Mapping Two Decades of Research on Sustainable Agriculture and Food Security in South and Southeast Asia: Advancing Agribusiness Policy Coherence in BIMSTEC Countries

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ABSTRACT

Food insecurity remains a critical challenge in the 21st century, closely linked to climate resilience and exacerbated by the convergence of climate change, socio-economic vulnerabilities, geopolitical conflicts, and unsustainable agricultural practices. Consequently, the sustainable agriculture and food security (SAaFS) nexus has emerged as a global policy priority aligned with United Nations Sustainable Development Goal (SDG) 2, which aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture by 2030. Countries across South and Southeast Asia, including the BIMSTEC bloc, confront multifaceted challenges in advancing sustainable agriculture policies and practices. Yet systematic understanding of how research on the SAaFS nexus has evolved in Asia—a region disproportionately affected by food insecurity and climate vulnerability—remains limited. This study addresses this gap by conducting a bibliometric scoping review (BSR) of scholarly literature and a rapid environmental scan (RES) of country-level agricultural priorities. Using VOSviewer, the BSR of 67 outputs (2007–2026) from the Scopus database identified three primary research clusters: agribusiness, food supply, and alternative agriculture. The RES of agricultural priorities within BIMSTEC nations reveals a persistent policy-coherence gap: integrating alternative agriculture as a scalable mechanism to strengthen agribusiness and mitigate food insecurity requires urgent and coordinated attention under climate-resilience imperatives. These findings are particularly relevant to sustainable development scholars, policymakers, and practitioners.

Keywords: agribusiness/ alternative agriculture/ bibliometric scoping review/ climate resilience/ food supply/ policy coherence/ rapid environmental scan/ SDG 2/ VOSviewer

1. INTRODUCTION

Food insecurity remains a critical challenge in the 21st century, closely linked to climate resilience and exacerbated by the convergence of climate change, socio-economic vulnerabilities, geopolitical conflicts, and unsustainable agricultural practices. A recent global assessment by the Food and Agriculture Organisation (FAO) indicates that 8.1 per cent of the global population faces hunger, affecting over 600 million people [1]. Climate change has exacerbated declines in agricultural productivity and food production in many regions [2], affecting multiple dimensions of food security [3]. Barakat et al. [4] note that growing socioeconomic inequalities add layers of complexity and worsen food insecurity by limiting financial resources, reducing access to healthy food, and constraining educational opportunities. In contrast, Hernández & Camardiel [5] contend that food insecurity across the developing world has markedly intensified because of exogenous shocks, including the COVID-19 pandemic and persistent geopolitical armed conflicts. Critically, unsustainable agricultural practices have undermined long-term food security by degrading natural resources, reducing future crop yields, and destabilising food supplies [6]. Consequently, climate-resilient sustainable agriculture can be understood through the triple bottom line construct: (i) adapting to environmental change whilst practising environmental stewardship, (ii) enhancing the economic profitability and viability of farming operations, and (iii) ensuring socially just and inclusive outcomes for farmers and consumers. Sustainable agriculture as a tool to address food insecurity has therefore gained global policy currency. For instance, the second Sustainable Development Goal (SDG 2) within the United Nations 2030

Agenda aims to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture" [7, para 1].

On the one hand, FAO defines food security as a situation "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [8, p. 3]. On the other hand, Radimer [9] defines food insecurity as existing "whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable food in socially acceptable ways is limited or uncertain" [p. 860]. A conceptual analysis of the food security construct [10] observed that "food security is perceived in an ambiguous and often completely unrelated manner. It results from the fact that the problem is not clearly defined, and its solution involves many parties concerned" (p. 1). Hence, food insecurity can be framed as a wicked problem [11] characterised by a wide range of challenges that defy clear portrayal or straightforward solution. Like other wicked problems, food insecurity reflects broader systemic challenges [12]—including climate change, socio-economic vulnerabilities, geopolitical conflicts, and unsustainable agricultural practices—and will require robust national policy reforms and results-based strategic plans for the agricultural sector.

Countries in South Asia and parts of Southeast Asia remain most vulnerable to food insecurity [13]. In this context, this paper contends that examining how literature on the sustainable agriculture and food security (SAaFS) nexus has evolved in Asia, coupled with country-level policy analysis, can generate valuable insights for the Global South to inform future research and shape reforms. For example, regional blocs in the Global South, such as the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), which includes countries in South and Southeast Asia, face diverse challenges in the transition to climate-resilient, sustainable agriculture that warrant urgent policy attention [14]. However, systematic analysis of scholarly literature and policy imperatives on the SAaFS nexus in Asia remains limited. This study addresses this gap.

This article is structured in five sections. Following this introduction, it provides an overview of BIMSTEC countries before presenting the methodology, findings, and discussion. The article concludes with recommendations.

2. BACKGROUND ON BIMSTEC COUNTRIES

BIMSTEC is an international organisation comprising seven member countries: Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand [15]. The bloc was established in June 1997 through the Bangkok Declaration, initially with four members: Bangladesh, India, Sri Lanka, and Thailand. Myanmar joined the bloc in December 1997, and Bhutan and Nepal were admitted in February 2004 [16]. BIMSTEC's composition as an interregional organisation reflects its unique position connecting member countries from the South Asian Association for Regional Cooperation (SAARC) and the Association of Southeast Asian Nations (ASEAN). Despite BIMSTEC's acknowledged limitations [17,18], it collectively represents nearly 2 billion people—approximately one-quarter of the world's population—with a combined gross domestic product (GDP) of approximately US$4 trillion [15].

BIMSTEC member countries include a mix of developing and emerging economies, ranging from Thailand, with a per capita GDP of US$8,056, to Myanmar, at US$1,488 [19]. Thailand leads in the Human Development Index (HDI), ranked 76th out of 193 countries [20], while Bangladesh is the worst performer on the Global Food Insecurity Index (GFSI), ranked 80th out of 113 countries [21]. Although the GFSI does not rank Myanmar, the country is clearly in a dire situation, as one-third of the population faces food insecurity [22]. Nepal depends most on the agriculture sector in terms of GDP contribution (24%) and sectoral employment (60%) [23]. Inter-country cooperation in agriculture is a core priority for BIMSTEC, with agriculture-related trade valued at over US$131 billion in 2020 [24].

3. METHODOLOGY

This study employed a combination of a bibliometric scoping review (BSR) and a rapid environmental scan (RES), drawing on established methodological frameworks. The BSR integrates bibliometric analysis and scoping review to systematically map the scope and characteristics of research on a given topic, using quantitative methods to track publication trends and identify research gaps [25]. Such scoping reviews are valuable for synthesising existing literature, surfacing dominant themes, identifying knowledge deficits, and generating evidence-based recommendations [26]. The RES, conversely, provides a framework for examining the policy landscape through a coherence lens, enabling scrutiny of broader structural contexts and strategic priorities [27]. Drawing on Dewi et al. [28], the premise of policy coherence is that policies and objectives across different agricultural sub-sectors align and mutually reinforce one another. BSR alone can identify SAaFS research priorities but lacks a granular understanding of their significance, whereas RES alone can illuminate policy priorities but lacks substantive connections to evidence generated through scholarly inquiry. By complementing BSR with RES, this study draws on both research-informed policy and policy-informed research.

3.1 Data collection

Literature on SAaFS was retrieved from the Scopus database on July 30th, 2026. Scopus is widely recognised in scientometric research as a reliable source for mapping knowledge domains. The database facilitates robust co-citation and co-authorship analyses and typically provides larger datasets than alternative sources such as Web of Science [29]. Notably, a comparative database study by Dhakal & Mahmood [30] found that Scopus retrieves substantially more citations than Web of Science, making it better suited for capturing comprehensive scholarly impact in these areas. This study used a search strategy combining keywords related to sustainable agriculture, food security, and food insecurity to identify relevant literature. Because BIMSTEC countries overlap with two regional entities—ASEAN and SAARC—this study incorporated both into the Boolean search string in Scopus (as detailed below).

(TITLE-ABS-KEY ("food security" OR "food insecurity") AND TITLE-ABS-KEY ("sustainable agriculture") AND TITLE-ABS-KEY ("southeast asia" OR "south asia") OR TITLE-ABS-KEY ("ASEAN" OR "SAARC" OR "BIMSTEC")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "cp")) AND (LIMIT-TO (LANGUAGE, "English"))

This search was deliberately narrow, focusing exclusively on studies examining key aspects of food security or insecurity within the sustainable agriculture context. Consequently, it reduced conceptual drift and helped identify potential policy priorities. The initial search returned 73 outputs. After removing non-English outputs, 67 outputs were retained for analysis: journal articles (n=28), book chapters (n=19), reviews (n=14), and conference papers (n=6). Two complementary software platforms, Microsoft Excel and VOSviewer, were used to disseminate results. Scopus's structured metadata and rich citation information facilitated direct integration with both tools. VOSviewer, freely available software, enabled visualisation and analysis of research outputs, influential outlets, prominent authors, and their collaboration patterns and thematic relationships within the literature [31]. Microsoft Excel provided data organisation and preliminary visualisation capabilities.

4. RESULTS AND DISCUSSION

4.1 Bibliometrics Scoping Review

4.1.1 Research trend (2007–2026)

Research outputs show steady growth, especially in the past five years. Figure 1 shows that 57 outputs (85%) were published from 2021 onwards. This trend coincides with the adoption of alleviating hunger and increasing food security as part of the 2030 Agenda and the 17 SDGs in 2015. Twenty

disciplines were represented across the 67 outputs. The top five were: Agricultural and Biological Sciences (n=44), Environmental Science (n=30), Engineering (n=14), Social Sciences (n=11), and Earth and Planetary Sciences (n=11), followed by Medicine (n=8). However, Dhakal & Mahmood [32] note that it is important to note that most books, conferences, and journals are multidisciplinary in nature and "a single article can be assigned to various discipline categories in the database, potentially distorting the actual contribution" [p. 81].

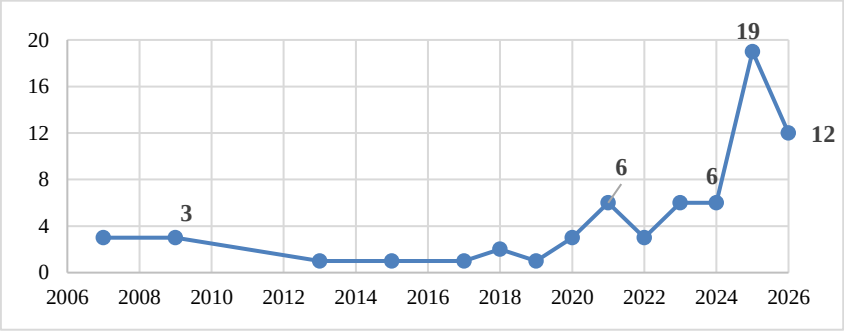

Figure 1. Research outputs trend on the SAaFS nexus in Asia (2007–2026)

Of the 67 scholarly outputs, 42 (62%) examined the SAaFS nexus within BIMSTEC countries. India dominated this subset, accounting for more than half of the outputs (n=25; 60%), followed by Bangladesh (n=7) and Thailand (n=5). Nepal and Sri Lanka each contributed two outputs, Myanmar contributed one, and Bhutan had no representation.

4.1.2 Prominent outlets

Table 1 presents the top five publication venues (n≥2) alongside their key performance metrics. Agricultural Systems emerged as the dominant outlet, publishing the most articles on the SAaFS nexus across South and Southeast Asia. It also had the highest Impact Factor, while Science of the Total Environment recorded the highest CiteScore. These metrics differ in their scope: Impact Factor (IF) captures citations within a two-year timeframe, whereas CiteScore (CS) employs a broader four-year citation window.

Table 1: Prominent outlets (n≥2) and their metrics

Outlets (Publisher)	Outputs	Impact Factor	Cite Score
Agricultural Systems (Elsevier)	4	9.3	13.6
Sustainability Switzerland (MDPI)	2	4.1	8.9
Science of the Total Environment (Elsevier)	2	n/a	18.8
Ecological Intensification of Natural Resources for Sustainable Agriculture (Springer, Edited Volume)	2	n/a	n/a
CAB Reviews Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources (CABI International)	2	n/a	2.7

4.1.4 Most influential authors and outputs

First, five authors produced at least two outputs indexed in Scopus: (a) Gudi Nachiket, Public Health Evidence South Asia (India); (b) Guo Fang-Rui, Sanya Institute of Nanjing Agricultural University (China); (c) Jat Hanuman Sahay, ICAR-Indian Institute of Maize Research (India); (d) Panchami, L. R., Manipal Academy of Higher Education (India); and (e) Parihar C. M., ICAR-Indian Agricultural Research Institute (India).

Second, the three most-cited scholarly outputs (n≥100) indexed in Scopus were extracted. Table 2 presents bibliographic information—including author, publication date, title, and publication outlet—alongside citation metrics from Google Scholar (GS). GS citations consistently exceed those in Scopus because GS covers a broader range of sources. Consequently, GS captures scholarly work disseminated through channels beyond conventional peer-reviewed journals more comprehensively than Scopus. An article examining environmental impacts and constraints for major food crops in Sub-Saharan Africa and South Asia [33] garnered the most citations in both Scopus and Google Scholar.

Table 2: Most Cited Outputs

Author/Year	Title	Source	Citations
Reynolds et al. (2015)	Environmental impacts and constraints associated with the production of major food crops in Sub-Saharan Africa and South Asia	Food Security	234 (SD); 381 (GS)
Mainali et al. (2018)	Evaluating synergies and trade-offs among Sustainable Development Goals (SDGs): Explorative analyses of development paths in South Asia and Sub-Saharan Africa	Sustainability (Switzerland)	189 (SD); 303 (GS)
Sarkar et al. (2020)	Low input sustainable agriculture: A viable climate-smart option for boosting food production in a warming world	Ecological Indicators	173 (SD); 262 (GS)

SD=Scopus Database; GS=Google Scholar

4.1.3 Research Focus (co-occurrence of keywords analysis)

Keywords mark research emphasis and thematic breadth across scholarly literature. Methodological guidance for VOSviewer [31] indicates that keyword networks can map conceptual linkages, identify emerging trends, and illuminate the intellectual evolution of knowledge domains over time. Network visualisation of keyword co-occurrence further reveals how research areas develop and intersect [34]. Keyword extraction from the Scopus dataset, conducted via VOSviewer's full counting methodology, yielded 764 discrete lexical units. Applying a minimum occurrence threshold of three yielded a refined analytical corpus of 56 keywords. The resulting network map (Figure 2) identified three thematic clusters: (a) agribusiness (red), (b) food supply (blue), and (c) alternative agriculture (green). Box 1 provides descriptions of these three key terms. The strength and density of connections between keywords reflect how often they co-occur across publications.

Box 1: Key definitions

• Alternative Agriculture encompasses practices such as organic, sustainable, regenerative, and low-input farming, all prioritising organic or low-chemical production methods. As such, it advocates smaller-scale operations, reduced dependence on synthetic inputs and fossil fuels, environmental stewardship, and direct-to-consumer marketing channels.

• Food Supply incorporates the chain of integrated processes of production, storage, transportation, and retail distribution that deliver food to consumers within specified timeframes. It constitutes a network of interdependent actors, operations, and technologies coordinated to safely move food from farm to consumer. Key stakeholders include farmers, processors, logistics providers, retailers, foodservice operators, and consumers.

• Agribusiness involves the commercial dimensions of agriculture through integrated operations spanning the manufacture and distribution of farm inputs, alongside storage, processing, and distribution of agricultural commodities. It combines finance, logistics, technology, and policy to advance sustainable agricultural and food supply outcomes. The ecosystem comprises diverse actors, smallholder enterprises, multinational corporations, producer cooperatives, and public

First, the agribusiness cluster comprised 26 items, with notable connections between agricultural intensification and agricultural workers. For instance, Sri Lankan scholars Atapattu & Udumann [35] examined livestock and coconut agribusinesses in the country by analysing their economic contributions to GDP and employment alongside food security outcomes. However, they found that aspects of commerce/marketing and public policy/strategy were either missing or minimal. For instance, Teng &

Oliveros [36] emphasise that integrating smallholder farmers and agribusinesses into dynamic, well-functioning markets across the food supply chain is pivotal to long-term poverty and food insecurity mitigation.

Second, the food supply cluster contained 14 items, linking agricultural production to land use patterns. However, aspects of policy/strategic focus on the midstream food supply chain, e.g. comprising small and medium-sized enterprises (SMEs) handling storage, processing, transport, and wholesale, were absent. For example, the examination of the structural transformation of the "post farm-gate" food supply chain across Asia [37] delineated key agribusiness intermediaries, including wholesale retailers, brokers, logistics operators, cold storage infrastructure, processing facilities, and retail distribution channels. The research also demonstrated that 50 to 70% of aggregate food costs incurred by urban consumers originate within these supply chain segments, consequently exacerbating food insecurity dynamics. At the same time, Dharmalingam and colleagues [38] point out that locally contextualised strategic actions can enhance food security through traditional processing and localised food supply chains in India, leveraging small-scale enterprises within the agribusiness sector.

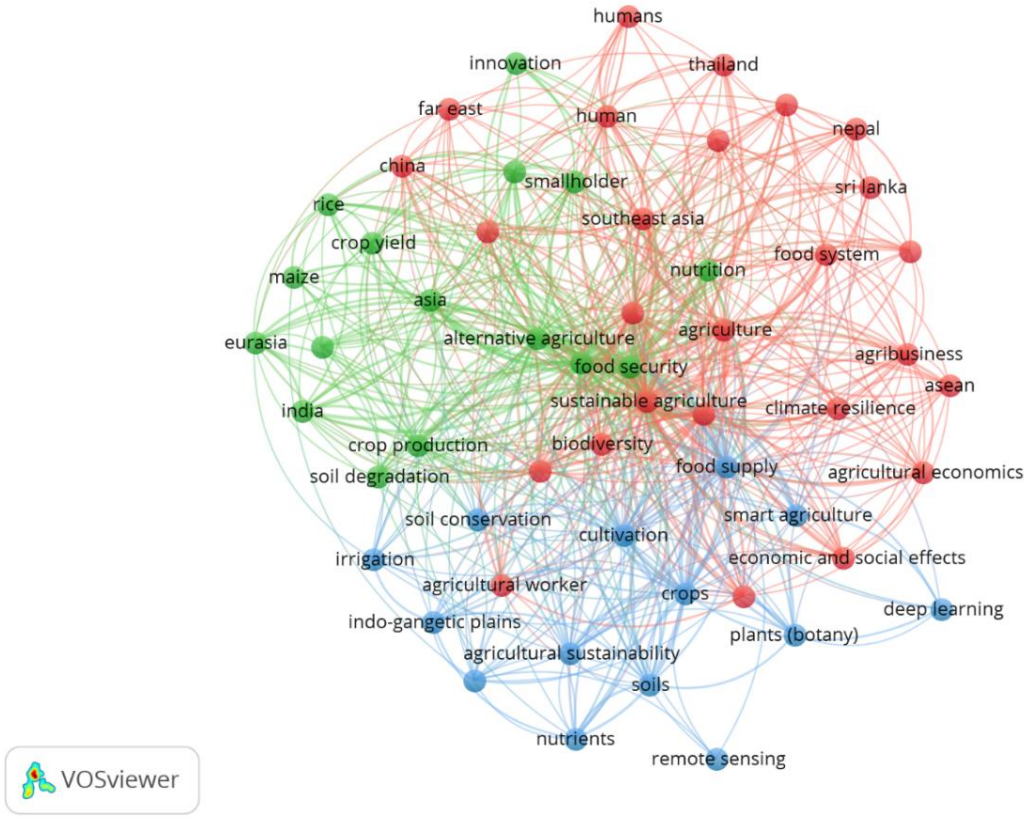

Figure 2: A co-occurrence map of SAaFS literature in South and Southeast Asia

Third, the alternative agriculture cluster encompassed 16 items, connecting food security to sustainable development and climate resilience. For example, Ghimire & Parajuli [39] explored climate-smart agriculture's potential in South Asia to reshape food systems and prioritise SDG attainment. Nonetheless, although availability, supply, and cost of food dominate public and policy discourse on food security, strategic implications of rural-to-urban and international migration of agricultural labour—particularly from countries like Nepal [40]—remain largely missing from the literature. The convergence of alternative agriculture, food supply chains, and contemporary agribusiness creates an ecosystem in which sustainable, climate-resilient farming practices integrate with scalable production, infrastructure, and policies to enhance food security outcomes.

Figure 3 presents the BSR findings as a conceptual framework showing how agribusiness can catalyse climate-resilient sustainable development by advancing food supply stability and alternative agricultural practices. It also serves as an analytical framework underpinning the RES of agricultural policies across BIMSTEC countries.

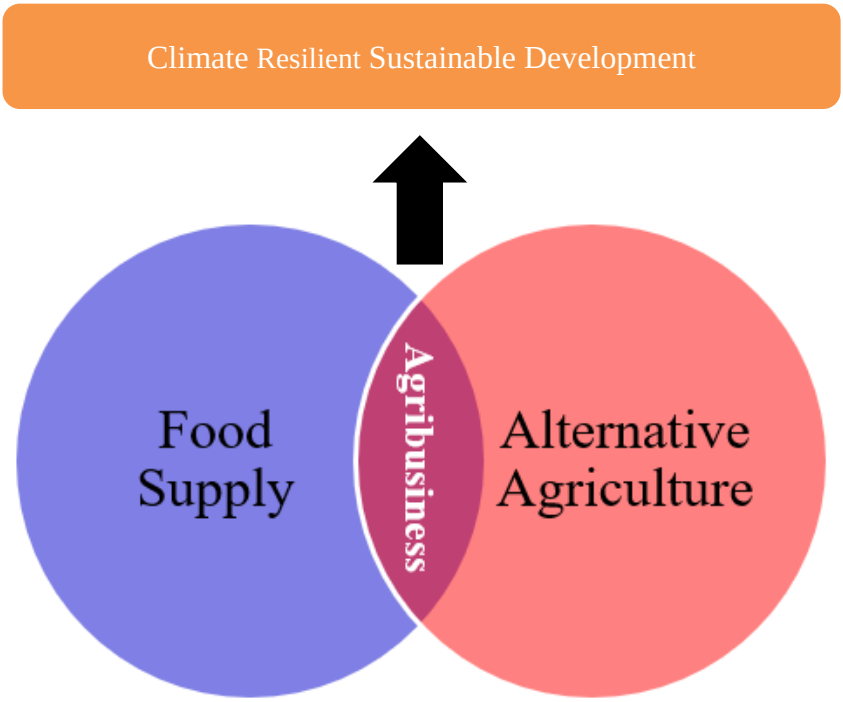

Figure 3: Agribusiness as a catalyst to advance climate-resilient sustainable development

4.2 Rapid Environmental scan of agricultural policies

As noted earlier, BIMSTEC has formally designated sustainable agriculture and food security as core pillars of regional cooperation. For example, the 2022–27 BIMSTEC Plan of Action comprises 17 actions organised across five strategic areas: agricultural productivity, sustainable agriculture, agricultural trade and investment, agricultural research and development, and food security and nutrition [14]. Table 3 summarises key findings of a RES of key agricultural policies for each country, and the following section discusses them.

4.2.1 Bangladesh

Bangladesh has several flagship policies. The National Agriculture Policy 2018 emphasises productivity, diversification, sustainable resource use, and climate-smart commercial agriculture [41]. The National Food and Nutrition Policy Plan of Action (2021–2030) prioritises food availability, accessibility, utilisation, and nutrition [42]. The 2020 Good Agricultural Practices Policy establishes a national framework to ensure safe food production, protect consumer health, and enhance agricultural export competitiveness [43]. Collectively, these policies address socioeconomic upliftment and food security concurrently by directing sustained attention toward strengthening agricultural value chains, cold storage infrastructure, processing capabilities, market connectivity, and export competitiveness. However, inherent policy tensions persist. The agribusiness sector prioritises productivity, commercialisation, processing, and export, whereas sustainable agriculture emphasises climate-smart good agricultural practices and ecological resilience.

Table 3: Environmental scan of agricultural policies of BIMSTEC countries

Country	Flagship Agricultural Policy	Agribusiness Sector	Food Supply Chain	Alternative Agriculture	Policy coherence tension
		Strategic emphasis: Weak, Moderate, Strong			
Bangladesh	National Agricultural Policy (2018)	Moderate	Moderate	Weak	Production intensification versus environmental protection
Bhutan	Food and Nutrition Security Policy (2023)	Weak	Moderate	Strong	Commercialisation vs. ecological/cultural integrity
India	National Agriculture Policy (2000)	Strong	Strong	Moderate	High productivity & technology model vs. ecological deterioration
Myanmar	Agriculture Development Strategy & Investment Plan (2018-2023)	Weak	Weak	Weak	Export specialisation aspiration versus deteriorating food security amidst ongoing social unrest
Nepal	Agriculture Development Strategy (2015 - 2025).	Weak	Moderate	Moderate	Investment in sustainable agriculture versus mass outbound migration of agricultural workforce
SriLanka	National Agriculture Policy (2021–2030)	Moderate	Strong	Strong	Organic-based alternative agriculture based on self-reliance versus creation of agribusiness diversification
Thailand	National Economic and Social Development Plan (2023–2027)	Strong	Strong	Strong	Adoption of the BCG model to curb environmental degradation versus measures to make agribusiness sufficiently attractive and profitable for young farmers.

4.2.2 Bhutan

Bhutan's agriculture policies are aligned with its distinctive development philosophy of Gross National Happiness (GNH), which emphasises environmental conservation and community wellbeing [44]. The Food and Nutrition Security Policy 2023 centres food availability, access, nutrition, and resilience in national policy [45], while the Bhutan Agrifood Sector Strategy 2034 aims to transform agriculture and food systems through enhanced productivity, commercialisation, investment, technology adoption, and market development [46]. In this context, national policy increasingly seeks to advance the greening of commercialisation and strengthen the agrifood sector's climate resilience. However, mirroring the paradox of GDP versus GNH, fundamental contradictions persist between alternative agriculture's emphasis on ecological sustainability and agribusiness' market-oriented aspirations, particularly regarding operational scale.

4.2.3 India

India possesses the largest agricultural sector in BIMSTEC. Currently valued at approximately USD 600 billion, India's agriculture sector is projected to reach USD 1.4 trillion by 2035 and USD 3.1 trillion by 2047 [47]. The National Agriculture Policy (2000) emphasises GDP growth, efficient resource use, technology adoption, farmer credit, and price protection and support infrastructure [48]. India's agribusiness sector is politically sensitive, driven by a protectionist agenda and overarching

goals of minimising social disruption and maximising rural electoral support, with three core objectives: food security, food self-sufficiency, and farmer income support [49]. India's principal strategic opportunity lies in leveraging its enormous agricultural base to create a more integrated, productive, and climate-resilient alternative agriculture. However, India's current agricultural model confronts severe long-term sustainability challenges stemming from decades of intensive chemical use, groundwater depletion, and soil degradation—legacies of the Green Revolution [50]. Whether recent initiatives such as the National Mission for Sustainable Agriculture can simultaneously advance sustainable and climate-resilient agriculture whilst ensuring long-term food and livelihood security [51] remains the key challenge.

4.2.4 Myanmar

Myanmar's national agricultural priorities have historically emphasised increasing agricultural productivity, improved market access, and strengthening food supply chains. The 2018 Myanmar Agriculture Development Strategy and Investment Plan provides an overarching framework for agricultural transformation organised around three pillars: governance, productivity, and market linkages and competitiveness [52]. This long-term strategy aims to guide inclusive agricultural development through cooperation amongst government, farmers, and private businesses. The International Fund for Agricultural Development has supported multiple initiatives addressing agricultural infrastructure—irrigation, potable water, participatory land-use planning, and land consolidation—and agribusiness services, including knowledge centres, common interest group formation, and financial services [53]. While Myanmar has also developed a climate-smart sustainable agriculture strategy, critical obstacles to catalysing agribusiness-sector-led reductions in food insecurity persist, particularly chronic infrastructure deficits and prolonged social unrest [54].

4.2.5 Nepal

The agriculture sector accounts for approximately one quarter of GDP and more than three-quarters of employment [55]. Agribusiness therefore plays a disproportionately important role in addressing food supply chain and food insecurity challenges. The Agriculture Development Strategy 2015–2035 provides the principal framework for rapid transformation, from subsistence to commercialisation [56]. Complementary policies—including the National Agroforestry Policy 2019 [57] and initiatives such as the Agricultural Mechanisation and Market-development Programme–Sahaj [58]—seek to formally integrate agriculture, livestock, and forestry on single land units to enhance rural agribusiness and socioeconomic development. In recent years, policy attention has gradually shifted towards commercial farming, cooperatives, agribusiness entrepreneurship, agricultural infrastructure, processing, and market connectivity [59]. Nevertheless, Nepal remains highly dependent on food imports, a situation further exacerbated by outbound migration that has drastically depleted the agricultural workforce [60]. The critical challenge is therefore not merely to increase agricultural investment but to forge agribusiness-related employment opportunities that simultaneously advance alternative agriculture and reverse the mass exodus of youth from farming communities.

4.2.6 Sri Lanka

Sri Lanka's agricultural sector is strongly oriented towards export-oriented commodities. The National Agriculture Policy (2021–2030) aspires to achieve sustainable transformation and improved farmer profitability. Recent economic and food-system shocks have prompted policy emphasis on climate-resilient domestic food supply chains alongside export-oriented agribusiness [62]. The country's Climate-Smart Agriculture Investment Plan aims to bridge local growers and climate investors to fund green infrastructure [63]. However, haphazard policy interventions such as agrochemical bans and an exclusive focus on organic agriculture have met scepticism from the agribusiness sector [64]. Innovative agrotourism and agribusiness approaches present diversification

opportunities for value creation [65]. The policy challenge centres on balancing organic-based alternative agriculture rooted in self-reliance with agribusiness diversification that adds value through sustainable practices, creating socioeconomic opportunities and bolstering food security.

4.2.7 Thailand

Thailand's 20-Year Agriculture and Cooperatives Strategy (2017–2036) provides a comprehensive framework to secure farmers' livelihoods, enhance commodity quality, and advance sustainable agriculture in response to climate vulnerability, low productivity, and an ageing farming workforce [66]. Thailand's agricultural priorities reflect a dual emphasis: advancing technology and innovation through the "Agriculture 4.0" model whilst strengthening inclusive agribusinesses and social enterprises as mechanisms for promoting alternative agriculture and food security [67]. Thailand possesses one of the most advanced agribusiness and agrifood systems in BIMSTEC, underpinned by several cutting-edge initiatives. For instance, Thailand is a pioneering nation in adopting the Bio-Circular-Green (BCG) economy model as a transformative framework for advancing four strategic sectors, including agriculture and food [68]. The country has also introduced the Young Smart Farmer Program, an initiative designed to address the ageing and declining agricultural workforce [69]. The overarching policy challenge is consequently to adopt the BCG model to curb environmental and resource degradation whilst making agribusiness sufficiently attractive and profitable to retain and recruit young farmers.

4.2.8 Cross-country synthesis: similarities, differences, and shared priorities

A cross-country synthesis of the RES (Table 3) indicates that BIMSTEC countries share a common narrative around policy aspirations—strengthening productivity, market integration, and resilience—yet differ markedly in state capacity, market maturity, and political-economic constraints, which in turn shape policy coherence across the agribusiness–food supply–alternative agriculture triad.

Key similarities or the shared emphases include productivity and commercialisation in all national strategies, even where implementation capacity is limited (e.g., Myanmar). Supply-chain upgrading (storage, logistics, market connectivity, processing) is consistently recognised as central to food security, particularly in Bangladesh, India, Sri Lanka, and Thailand. Climate-resilience framing is widespread, with growing references to climate-smart agriculture, good agricultural practices, and sustainability-linked investment.

Key differences include uneven agribusiness strength: India and Thailand have strong agribusiness ecosystems and policy instruments, while Bhutan, Nepal, and Myanmar show weaker private-sector depth and/or constraints that limit scale. Alternative agriculture is most institutionalised in Bhutan and Sri Lanka (and strongly present in Thailand), whereas Bangladesh and Myanmar show comparatively weaker emphasis or integration. Political and social conditions also strongly impact feasibility: Myanmar faces systemic disruption due to unrest; Nepal faces labour shortages due to migration; Thailand and India face sustainability challenges in intensive agricultural systems. BIMSTEC as a bloc also faces shared policy-coherence tensions and recurring trade-offs. For example, the dominant coherence gap concerns how to reconcile productivity-oriented agribusiness growth with ecological resilience and social inclusion. This manifests differently in different countries:

- Intensification vs. environmental protection (Bangladesh; India)
- Commercialisation vs. ecological/cultural integrity (Bhutan)
- Export ambitions vs. domestic food security stability under shocks (Myanmar; Sri Lanka)
- Investment priorities vs. labour-force depletion and youth exit from farming (Nepal; Thailand)
- Shared priorities for BIMSTEC-level collaboration (policy coherence opportunities).

A common climate-resilient alternative agriculture playbook to enhance food security links scalable practices (e.g., climate-smart/low-input approaches) with agribusiness models that create rural employment and value addition. It also calls for youth and labour-force renewal strategies, sharing lessons from Thailand's Young Smart Farmer approach [69] and designing incentives to retain labour suited to high-migration contexts such as Nepal [60]. In this context, building on the BIMSTEC Plan of Action [14], opportunities identified for regional policy coherence and collaboration include:

- Harmonised standards and learning (e.g., traceability, food safety) to support both domestic food security and cross-border agribusiness trade.
- Regional supply-chain resilience investments, especially cold-chain, logistics, and agribusiness-capable "midstream" infrastructure.

4.2.9 Limitations

The BSR and RES conducted in this study have certain limitations, particularly given the rapid pace of scholarly interest in and significance of the SAaFS nexus. First, the reproducible algorithmic framework operationalised to interrogate the Scopus repository was geographically delimited to South and Southeast Asia. Subsequent scholarly investigations could profitably extend this analytical apparatus to encompass a comprehensive global analytical scope, thereby situating the SAaFS nexus within the emergent conceptual paradigm of climate-resilient smart alternative agriculture. Second, the environmental scan of policy instruments and grey literature, whilst providing valuable preliminary insights, remained circumscribed in methodological scope and analytical comprehensiveness. Future research endeavours could focus on rigorous, comprehensive policy analysis of climate-resilient smart alternative agriculture, thereby furnishing a more nuanced, empirically grounded understanding of policy coherence mechanisms and their substantive implications for transnational sustainable development trajectories.

5. CONCLUSIONS

This study examined how research on the sustainable agriculture and food security (SAaFS) nexus has evolved in South and Southeast Asia, with a particular focus on BIMSTEC countries, and assessed how national agricultural priorities align with the evidence base. Methodologically, the study combined a bibliometric scoping review (BSR) of 67 Scopus-indexed outputs (2007–2026) with a rapid environmental scan (RES) of flagship agricultural policies across BIMSTEC member states.

The analysis yielded three main findings. First, SAaFS research has accelerated sharply since 2021, with India contributing the largest share of BIMSTEC-focused outputs. Second, keyword co-occurrence analysis identified three interlinked thematic clusters agribusiness, food supply, and alternative agriculture—suggesting that food security outcomes are most likely to advance when these three domains are addressed as a connected ecosystem rather than as isolated sectors. Third, the RES indicates that, across BIMSTEC, policy intent frequently acknowledges climate resilience and sustainability, yet policy coherence remains uneven: countries face persistent trade-offs between productivity-led agribusiness expansion and environmental stewardship, between export orientation and domestic food security, and between investment in modernisation and labour constraints driven by demographic change and migration.

This study makes two principal contributions. Conceptually, it advances an integrated framing—agribusiness as a catalyst linking food supply stability and alternative agriculture—relevant for climate-resilient sustainable development. Empirically, it highlights a BIMSTEC-wide policy coherence gap shaped by differing capacities and political-economic realities, but it also reveals shared priorities that regional cooperation can advance. Drawing on these findings, the study proposes two strategic recommendations:

a) Establish a BIMSTEC Academy for Research & Development: Designate the sustainable agriculture and food security theme as a core strategic priority to facilitate research-informed policy development across agribusiness, food supply chains, and alternative agriculture within the broader context of climate-resilient sustainable development. Such an academy would strengthen regional research capacity, foster cross-country collaboration, and ensure that policy interventions are grounded in rigorous evidence.
b) Develop a BIMSTEC-wide policy coordination mechanism: Institutionalise cross-ministerial and cross-country review of agribusiness, food supply chains, and alternative agriculture policies to advance policy-informed research and ensure coherence across sectoral and national boundaries. This mechanism would facilitate systematic assessment of policy alignment, identify contradictions, and improve readiness to respond to emerging shocks affecting food security.

In conclusion, the BSR and RES indicate that BIMSTEC's food-security challenge is best understood as a food-system policy-coherence gap: the failure to align agribusiness incentives, midstream supply-chain resilience, and climate-resilient alternative agriculture into an integrated transition pathway at both national and regional levels.

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