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From Production to Resilience and Sovereignty: A Historical-Thematic Synthesis of Food Security Frameworks for Morocco's Compound Vulnerabilities

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Abstract:

This article explores the evolution of food security frameworks, moving from production sufficiency and entitlement-based access towards broader dimensions such as stability, utilization, resilience, and food sovereignty, while relating these concepts to Morocco's context.

Despite initiatives such as the Plan Maroc Vert, Morocco's food system continues to face recurring droughts and significant import dependency. It also suffers from limited adaptive capacity and fragmented governance structures. This article builds a simple integrated model to help understand how climate pressures and geopolitical disruptions together affect Morocco's food system.

Keywords: Food security, Morocco, compound vulnerability, resilience, food sovereignty

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1. Introduction

Morocco has long been described as the "breadbasket of North Africa", yet this image conceals a deeper structural fragility (World Bank, 2018). The country produces on average only 57% of its domestic cereal consumption, relying on imports – predominantly from France, Ukraine, Russia, and Canada – to fill the gap (FAO, 2021; HCP, 2020). This dependence becomes critical during recurrent drought years, when domestic production can fall by nearly 50% (World Bank, 2018). In 2022, following the Russia-Ukraine conflict, global wheat prices surged by 37%, and Moroccan bread prices rose by over 30%, triggering social protests and forcing the government to triple its wheat import subsidy, spending an additional 1.5 billion USD (HCP, 2022; FAO, 2022; IMF, 2022). This episode was not an isolated crisis but a manifestation of a chronic condition: Morocco's food security sits at the intersection of climate vulnerability and geopolitical dependency (Schilling et al., 2020).

Yet how should researchers and policymakers conceptualize this condition? The food security literature has produced a succession of frameworks – from the production-sufficiency paradigm of the 1960s–1980s (Evenson & Gollin, 2003), through Sen's access-entitlements approach (1980s–1990s) (Sen, 1981), the addition of stability and utilization dimensions (1990s–2000s) (FAO, 2008; WFP, 2009), the resilience paradigm (2000s–present) (Folke, 2006; Walker & Salt, 2006), and the politically charged food sovereignty perspective (Via Campesina, 2007; McMichael, 2009). Most applications of these frameworks treat them as either historical stages or competing ideologies (Pinstrup-Andersen, 2009). This article argues that Morocco's compound vulnerabilities demand an integrated, historical-thematic synthesis that draws insights from each framework while respecting their distinct contributions (Ericksen, 2008; Béné et al., 2010).

The article has four main objectives. First, to trace the historical evolution of food security concepts, highlighting how each paradigm addresses – or fails to address – the specific conditions of a country like Morocco. Second, to synthesize these frameworks into an integrated analytical model that captures the interactions between production failures, import dependence, price transmission, and adaptive capacity. Third, to apply this model to Morocco's current food system to identify critical vulnerabilities and resilience gaps. Fourth, to derive policy-relevant conclusions that go beyond conventional sectoral approaches, emphasizing transformative capacity and food sovereignty.

The article proceeds as follows. Section 2 describes the methodology of historical-thematic literature review and content analysis. Section 3 traces the evolution of food security concepts in five subsections, each linked to Morocco's realities. Section 4 develops the integrated framework, with explicit attention to vulnerability (exposure, sensitivity, adaptive capacity) and resilience (absorptive, adaptive, transformative). Section 5 applies the framework to Morocco's compound climate-geopolitical shocks. Section 6 discusses policy implications and limitations. Section 7 concludes.

2. Methodology

2.1 Research Design

This article employs a **systematic historical-thematic review** to synthesize food security conceptual frameworks and adapt them to Morocco. Unlike a systematic review that aggregates empirical findings, this design focuses on the intellectual history of concepts, their periodization, and their applicability to a national context characterized by compound risks (Snyder, 2019). The approach follows Snyder's typology of a "theoretical review" that maps the evolution of key constructs.

2.2 Content Analysis

The content analysis followed a structured but transparent process. First, each selected document was read carefully to identify the main definitions of food security and the key concepts employed by different authors and institutions. Second, recurring themes – such as "production", "access", "stability", "nutrition", "resilience", and "food sovereignty" – were identified and grouped into broad categories. Third, these categories were compared over time, from the 1960s to the present, to trace the evolution of food security thinking. Fourth, the analysis examined how each category applies to Morocco, using data from Moroccan reports and international databases. The literature search was conducted across **Scopus**, **Web of Science**, **Google Scholar**, and cairn.info (for French-language material). Search terms combined general food security keywords ("food security", "sécurité alimentaire", "concept*", "framework*") with specific framework names ("entitlements", "resilience", "vulnerability", "food sovereignty") and Morocco-specific terms ("Morocco", "Maroc", "Maghreb", "Plan Maroc Vert", "cereal import", "drought"). Inclusion criteria were: (a) peer-reviewed articles, academic books, or official FAO/WFP/World Bank reports; (b) published 1960-2023; (c) explicit address of conceptual frameworks of food security; (d) English or French.

Morocco-specific sources were prioritized for empirical grounding, including the World Bank (2018) agricultural sector review, HCP (2020) statistical yearbooks, the Plan Maroc Vert evaluation documents, and Schilling et al. (2020) on climate vulnerability in North Africa.

3. Evolution of Food Security Concepts: Relevance to Morocco

3.1 The Production-Sufficiency Paradigm (1960s-1980s) and Morocco's Green Revolution

The earliest conceptualization of food security focused on national self-sufficiency in food production. A country was considered food-secure if it could produce enough calories domestically (Evenson & Gollin, 2003). This paradigm was embodied by the Green Revolution, which doubled global cereal production between 1960 and 1990. Between 1960 and 1990, global cereal production increased from approximately 900 million tons to over 2 billion tons annually (World Bank, 2007).

Morocco attempted its own Green Revolution through the **"Plan Maroc Vert" (PMV)** launched in 2008, which modernised irrigated agriculture, subsidised inputs, and promoted high-yield varieties in designated "pillar" zones (World Bank, 2018). The PMV achieved significant productivity gains in export crops (citrus, tomatoes) and in the large-scale irrigated perimeters of Tadla, Gharb, and Loukkos (World Bank, 2018). Between 2008 and 2016, agricultural value added grew by 5.2% annually in irrigated areas (HCP, 2016). However, the production-sufficiency paradigm contained a fundamental flaw: it conflated national production with food security (Sen, 1981). In Morocco, despite increased cereal yields in good rainfall years, the country remains a net importer (FAO, 2021). Moreover, the PMV exacerbated dualism: a modern, export-oriented sector coexists with a fragmented rain-fed smallholder sector that covers 80% of agricultural land but produces only a fraction of marketed output (World Bank, 2018). The production-sufficiency lens alone cannot explain why Morocco experiences food insecurity even in years of adequate national production.

3.2 The Access-Entitlements Paradigm: Sen in the Moroccan Context

Amartya Sen's *Poverty and Famines* fundamentally reoriented food security thinking away from production and toward the ability of individuals to access food through legal, economic, and social entitlements (Sen, 1981). Sen demonstrated that the worst famines – the Bengal famine of 1943, the Ethiopian famine of 1973 – occurred not from food unavailability but from population groups lacking purchasing power (Sen, 1981). The FAO's 1996 World Food

Summit adopted this access dimension, defining food security as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food" (FAO, 1996).

In Morocco, the access-entitlements framework directs attention to poverty and inequality (HCP, 2020). Despite reaching lower-middle-income status, Morocco has a Gini coefficient of 39.5 (World Bank, 2021). Rural poverty is twice as high as urban poverty (19% vs. 9%), and the southern and eastern regions (Drâa-Tafilalet, Oriental) lag significantly with poverty rates exceeding 25% (HCP, 2020). Food access is mediated by labour markets, remittances (estimated at 8 billion USD annually), and social protection programmes such as *Tayssir* (conditional cash transfers reaching 1.2 million households) and *RAMED* (health insurance for the poor) (World Bank, 2021). However, the coverage of social protection is uneven; only about 25% of rural households receive any form of regular transfer (HCP, 2020). The access framework also highlights how food price inflation – as seen in 2008 (price of bread +45%), 2011 (+30%), and 2022 (+35%) – directly erodes real incomes, pushing households below the food poverty line (FAO, 2022; IMF, 2022).

3.3 Stability and Utilization Dimensions

The 1990s and 2000s saw the incorporation of two additional pillars: **stability** (temporal consistency) and **utilization** (nutritional adequacy) (FAO, 2008; WFP, 2009). Stability is critical for Morocco, where seasonal food insecurity peaks during the "lean season" (May-July) before the harvest, and where drought can cause multi-annual production collapses (Devereux, 2009). Between 2000 and 2020, Morocco experienced seven major droughts (2000-2001, 2004-2005, 2007, 2012, 2016, 2019, 2021-2022), each reducing cereal production by 30-50% (HCP, 2022). The country's cereal storage system (managed by ONICL) provides a buffer, but its capacity covers only 2-3 months of national consumption (FAO, 2021). Price volatility is another stability threat: international cereal prices are transmitted almost directly to Moroccan consumers due to high import dependence; a 10% increase in world wheat prices translates into a 7-9% increase in domestic bread prices within one month (World Bank, 2018).

Utilization refers to the ability to digest, absorb, and benefit from food (UNICEF, 2009). In Morocco, despite adequate calorie availability at the national level (3,200 kcal/person/day), micronutrient deficiencies remain widespread (FAO et al., 2021). Stunting affects about 20% of children under five in rural areas (compared to 12% in urban areas), and anemia affects over

30% of women of reproductive age (UNICEF, 2019). Utilization is compromised by poor water quality in certain regions (only 65% of rural households have access to safely managed drinking water), limited sanitation (42% of rural households), and inadequate infant and young child feeding practices (only 27% of infants under six months are exclusively breastfed) (UNICEF, 2019). The utilization dimension thus connects food security to health, water, and care systems.

3.4 The Resilience Paradigm: Absorptive, Adaptive, and Transformative Capacity

Since the 2000s, the resilience paradigm has gained prominence, emphasizing the capacity of food systems to absorb shocks, adapt to changing conditions, and transform fundamentally when necessary (Holling, 1973). Resilience comprises three dimensions: **absorptive capacity** (cope with shocks without fundamental change), **adaptive capacity** (adjust to change), and **transformative capacity** (restructure systems) (Walker & Salt, 2006).

In Morocco, absorptive capacity is visible in household-level coping strategies: drawing down savings (reported by 45% of rural households during drought), reducing meal frequency (38% of households), selling livestock (22% of pastoral households), or relying on migrant remittances (which increase by 25% during crises) (HCP, 2020; World Bank, 2021). At the national level, the government absorbs shocks through subsidies (wheat, sugar, cooking oil – costing 1.2-1.5 billion USD annually) and ad-hoc import tariff reductions (from 45% to 0% during crisis) (IMF, 2022). Adaptive capacity is more limited but includes the expansion of drip irrigation (from 50,000 ha in 2008 to 180,000 ha in 2020 under the PMV), crop diversification into drought-tolerant varieties (barley, sorghum, pulses – which increased from 15% to 22% of cropped area), and livelihood diversification into non-farm activities (which now accounts for 40% of rural household income) (World Bank, 2018; Schilling et al., 2020). However, transformative capacity – i.e., fundamentally restructuring the food system away from rain-fed vulnerability and import dependence – remains weak. Few policies address the deep structural issues: fragmented landholdings (average farm size 5.6 ha, 70% of farms <5 ha), water depletion (groundwater table falling 1-2 m/year in key aquifers), and the political economy of grain imports (a small number of private importers control 80% of wheat imports) (World Bank, 2018; Schilling et al., 2020).

3.5 The Food Sovereignty Perspective

Parallel to mainstream frameworks, the food sovereignty perspective emerged from peasant movements such as *Via Campesina* (Via Campesina, 2007). It is defined as “the right of peoples

to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (FAO, 2018). Food sovereignty critiques market-based approaches that undermine local production and create dependency on global agribusiness.

For Morocco, food sovereignty raises critical questions. The country's grain import dependency – over 40% of wheat consumption – makes it vulnerable to geopolitical coercion and commodity speculation (FAO, 2022). Moreover, the PMV's focus on export-oriented agriculture (citrus, tomatoes, olives for EU markets) has diverted water and land away from staple food production for domestic consumption (World Bank, 2018). Smallholder farmers have been marginalized: the number of farms below 2 ha increased by 15% between 2000 and 2016, and traditional seed systems have been eroded, with 80% of farmers now using commercial hybrid seeds (Schilling et al., 2020). A food sovereignty lens would prioritize rebuilding local grain value chains, strengthening farmer co-operatives (currently covering only 10% of smallholders), protecting domestic markets from dumping, and promoting agro-ecological practices (Via Campesina, 2007; FAO, 2018). While this perspective is sometimes dismissed as unrealistic for a water-scarce country, Morocco's reliance on imports is itself a political choice rather than a technical necessity.

4. An Integrated Vulnerability-Resilience Framework for Morocco

4.1 Synthesis of Frameworks

No single framework captures Morocco's compound vulnerabilities. We therefore propose an integrated analytical framework that combines four complementary bodies of literature:

- The vulnerability components from climate adaptation research: exposure, sensitivity, and adaptive capacity (Adger, 2006; Turner et al., 2003).
- The resilience dimensions: absorptive, adaptive, and transformative capacity (Walker & Salt, 2006).
- The four pillars of food security: availability, access, stability, and utilization (FAO, 2008).
- The food sovereignty emphasis on agency and structural transformation (Via Campesina, 2007).

These elements are combined into a single function where each component is assigned a directional sign (+ or –) to indicate whether it improves or worsens food security:

Food security outcome = f(–Exposure, –Sensitivity, +Absorptive capacity, +Adaptive capacity, +Transformative capacity, +Agency)

Where:

- **Exposure** = frequency and magnitude of climate and geopolitical shocks (Schilling et al., 2020). Higher exposure worsens food security (–).
- **Sensitivity** = degree to which the food system is affected by exposure (e.g., rain-fed share, import share) (World Bank, 2018). Higher sensitivity worsens food security (–).
- **Absorptive capacity** = ability to cope without fundamental change (e.g., subsidies, storage, social protection) (Walker & Salt, 2006). Higher capacity improves food security (+).
- **Adaptive capacity** = ability to adjust incrementally (e.g., irrigation, diversification) (Adger, 2006). Higher capacity improves food security (+).
- **Transformative capacity** = ability to restructure the system (e.g., land reform, agro-ecological transition). Higher capacity improves food security (+).
- **Agency** = degree of control that local actors have over food system decisions (Via Campesina, 2007). Higher agency improves food security (+).

The same logic can be expressed through the separate concepts of vulnerability and resilience:

Vulnerability = f(Exposure, Sensitivity, –Adaptive capacity)
Resilience = f(Absorptive capacity, Adaptive capacity, Transformative capacity, Agency)

Then:

Food security = Resilience – Vulnerability

This formulation makes explicit the mathematical intuition behind the conceptual model: food security improves when resilience increases and vulnerability decreases.

4.2 Application to Morocco: The Compound Vulnerability Equation

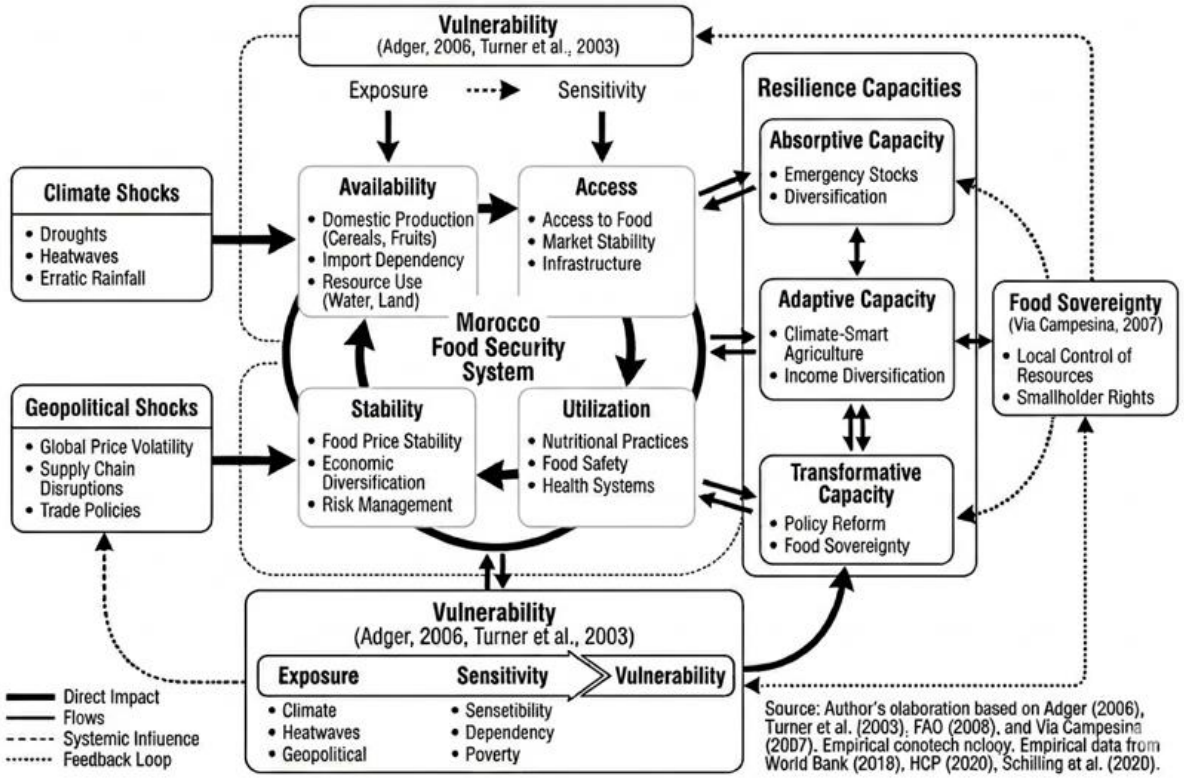
Using Morocco as a case, we can populate the framework with empirical proxies (based on World Bank, 2018; HCP, 2020; Schilling et al., 2020; FAO, 2022):

Component	Morocco's context	Vulnerability / Resilience implication
Exposure	**High:** drought occurs every 3-5 years (HCP, 2022); import price shocks occur every 5-7 years (FAO, 2022)	Increases vulnerability
Sensitivity	**High:** 80% of farmland rain-fed (World Bank, 2018); wheat imports >40% of consumption (FAO, 2021); bread is 15% of household food expenditure for poor households (HCP, 2020)	Amplifies impact of exposure
Absorptive capacity	**Moderate:** wheat subsidies (1.2-1.5 billion USD/year) (IMF, 2022) strategic storage (2-3 months consumption) (FAO, 2021); social protection covers 25% of rural households (HCP, 2020)	Reduces short-term vulnerability but costly
Adaptive capacity	**Low-moderate:** drip irrigation covers 180,000 ha (17% of irrigated area) (World Bank, 2018); crop diversification slow (pulses only 5% of area) (Schilling et al., 2020); early warning system exists but limited reach (FAO, 2021)	Insufficient for changing climate
Transformative capacity	**Low:** land fragmentation (70% of farms <5 ha) (World Bank, 2018); water over-extraction (aquifer depletion 1-2 m/year) (Schilling et al., 2020); import dependency entrenched (imports increased 50% since 2000) (FAO, 2021); limited political will for structural change	Severe constraint long-term
Agency	**Low:** smallholder influence weak (only 10% in co-operatives) (World Bank, 2018); trade policy driven by global market integration (free trade agreements with EU, US, Turkey) (McMichael, 2009); civil society oversight limited	Food sovereignty deficits

The compound vulnerability arises because **high exposure + high sensitivity + low adaptive/transformative capacity** creates a situation where shocks become crises (Turner et al., 2003). Moreover, climate and geopolitical shocks **interact**: a drought reduces domestic production, requiring increased imports at precisely the moment when global prices may spike. This interaction is not additive but multiplicative.

4.3 Integrated Vulnerability-Resilience-Sovereignty Framework for Morocco

Figure 1. Conceptual diagram of Morocco's compound food security vulnerabilities showing interactions between climate shocks, geopolitical shocks, the four pillars of food security, and resilience capacities.



Source: Author's elaboration based on Adger (2006), Turner et al. (2003), FAO (2008), and Via Campesina (2007). Empirical data from World Bank (2018), HCP (2020), Schilling et al. (2020).

Figure 1 outlines the integrated vulnerability and resilience framework for Morocco's food system. This model recognizes that national food security—structured around **availability, access, stability, and utilization**—is increasingly threatened by two external drivers: **climate shocks** (e.g., water scarcity and heatwaves) and **geopolitical shocks** (e.g., trade disruptions and price volatility).

The systemic response to these pressures is defined by three layers of resilience capacity:

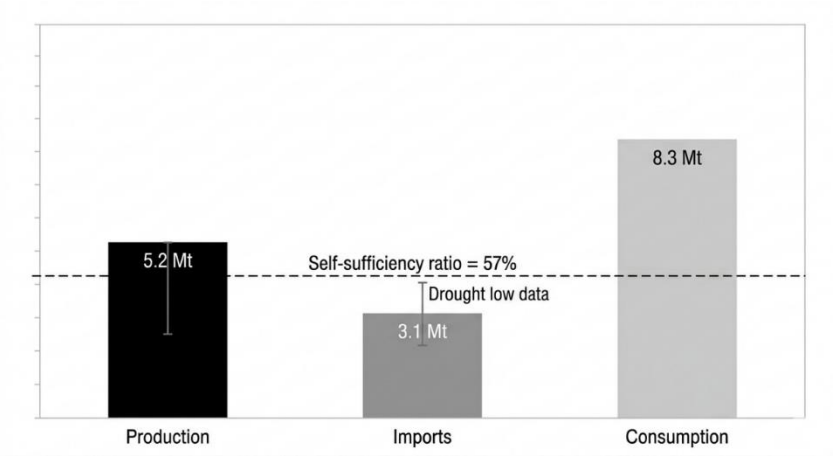
- **Absorptive Capacity**: The system's ability to cope with immediate shocks through emergency stocks and diversification.
- **Adaptive Capacity**: The implementation of climate-smart agriculture and income diversification to adjust to changing conditions.

- **Transformative Capacity**: The capacity for structural policy reform that shifts the system's fundamental state.

Supported by empirical data from the World Bank (2018), HCP (2020), and Schilling et al. (2020), the framework emphasizes a feedback loop where transformative actions proactively reduce future vulnerability. Finally, the entire system is grounded in **Food Sovereignty**, positioning local agency and resource control as the essential drivers for long-term stability.

4.4 Morocco's Cereal Balance (2010-2022 Average)

Figure 2. Morocco's cereal production, imports, and consumption (million tons per year, 2010-2022 average). Self-sufficiency ratio = 57%.*



Source: Data from FAO (2021) and HCP (2022).

Figure 2 illustrates the structural imbalance in Morocco's cereal sector based on average data from 2010 to 2022. With an average annual consumption of 8.3 Mt against a domestic production of 5.2 Mt, the national self-sufficiency ratio stands at approximately 57%. This gap necessitates a consistent reliance on imports, averaging 3.1 Mt per year.

However, these averages mask significant systemic volatility caused by climatic instability. As indicated by the error bars, drought years can see domestic production plummet to as low as 2.5 Mt, forcing a sharp increase in imports (up to 4.0 Mt) to maintain national supply. This data, sourced from the FAO (2021) and HCP (2022), highlights the high sensitivity of Morocco's food security to rainfall patterns and the critical role of international trade in offsetting domestic harvest failures.

5. Morocco's Compound Shocks: Two Illustrative Scenarios

5.1 Scenario A: Severe Drought without Geopolitical Shock (e.g., 2016)

A severe drought in 2016 reduced Morocco's cereal harvest by 60% (HCP, 2016). Because international wheat prices remained stable at around 180 USD per ton, the government was able to import additional grain at a moderate cost.

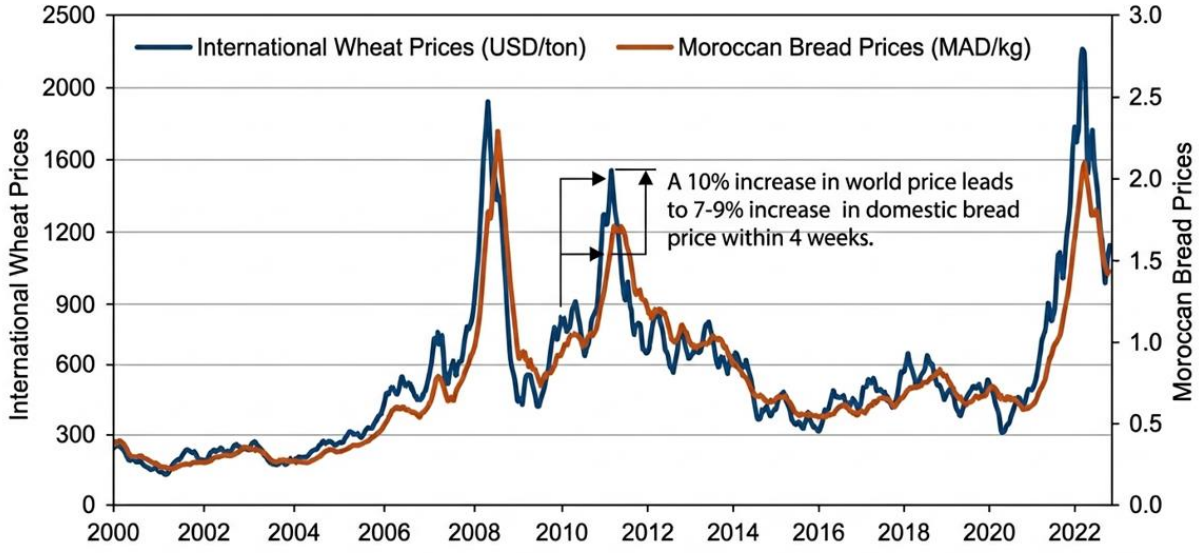
The wheat subsidy bill increased from 800 million dollars to 1.1 billion dollars (IMF, 2016). Social unrest was limited, with only 12 protests recorded. Rural areas suffered considerably: agricultural employment fell by 25%, livestock losses reached 15% in pastoral zones, and food poverty increased from 9% to 14% in the affected regions (HCP, 2016). Urban food access, however, remained stable because imports kept bread affordable. This scenario illustrates that absorptive capacity can function moderately well when only one shock occurs, but it does not address the underlying sensitivity of Morocco's food system

5.2 Scenario B: Combined Drought and Geopolitical Price Shock (e.g., 2022)

In 2022, drought cut production by 58%, while the Russia-Ukraine war drove wheat prices up 80% (FAO, 2022). Morocco faced a trilemma: subsidize imports (massive fiscal cost), allow prices to rise (social unrest), or ration supplies (politically difficult) (IMF, 2022). The government tripled the wheat subsidy, spending over $1.5 billion (1.2% of GDP). Bread prices still rose by 35%, triggering 45 protests (HCP, 2022). Adaptive measures are too slow, and transformative change remains unimplemented (World Bank, 2018). Scenario B represents the **compound risk** that single-framework analyses miss.

5.3 Price Transmission from Global to Domestic Markets (2000-2022)

Figure 3. Correlation between international wheat prices (USD/ton) and Moroccan bread prices (MAD/kg), 2000-2022. Correlation coefficient r = 0.89.



Source: Data from FAO (2022) and HCP (2022).

The high degree of integration between global commodity markets and the Moroccan domestic food supply is suggested by the strong co-movement between international wheat prices and local bread prices (Figure 3). Visual inspection of the data from FAO (2022) and HCP (2022) indicates that domestic prices tend to follow international movements with a short lag, broadly consistent with pass-through observed in other import-dependent countries. The synchronous spikes during major global shocks – notably the 2008 food crisis, the 2011 period of regional unrest, and the 2022 geopolitical disruptions (HCP, 2022; FAO, 2022) – illustrate Morocco's vulnerability to external price volatility. These trends underscore a core weakness in Morocco's food security strategy: despite domestic subsidy mechanisms, the country's heavy reliance on cereal imports means that geopolitical and market shocks are rapidly transmitted to Moroccan consumers. This strong co-movement reinforces the need for the transformative capacity discussed in the framework analysis, moving beyond temporary subsidies toward deeper structural resilience.

6. Discussion: Toward Transformative Resilience and Food Sovereignty in Morocco

6.1 Implications for Policy

The integrated framework points to several policy directions:

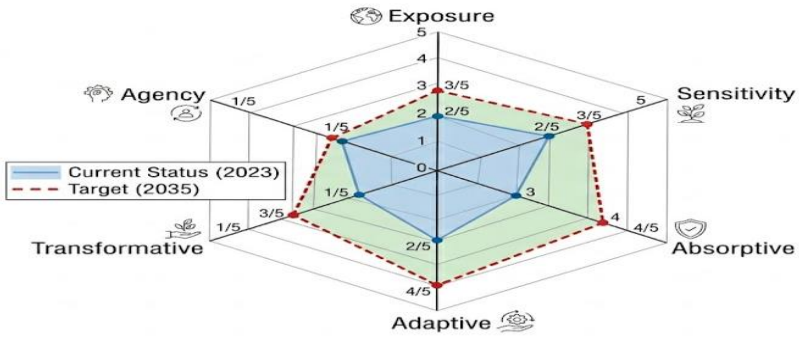
1. **Reducing exposure and sensitivity** – Shift rain-fed areas to drought-tolerant crops (sorghum, millet, pulses). Currently pulses account for only 5% of cropped area; increasing to 15% could reduce water demand by 30% (World Bank, 2018).
2. **Strengthening absorptive capacity** – Replace expensive subsidies with targeted cash transfers and increase strategic grain reserves from 2-3 months to 6 months (FAO, 2021). Current storage capacity is only 4-5 weeks of wheat consumption (FAO, 2021).
3. **Enhancing adaptive capacity** – Scale up conservation agriculture (currently 2% of farmland) and farmer-managed seed systems. Link early warning to anticipatory action (only 15% of at-risk households receive early warning) (FAO, 2021).
4. **Building transformative capacity** – Land consolidation in rain-fed areas, shift from export-oriented to domestic-oriented production (40% of irrigated area is export crops), and renegotiate trade agreements to protect local staples (Schilling et al., 2020).
5. **Strengthening food sovereignty** – Empower smallholder co-operatives (only 10% membership), protect domestic markets from dumping, invest in local processing and storage (only 30% of grain stored at farm level) (World Bank, 2018; FAO, 2018).

6.2 Limitations of the Study

The study relies on secondary data (Snyder, 2019). Empirical validation through household surveys or price transmission econometrics would strengthen the conclusions. The framework has not been tested against real-time shocks beyond 2022. Future research should operationalize the integrated framework with quantitative indicators.

6.3 Policy Pathways for Transformative Resilience in Morocco

Figure 4. Policy pathways matrix showing current status (2023) and target (2035) for six domains.



Source: Author's assessment based on World Bank (2018), HCP (2020), Schilling et al. (2020), FAO (2021).

Source: Author's assessment based on World Bank (2018), HCP (2020), Schilling et al. (2020), FAO (2021).

The Figure 4 maps a comparative assessment of Morocco's current food system status (2023) against the strategic targets established for 2035. This policy matrix evaluates six critical domains of the food security framework, revealing significant gaps between present vulnerabilities and the desired resilient state.

The current assessment (2023) highlights several areas of systemic weakness:

- **Transformative Capacity and Agency**: Both domains currently score lowest (1/5), indicating a critical need for structural policy reform and enhanced localized resource control.
- **Adaptive Capacity and Exposure**: Scores of 2/5 reflect the ongoing challenges posed by climatic sensitivity and the limited implementation of climate-smart agricultural practices.
- **Absorptive Capacity**: This domain shows the highest current performance (3/5), likely due to existing emergency stock mechanisms and social safety nets.

The 2035 target pathways envision a comprehensive shift toward systemic resilience. Reaching these goals requires a coordinated increase in **Adaptive Capacity** (to 4/5) and **Transformative Capacity** (to 3/5), shifting the focus from immediate coping mechanisms to long-term structural adaptation. As demonstrated by the author's assessment, achieving this "balanced hexagon" necessitates that policy interventions move beyond cereal subsidies toward empowering the agency of smallholders and reducing the sensitivity of the national food system to external shocks.

6.4 Critical Reflections on the Frameworks

Each framework discussed has limitations. First, the resilience paradigm can justify the status quo. If policymakers focus only on helping people “cope” (absorptive capacity), they may avoid structural transformation. Morocco’s repeated use of wheat subsidies is an example – it eases pain but does not fix import dependence. Second, food sovereignty is normatively attractive but faces practical challenges in a water-scarce country. Growing all wheat domestically would require huge additional irrigation water that does not exist. A balanced approach – reduced dependence rather than full sovereignty – may be more realistic. Third, the vulnerability framework (exposure, sensitivity, adaptive capacity) tends to treat components as separate when they are dynamically linked. High import dependence is itself a result of past policy

choices. These reflections suggest the integrated model should be used as a thinking tool, not a final answer.

6.5 Testable Research Questions

The conceptual synthesis leads to several simple research questions:

1. **Vulnerability index for Morocco's regions** – A composite index using drought frequency, rain-fed share, poverty rate, and irrigation access could rank regional vulnerability.
2. **Cost-effectiveness of resilience interventions** – Compare subsidies, grain reserves, drip irrigation, and cash transfers to identify best investment.
3. **Local production as a buffer against price shocks** – Compare communities with strong co-operatives versus those without to test if local production protects households.
4. **Pathways to reduce import dependence** – Model different combinations of demand reduction, supply increase, and storage expansion to reach 20% dependence by 2050.

These questions are testable with existing or collectable data and would move from conceptual review to practical guidance.

7. Conclusion

This article has traced the evolution of food security concepts from production-sufficiency to resilience and food sovereignty, synthesising them into an integrated framework for Morocco's compound climate-geopolitical vulnerabilities. Morocco's food security cannot be understood through any single lens: it requires simultaneous attention to availability, access, stability, utilization, resilience (absorptive, adaptive, transformative), and sovereignty (agency and control).

The empirical application reveals a concerning picture: high exposure (drought every 3-5 years, price shocks every 5-7 years), high sensitivity (80% rain-fed, 40% import dependence, bread as 15% of poor household expenditure), moderate absorptive capacity, low adaptive capacity, very low transformative capacity, and low agency (HCP, 2020; World Bank, 2018; Schilling et al., 2020). The 2022 episode was a stress test that Morocco passed only by incurring unsustainable fiscal costs ($1.5 billion) (IMF, 2022). Without structural transformation, future compound shocks will produce even worse outcomes.

The way forward is not simply more aid or more technology, but a deliberate strategy of **transformative resilience** that reduces import dependency, empowers smallholders, diversifies production systems, and redefines food security as a matter of national sovereignty (FAO, 2018; Via Campesina, 2007). This requires political will and long-term investment. Future research should operationalize the integrated framework with primary data and test it across multiple shock scenarios.

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