Table S1. Systematic Literature Review Stages and Methodology.

Stage	Description	Comments / References
Stage 1: Relevant data sources identification	Databases: Scopus and Web of Science Peer-reviewed international journal articles in English from 2000 till 2023. Search across all fields (title, keywords, abstracts). Stored in local EndNote library, examined, and screened by two researchers separately.	
Search Round 1	*1A:* (agri* AND supply chain* AND (decision support* OR resilien*)), obtained 689 articles.	Initial search focused on the 'umbrella' theme of decision support systems (DSS) for GSCs.
	1B: (agri* OR grain* OR crop) AND supply chain* AND (decision support* OR resilien*), obtained 454 articles	Modified search strings to include direct keywords related to grain based on Preliminary scrutiny of Round 1A.
	Total: 848 articles after removing duplicates	
Search Round 2	*2:* agri* AND supply chain* AND (simulation* OR optimisation* OR discrete choice*), resulted in 1670 articles	Separate search conducted to discuss DSS and resilience with various modelling and simulation processes
Stage 2: Refinement of body of literature	Primary Screening Result after reading titles and abstracts *Round 1:* resulted in 140 articles and 13 extant literature reviews. *Round 2:* resulted in 326 articles and 6 extant literature reviews.	Independent analysis by two researchers
Literature review	**Design and Decision-Making Processes:** Highlighted the distinct nature of perishable crops requiring stochastic planning models to enhance efficiency during harvesting and post-processing. Emphasised consumer satisfaction, revenue, waste reduction, and demand-supply issues. Explored commodity-based optimisation, innovative distribution channels, and strategies to mitigate post-harvest losses.	[3, 12,32-34]
	Risk Management and Resilience: Identified key risks such as climate change, pest control, soil degradation, and population growth. Suggested risk management strategies for farmers. Explored ASC resilience from a multidisciplinary perspective, focusing on	[13, 24-37, 128]

Stage	Description	Comments / References
	weather variability, pest outbreaks, and system adaptiveness.	
	Advanced Technologies and Methodologies:	[21-23, 129]
	Advocated for multi-disciplinary research in decision-making, dynamic models, and agent-based methods (ABM) to improve ASC operations and policies.	
	Proposed using machine learning (ML) and AI for sustainability and digital transformation in production and distribution.	
Inclusion/exclusion criteria for this SLR	*Criteria 1:* Focus on crop-based commodities (grains); excluding livestock, horticulture, dairy, non-consumable commodities.	Criteria designed to optimise logistics, ensure the stability and resilience of GSCs, and facilitate effective decision-making in managing these complexities.
	Criteria 2: Focus on post-harvest logistics; excluding pre-harvest risks, processed products, urban supply chains.	
	Criteria 3: Focus on agents in post-harvest stages or upstream supply chain.	
	Criteria 4: Relevance to research questions, high-quality literature from Q1, Q2 journals and indexed conference proceedings.	
Stage 3: Analysis and synthesis	Final Full text Screening Result: 34 papers (Round 1), 51 (Round 2), and 19 SLRs, totalling 104 papers	
Techniques Used	***VOS Viewer:*** Generates network maps representing relationships between keywords and concepts, useful for displaying large bibliometric bodies of text.	[24, 29, 18-22]
	Leximancer: Uses ML and natural language processing to automatically identify and analyse words, concepts, and their relations, reducing subjective influences.	