hedging, and supply chain optimisation, while Islamic ERM incorporates Zakat-based safety nets, ethical investment frameworks, and resource conservation strategies. These theoretical foundations support the evaluation of Prophet Yusuf's risk management principles within a modern ERM framework, bridging historical governance insights with contemporary policy applications.

Climate Change and Agricultural Disruptions

Climate change presents a severe threat to global food security, intensifying extreme weather events such as droughts, floods, and hurricanes. These disruptions degrade soil quality, reduce water availability, and damage essential crops, leading to declining agricultural yields and food shortages (IPCC, 2014). Empirical studies confirm that prolonged droughts significantly lower agricultural output, while climate-induced floods and storms devastate farmlands, causing substantial economic losses (FAO, 2021). Addressing these challenges requires ERM as a structured framework to identify, assess, and mitigate agricultural risks (World Bank, 2022).

Applying ERM principles strengthens food security resilience by integrating risk assessment, crisis response, and adaptive strategies. Conventional ERM frameworks incorporate statistical risk models, insurance mechanisms, and market stabilisation policies (COSO, 2017). Meanwhile, Islamic ERM frameworks integrate *Maqasid Shariah* principles, ethical risk-sharing mechanisms, and sustainable resource governance (Dusuki & Bouheraoua, 2011). Examining the intersection of these frameworks provides insight into how ERM strategies mitigate climate-related threats while incorporating Islamic governance principles to reinforce food security policies.

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Several ERM-based climate resilience strategies have proven effective in strengthening agricultural sustainability. Crop diversification, climate-resilient irrigation systems, and modern agricultural technologies help reduce food security risks (GAO, 2021). Studies indicate that farms implementing diverse crop rotations experience lower yield losses during climate shocks compared to those relying on single-crop production (Lin, 2011). Similarly, water conservation strategies, such as drip irrigation and rainwater harvesting, improve water-use efficiency and reduce drought vulnerability (FAO, 2020). Research confirms that precision irrigation systems lower water wastage by up to 40 per cent, contributing to sustainable food production (Pretty, 2008).

Technological advancements further enhance ERM-based climate adaptation strategies. Climate-smart agricultural technologies, including drought-resistant crop varieties, AI-driven precision farming, and advanced water resource management, support resilience against environmental stressors (Fu et al., 2024). Implementing remote sensing and Geographic Information Systems (GIS) facilitates real-time monitoring of crop health, soil conditions, and climate patterns, enabling early risk detection and proactive decision-making (FAO, 2023). Integrating these technological solutions within ERM frameworks allows policymakers to establish structured, verifiable, and sustainable food security risk management strategies.

Despite extensive research on ERM applications in agriculture, scholars have conducted limited empirical studies linking Prophet Yusuf's principles to modern ERM frameworks. Islamic-based risk management strategies remain underexplored compared to conventional ERM models, particularly concerning food security governance. Shihab (2002) and Al-Maraghiy (2001) highlight that Prophet Yusuf's crisis management approach, which integrates predictive risk assessment, strategic food storage, and resource optimisation, aligns with contemporary ERM principles.

Islamic governance models addressing risk mitigation receive limited attention in mainstream ERM research. Studies by Dusuki & Bouheraoua (2011) discuss Islamic economic governance and its role in strengthening food system resilience, but they do not provide a direct comparative analysis of Islamic and conventional ERM frameworks. Similarly, Mostenska et al. (2022) explore modern ERM applications, yet fail to examine how historical governance principles, such as Prophet Yusuf's model, can be adapted to contemporary policy frameworks.

Food Supply Chain Vulnerabilities

Geopolitical instability, trade restrictions, and global pandemics continue to disrupt food supply chains, reducing food availability and accessibility. International conflicts, including the Russia–Ukraine war, destabilise agricultural exports, increase food prices, and cause supply shortages (Kalkuhl et al., 2023). Trade barriers and economic sanctions imposed by dominant economies further restrict the movement of food commodities, exacerbating food insecurity in nations reliant on imports (Lake et al., 2020). The COVID-19 pandemic exposed weaknesses in food distribution networks, as labour shortages, logistical disruptions, and export restrictions created severe bottlenecks in supply chains (Azizsafaei et al., 2021). These challenges highlight the necessity of

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Enterprise Risk Management (ERM) in maintaining food supply chain resilience and stability.

Governments and agribusinesses implement ERM strategies to identify, assess, and mitigate risks within food supply systems. Policymakers develop contingency plans through structured risk assessment frameworks to anticipate disruptions (Cochrane, 2017). Diversifying food supply sources reduces dependency on a single country or supplier, minimising risks associated with trade restrictions and geopolitical tensions (Lake et al., 2020). Establishing alternative transportation routes and expanding logistics networks ensures that food distribution continues despite periods of instability (Kalkuhl et al., 2023).

Governments strengthen food security by maintaining buffer stocks and strategic food reserves. Countries implementing national grain reserves stabilise food prices and prevent shortages during trade restrictions and supply chain failures caused by natural disasters (Azizsafaei et al., 2021). Empirical studies confirm that nations with robust food reserve policies sustained supply chain stability more effectively during the COVID-19 pandemic and geopolitical conflicts than those without such frameworks (Cochrane, 2017).

Technological advancements reinforce ERM strategies in supply chain resilience. Artificial intelligence and blockchain technology enhance transparency, traceability, and efficiency in supply chain management, reducing fraud and improving operational coordination (Lake et al., 2020). Predictive analytics and remote sensing enable policymakers and industry leaders to monitor vulnerabilities in real time, detect emerging risks, and implement rapid responses to prevent disruptions (Azizsafaei et al., 2021). Integrating ERM principles with digital innovations facilitates data-driven risk management frameworks that improve the stability and sustainability of food supply chains.

Existing research extensively examines ERM applications in supply chain risk management but provides limited analysis of how Islamic-based risk governance can strengthen food security. Scholars such as Dusuki & Bouheraoua (2011) emphasise that Islamic economic principles, particularly ethical risk-sharing, sustainable resource management, and social justice, offer valuable insights into securing food supply chains. However, few studies examine the application of Islamic risk management frameworks in strategic food reserves and equitable food distribution policies.

Economic Instability and Food Price Volatility

Economic instability significantly affects food affordability by driving up commodity prices, increasing inflation, and devaluing currencies. The 2007–2008 global food price crisis exemplifies how rising food prices intensify food insecurity in developing nations (FAO, 2008). Hyperinflation weakens purchasing power, limiting access to essential food supplies, while currency depreciation raises input costs for imported agricultural products (Mostenska et al., 2022). These economic disruptions create food price volatility, increasing risks for both producers and consumers.

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ERM frameworks provide structured solutions to mitigate economic risks in food security. Governments implement price stabilisation mechanisms to counteract sudden market fluctuations (Wright, 2012; Ahmad Jaber & Mohammed Shah, 2024). Strategic grain reserves play a crucial role in stabilising food markets, allowing policymakers to release food stocks when prices spike, thereby preventing excessive price surges (Wright, 2012). Countries with well-managed national food reserves maintain market stability more effectively, ensuring that vulnerable populations maintain access to essential food supplies (Mostenska et al., 2022).

Agricultural subsidies serve as another key ERM mechanism to strengthen food security. Governments provide subsidies to reduce production costs, encouraging farmers to cultivate staple crops and sustain food supply levels (Polukhin & Panarina, 2022). However, improperly structured subsidies may distort markets or fail to reach target beneficiaries, reducing their effectiveness (Mostenska et al., 2022). ERM methodologies assist policymakers in evaluating the impact of subsidies, ensuring that they enhance sustainable agricultural practices while maintaining economic stability.

Islamic financial mechanisms provide an alternative framework for stabilising food prices through finance models. Risk-sharing instruments such as Zakat and Waqf finance social safety nets, ensuring that economically disadvantaged groups maintain food access during financial crises. Interest-free microfinancing and profit-sharing investments support small-scale farmers, allowing them to sustain production without excessive debt burdens (Dusuki & Bouheraoua, 2011). Integrating Islamic economic governance with ERM-driven policies enhances long-term food market stability, reducing dependency on volatile financial markets.

METHODS

This study applies a descriptive-analytical methodology to examine the integration of Prophet Yusuf's governance principles with contemporary Enterprise Risk Management (ERM) frameworks within food security governance. The research systematically analyses Islamic governance models, evaluates their applicability within modern risk management frameworks, and formulates policy recommendations to strengthen food security resilience (Creswell & Poth, (2018); Miles, Huberman, & Saldaña, 2014).

Justification for Qualitative Approach

A qualitative research design is essential for analysing historical governance models within modern ERM frameworks, as it captures interpretative and policy-based insights that quantitative methods cannot. This approach enables a structured textual analysis of risk anticipation, resource management, and crisis preparedness in Prophet Yusuf's governance model, ensuring its relevance to contemporary food security strategies.

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Research Process and Data Collection

Figure 1 presents the structured research process, demonstrating how each phase contributes directly to the study's objectives. The research follows a three-stage analytical framework, systematically integrating historical Islamic governance models with modern ERM strategies.

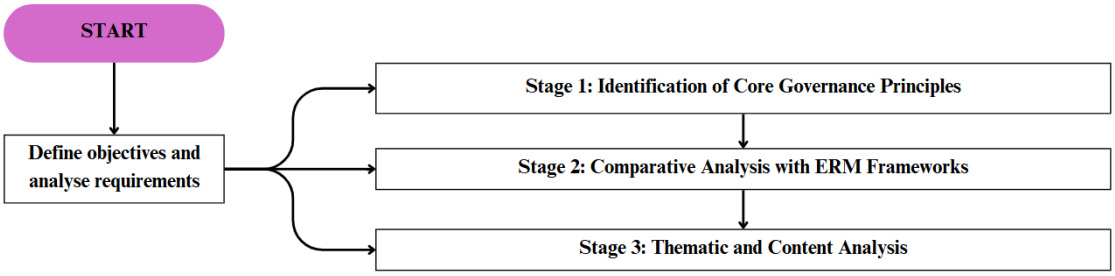

Figure 1. Research Process Diagram

The research begins by analysing classical tafsir sources, including Ibn Kathir (2004), Al-Qurtubi (2008), Al-Tabari (2009), and Al-Maraghiy (2001), which offer insights into Prophet Yusuf's governance strategies, particularly in predictive risk assessment, strategic food storage, and resource optimisation. Subsequently, it examines Enterprise Risk Management (ERM) principles through empirical research, incorporating studies by Mostenska et al. (2022) and Wright (2012), to identify intersections between Prophet Yusuf's governance model and contemporary risk mitigation frameworks, highlighting shared principles in strategic planning, sustainable food security policies, and economic risk management. Finally, thematic and content analysis are applied to extract governance strategies aligned with ERM principles; the thematic approach identifies patterns in risk mitigation, economic stability, and food distribution governance, while content analysis assesses the applicability of historical governance insights within modern ERM structures, ensuring the findings remain relevant for contemporary policy development.

Considering Figure 1, the methodological limitations and data reliability are presented, as this study ensures data credibility through rigorous textual analysis of Islamic governance sources and peer-reviewed Enterprise Risk Management (ERM) literature. The selection of tafsir references follows a critical evaluation process to align with established Islamic scholarship, while empirical studies are drawn from leading academic journals, policy reports, and institutional research, thereby reinforcing both credibility and policy relevance.

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RESULT AND DISCUSSION

Predictive Risk Management: Forecasting and Preparedness

Prophet Yusuf's interpretation of Pharaoh's dream, as detailed in Surah Yusuf (12:46–49), exemplifies predictive risk management. He anticipated seven years of abundance followed by seven years of famine, thereby establishing a structured risk assessment approach. This foresight aligns with modern Enterprise Risk Management (ERM) frameworks, which utilise historical data, climate models, and economic forecasting to assess agricultural risks. Ibn Kathir (2004) and Al-Qurtubi (2008) highlight Yusuf's interpretation as a strategic risk evaluation that shaped Egypt's long-term agricultural policies, reflecting contemporary data-driven decision-making and early warning systems.

Modern ERM-based risk mitigation strategies mirror Yusuf's proactive approach. The ERM framework emphasises early risk identification and mitigation, resembling Yusuf's pre-emptive famine management. Today, climate projections and big data analytics support predictive models for agricultural productivity and supply chain disruptions. Hamka (2007) notes that Yusuf's foresight guided the regulation of food supply and distribution, a strategy reflected in buffer stock programmes and subsidised storage policies employed within national food security frameworks.

Prophet Yusuf's foresight and strategic planning exemplify predictive risk management, aligning closely with modern agricultural ERM practices and underscoring the importance of proactive risk assessment and resource management in ensuring food security.

Strategic Preparedness and Resource Management

Prophet Yusuf's preparedness strategy underscores systematic agricultural planning and resource management. His methods align with sustainable farming practices, incorporating crop rotation, soil conservation, and water management. He recommended storing wheat with its stalks, a technique that remains widely adopted to reduce post-harvest losses. Similarly, Enterprise Risk Management (ERM) frameworks advocate investments in resilient agricultural infrastructure, including irrigation systems, drought-resistant crops, and precision farming, to safeguard food stability amid climate uncertainties.

Moreover, Yusuf implemented a structured crisis response by optimising resources and enforcing policies, ensuring regulated food reserves and efficient distribution systems during periods of scarcity. This approach aimed to maintain stable food access, a principle that aligns with modern risk governance, where governments introduce proactive measures to protect vulnerable populations. The food stockpiling mechanisms and market interventions introduced by Yusuf continue to underpin modern food security strategies.

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Strategic Food Storage and Supply Chain Management

Strategic food storage and supply chain management played a crucial role in ensuring food security during crises. Surah Yusuf (12:47–49) describes how Prophet Yusuf instructed the Egyptians to store surplus grain during years of abundance to prepare for periods of famine. Al-Maraghiy (2001) characterises this storage system as a preventive measure that stabilised food availability and supply chains. This approach aligns with modern Enterprise Risk Management (ERM) frameworks, which advocate contingency planning and national food reserves to strengthen food security resilience (Shihab, 2002). Governments today implement national grain reserves to mitigate market volatility and ensure access to staple foods during crises (Mostenska et al., 2022).

Stock preservation and quality control serve as essential components of food security strategies. Al-Qurtubi (2008) highlights how storing grain with stalks extends shelf life and prevents spoilage, a practice resembling modern controlled-atmosphere storage and airtight sealing (Bilgen & Taşkıner, 2023.a.b.). The Food and Agriculture Organization (FAO) reports that proper grain storage reduces post-harvest losses by up to 30 per cent, reinforcing the relevance of structured food storage techniques (FAO, 2021). Integrating ERM principles with advanced storage technologies enhances food reserve accessibility during economic and environmental crises.

Controlled Food Distribution and Agricultural Sustainability

Beyond storage management, structured food distribution mechanisms played a crucial role in preventing waste and ensuring equitable food allocation. Al-Tabari (2009) describes how a rationing system was implemented to facilitate gradual food distribution during periods of scarcity. This structured approach resembles modern food rationing strategies and strategic reserves, adopted by organisations such as the World Food Programme from WFP to allocate food supplies based on economic and demographic priorities (Ray et al., 2022). Governments today implement emergency food networks and state-controlled rationing systems to prevent shortages, particularly in disaster-prone regions.

Long-term agricultural sustainability and disaster preparedness received significant attention in historical governance models. Qutb (2000) notes how sustainable agricultural policies were introduced to facilitate post-crisis agricultural recovery. This approach aligns with climate-adaptive agriculture, incorporating drought-resistant crops, irrigation management, and precision farming to sustain productivity despite climate variability (Randall et al., 2024). Governments worldwide invest in agricultural resilience programmes to mitigate food security risks posed by climate change and supply chain disruptions (Smyth et al.,2021); Schmidhuber & Tubiello,2007). Integrating ERM principles with sustainable food policies enables policymakers to develop long-term food security strategies, reinforcing structured governance models as foundational frameworks for modern food security policies.

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Sustainable Agriculture and Resource Optimisation

Sustainable agricultural strategies and resource optimisation strengthen long-term food security. Surah Yusuf (12:47-49) details how surplus grain storage during years of abundance ensured resilience against future famine. Al-Maraghiy (2001) describes this as a proactive risk management strategy that stabilised food supply. This structured approach aligns with ERM frameworks, which emphasise contingency planning and national food reserves to enhance food security resilience (Shihab, 2002). Governments today establish national grain reserves to stabilise food markets, mitigate price volatility, and ensure accessibility during crises (Mostenska et al., 2022).

Stock preservation and quality control continue to play an essential role in food security governance. Al-Qurtubi (2008) highlights how grain storage with stalks minimised spoilage, resembling modern controlled-atmosphere storage and hermetic sealing methods (Bilgen & Taşkıner, 2023). The FAO reports that proper grain storage reduces post-harvest losses by up to 30 per cent, demonstrating its relevance in ensuring food security (FAO, 2021). Integrating ERM principles with advanced storage technologies strengthens food reserves, making them accessible during economic and environmental disruptions (Fu et al., 2024).

Structured food distribution mechanisms remain critical in food security frameworks. Al-Tabari (2009) describes how a controlled food rationing system ensured equitable distribution throughout periods of scarcity. This practice mirrors modern food rationing policies and strategic reserves, widely implemented by the WFP to prioritise food allocation based on economic and demographic factors (Ray et al., 2022). Governments continue to invest in emergency food networks and controlled distribution mechanisms to address food shortages in vulnerable regions.

Sustained agricultural planning and climate-adaptive strategies remain essential components of food security. Qutb (2000) notes how long-term agricultural sustainability was embedded in governance policies to ensure post-crisis recovery. This historical model aligns with contemporary climate-resilient agriculture, integrating drought-resistant crops, advanced irrigation techniques, and precision farming to maintain productivity despite environmental challenges (Randall et al., 2024). Global agricultural resilience programmes focus on mitigating climate-related food security risks, ensuring supply chain stability amid economic and environmental uncertainties (Schmidhuber & Tubiello, 2007). Integrating ERM principles with sustainable agriculture policies strengthens economic stability and enhances food security frameworks in diverse governance models.

Prudent Utilisation and Waste Reduction

Moderation in consumption and waste reduction played a crucial role in ensuring long-term food security. Surah Yusuf (12:47-49) details the recommendation to store surplus grain while preventing resource wastage, ensuring sustainability during famine. Al-Qurtubi (2008) describes this practice as a structured economic strategy that balanced consumption with preservation. This approach aligns with modern Enterprise Risk Management (ERM) frameworks, which promote supply chain efficiency, inventory

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control, and circular economy principles to minimise food waste and optimise resource management (FAO, 2017). Implementing ERM-driven policies in food systems enhances resource efficiency, stabilises emergency reserves, and reduces waste during crises (Mostenska et al., 2022).

Beyond consumption management, structured food monitoring mechanisms prevented unnecessary depletion. Al-Tabari (2009) highlights how a systematic distribution model ensured grain was used efficiently while preserving excess for future shortages. This strategy aligns with modern ERM-driven food security models, including real-time inventory tracking, just-in-time supply chains, and optimised distribution networks (Schmidhuber & Tubiello, 2007). Governments and food agencies today employ AI-driven forecasting, warehouse automation, and food redistribution networks to minimise losses and prevent supply chain disruptions (Fu et al., 2024). ERM-based monitoring techniques assist policymakers in identifying inefficiencies, preventing overproduction, and ensuring equitable food allocation.

Waste reduction strategies also incorporated surplus repurposing, a principle embedded in modern circular economy models. Qutb (2000) notes how grain husks and stalks were repurposed as animal fodder, preventing waste and maximising agricultural byproducts. This approach aligns with sustainable agriculture, where food waste is transformed into biofertilisers, livestock feed, and renewable energy sources, enhancing food system resilience (Randall et al., 2024). The United Nations' Sustainable Development Goal (SDG) 12 promotes zero-waste models, reinforcing the relevance of structured waste management in modern sustainability frameworks (FAO, 2021).

ERM contingency planning also strengthens waste reduction strategies. Al-Maraghiy (2001) highlights how food reserves were maintained through rotation policies, ensuring older stocks were used first to prevent spoilage and economic losses. This approach aligns with modern ERM inventory control models, such as first-in, first-out (FIFO) warehouse management, ensuring efficient stock rotation and quality preservation (Ray et al., 2019;2022). By integrating ERM waste reduction strategies with historical food security models, policymakers can enhance food resilience, minimise losses, and achieve long-term sustainability goals.

Contingency Planning and Disaster Preparedness

Structured contingency planning played a central role in ensuring post-famine recovery and long-term sustainability. Surah Yusuf (12:47-49) describes a seven-year agricultural cycle, securing food resources in anticipation of future shortages. Al-Qarni (2007) characterises this structured planning as an early warning system that guided policy decisions and crisis management. This proactive approach aligns with modern ERM frameworks, which emphasise risk forecasting, strategic reserves, and emergency preparedness to prevent food security crises (IPCC, 2014). ERM-driven policies strengthen global resilience against climate-induced disasters and economic instability (Mostenska et al., 2022).

Beyond food reserves, risk financing mechanisms stabilised economic conditions during crises. Al-Tabari (2009) highlights the introduction of a structured taxation

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system, ensuring equitable food collection and distribution. This approach mirrors modern financial risk management, where governments establish fiscal policies, emergency funds, and agricultural insurance programmes to stabilise food markets (Schmidhuber & Tubiello, 2007). Today, ERM-based financial mechanisms, such as sovereign disaster funds and agricultural insurance, mitigate economic losses and secure food supply chains during downturns (Fu et al., 2024).

Early warning systems played a critical role in disaster preparedness frameworks. Al-Maraghiy (2001) describes risk detection mechanisms that enabled preemptive planning for food shortages. This approach aligns with modern ERM strategies, where meteorological data, satellite imaging, and AI-driven analytics predict food shortages (FAO, 2021). Governments today utilise ERM-based early warning systems, such as FEWS NET, to monitor climate risks, assess food supply chains, and implement emergency interventions (Randall et al., 2024).

Post-crisis agricultural recovery remained a key focus in structured governance models. Qutb (2000) highlights how stored seed reserves facilitated economic recovery and reduced dependency on external aid. This strategy aligns with modern ERM disaster recovery models, which incorporate climate-resilient seed banking, reforestation, and post-disaster agricultural restoration (Ray et al., 2022). ERM-driven recovery policies, including drought-resistant seed distribution and climate-adaptive farming, reinforce long-term food security and economic sustainability (Subramaniam, 2024; World Economic Forum, 2022; Roszaimi, 2024). By integrating ERM frameworks into disaster preparedness, policymakers can develop resilient food security strategies that withstand economic and environmental disruptions (Kraak & Niewolny, 2024; Oñederra-Aramendi, Begiristain-Zubillaga, & Cuellar-Padilla, 2023).

CONCLUSION

This study confirms that Prophet Yusuf's food security strategies align with Enterprise Risk Management (ERM) frameworks, integrating predictive risk assessment, strategic food storage, sustainable resource management, waste reduction, and contingency planning. Forecasting models and structured agricultural planning reflect modern risk mitigation strategies, which prioritise early warning systems, resilient food policies, and effective supply chain governance. Rationing mechanisms and food distribution models correspond with contemporary supply chain frameworks, ensuring sustainable access to food during crises. Waste minimisation and resource optimisation align with circular economic principles, reducing losses and improving efficiency. Additionally, contingency planning and financial governance reinforce modern disaster preparedness frameworks, strengthening food security resilience.

Despite these findings, empirical validation remains necessary to assess the practical implementation of these strategies in contemporary agricultural policies. Comparative studies should evaluate the scalability of Prophet Yusuf's approach across diverse economic and geopolitical contexts, ensuring adaptability within global food security frameworks. Policymakers must address regulatory challenges, particularly

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harmonising Islamic-based ERM models within non-Islamic economies, while identifying best practices for integrating historical governance models into modern risk mitigation strategies.

To enhance food security resilience, policymakers must develop ERM-driven policies that integrate strategic grain reserves, sustainable agricultural practices, and ethical governance structures. Governments should invest in robust food storage systems to stabilise supply chains and mitigate price volatility. Expanding climate-adaptive farming techniques, including drought-resistant crops and regenerative agriculture, will strengthen food systems against environmental disruptions. Transparent governance frameworks and international cooperation will ensure equitable food distribution and support global food security partnerships.

Future research should prioritise the empirical validation of Islamic-based ERM models, comparing their effectiveness with conventional food security frameworks. Further investigation should explore how Islamic governance principles influence national and international food security policies, particularly within organisations such as the FAO, OIC, and WTO. Empirical case studies from regions that have adopted elements of Islamic-based risk management should be examined to determine their applicability in modern regulatory environments. By adopting these principles, nations can establish resilient food security policies, reinforcing Prophet Yusuf's governance model as a foundational framework for sustainable and adaptive food security strategies.

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