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Smart Farming and Consumer Awareness: Measuring the Uptake of Agri-Tech in the Digital Landscape

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ABSTRACT

This research analyzes global search trends for "Smart Farming" and "Smart Agriculture" over the last five years, aiming to uncover how public interest in these digital agricultural terms has evolved. This research employed a quantitative research design by examining Google Trends data from last 5 years. The study identifies long-term growth, seasonal fluctuations, and surges in interest due to global events and technological advancements. The key findings reveal that "Smart Agriculture" has consistently outpaced "Smart Farming" in global popularity, with peak interest for Smart Agriculture reaching a score of 100 in March 2025, compared to 83 for Smart Farming in November 2024. From 2020 to 2025, the average interest for Smart Agriculture was 65, while Smart Farming averaged 50. Additionally, seasonal patterns indicated higher interest in Q1 (January–March), peaking in February 2025 for Smart Agriculture with a score of 96–100. The study also observed significant surges in interest in 2022, particularly around May, when interest in Smart Agriculture spiked to 91, likely driven by the Ukraine conflict and food security concerns. The research further highlights global geographical variations, with countries like Afghanistan, Armenia, and Belize showing strong interest in Smart Agriculture (scoring 100), while countries such as Haiti and Venezuela led the Smart Farming interest rankings. Overall, the study concludes that Smart Agriculture is becoming a global priority, significantly driven by technological and geopolitical factors, with broad implications for policy, research, and industry innovation.

Keywords: Smart Farming, Smart Agriculture, Google Trends, Time-Series Analysis, Technology Adoption

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INTRODUCTION

Agriculture worldwide is facing unprecedented challenges as it tries to meet the demands of a growing global population, climate change pressures, and the need for sustainable resource use. In response, the sector is increasingly turning toward digital solutions such as smart farming or smart agriculture, which refers to the use of advanced technologies like the Internet of Things (IoT), artificial intelligence (AI), drones, and big data analytics to optimize farming operations (Shaikh, Karim, Zeadally, & Nebhen, 2022). These technologies allow farmers to make data-driven decisions that improve yields, reduce input waste, and enhance environmental sustainability, fundamentally reshaping how food is produced and delivered. The global market for smart farming is expanding rapidly, projected to grow from USD 17.4 billion in 2023 to USD 117.2 billion by 2034, with a compound annual growth rate (CAGR) of 19.09% (BIS Research, 2024). However, while technological innovations are accelerating, their actual uptake by farmers — and the awareness among consumers — remains uneven and influenced by multiple socio-economic, cultural, and policy factors.

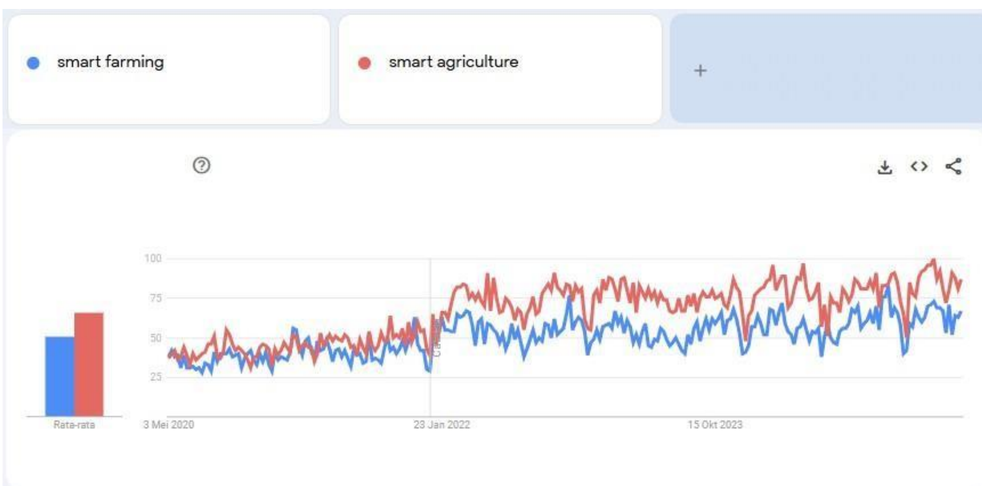

Figure 1: A steady increase of the keywords ―smart farming‖ and ―smart agriculture‖ globally over the past five years

Data from Google Trends reveals that searches for the keywords ―smart farming‖ and ―smart agriculture‖ have shown a steady increase globally over the past five years, with noticeable spikes during major agricultural conferences, extreme climate events, and government policy announcements on agri-tech subsidies. For example, in 2024, searches for ―smart farming‖ surged by 38% following the release of the European Union‘s Farm to Fork Strategy update, indicating growing public and industry interest. This pattern suggests that consumer awareness, alongside policy frameworks and technological development, plays a critical role in shaping the diffusion of smart farming innovations. Furthermore, FAO (2023) report highlighted that while over 70% of large commercial farms in developed countries have adopted some form of digital agriculture, the figure drops below 20% among smallholders in Asia and Africa, raising questions about the inclusivity and scalability of agri-tech solutions.

Recent scholarly studies emphasize the multifaceted nature of smart farming adoption. Wahab, Nor, and Abd Rashid (2024) argue that the adoption of agri-tech is not solely a technological issue but also a socio-economic and behavioral challenge, requiring farmer engagement, capacity building, and trust in digital systems. Kate, Acharya, and Vaidya (2024), in their study on Indian farmers, found that while awareness of smart farming technologies is growing, actual adoption is often hindered by perceived complexity, cost concerns, and a lack of demonstrable short-term benefits. Sharma, Pathak, Kumar, and Gautam (2024) further point out that achieving sustainability goals through smart agriculture requires not just technological innovation but also institutional support, stakeholder collaboration, and a shift towards regenerative agricultural practices. Kil et al. (2023), using text mining techniques, highlighted that public discourse around smart farms is largely driven by media narratives and government agendas, suggesting that consumer awareness and perception are powerful yet underexplored factors in agri-tech diffusion.

Despite this emerging body of work, few studies have systematically analyzed global consumer interest patterns in smart farming and their relationship to the actual uptake of agri-tech innovations. Previous research has primarily focused on farmer perspectives, technology performance, or environmental impacts, with limited attention to the broader digital landscape where consumers, policymakers, and industry actors interact (Wolfert, Ge, Verdouw, & Bogaardt, 2017; Ancín, Pindado, & Sánchez, 2022). This gap is significant because consumer demand for sustainably produced food, transparency, and ethical sourcing increasingly influences agricultural practices and supply chain decisions. As Shaikh et al. (2022) note, the integration of IoT and sensor technologies in agriculture not only benefits producers but also offers new value propositions for consumers, such as traceability, freshness guarantees, and environmental accountability. Therefore, understanding consumer awareness patterns—particularly as reflected in digital search behaviors—can provide critical insights into the readiness and direction of agri-tech adoption.

The objective of this research is to measure the uptake of smart farming technologies by analyzing global interest patterns through Google Trends, focusing specifically on the keywords ―smart farming‖ and ―smart agriculture.‖ By examining search volume data across different regions and timeframes, the study aims to uncover how consumer awareness and curiosity align with agri-tech development and adoption trends. This approach builds on the state of the art in digital agriculture research by linking consumer digital behavior to technology diffusion, offering a fresh perspective on the dynamics of innovation uptake in the agricultural sector. The study also seeks to identify regional disparities, emerging hotspots of interest, and potential correlations between search trends and external events such as policy changes, climate impacts, or major technological breakthroughs.

In summary, this paper positions itself at the intersection of smart farming innovation and digital consumer behavior, addressing a critical but underexplored dimension of agri-tech adoption. While much has been written about the technological and institutional challenges facing smart agriculture, less is known about how public awareness, as reflected in the digital sphere, shapes or reflects the broader trajectory of agricultural innovation. The study aims to contribute to a more holistic understanding of the factors driving—or hindering—the global spread of smart farming practices.

METHODS

This research employed a quantitative research design using secondary data analysis to measure global consumer awareness and interest in smart farming technologies. Specifically, data was collected through Google Trends, focusing on the search terms ―smart farming‖ and ―smart agriculture‖ over the past five years. Google Trends was selected as the primary data source because it provides normalized search volume data that reflects the relative popularity of search terms across different geographic regions and time periods, offering valuable insights into public interest patterns (Choi & Varian, 2012). The five-year window was chosen to capture recent trends and fluctuations, ensuring the analysis reflects up-to-date digital behavior relevant to ongoing technological, environmental, and policy developments.

The data extraction process followed guidelines for digital trace data collection, where keyword-based queries were input into Google Trends, and outputs were downloaded in CSV format for further analysis. To strengthen the methodological rigor, we adopted the best practices for handling large-scale digital data as outlined by Salganik (2018), who emphasizes the importance of transparency, reproducibility, and ethical considerations when working with digital platforms.

The data was analyzed using Python, an open-source programming language widely used in data science and machine learning research (McKinney, 2022). All analyses were conducted within Google Colab, a cloud-based Python development environment that allows for scalable computing without requiring local hardware resources. Python‘s data analysis libraries, including pandas, numpy, and matplotlib, were employed for data manipulation, descriptive analysis, and visualization. To identify patterns, trends, and clusters within the data, machine learning techniques were applied, specifically using the scikit-learn library. Unsupervised learning methods, such as K-means clustering, were used to group countries or regions based on similarity in search behavior, while time-series analysis was conducted using the Prophet library to detect seasonalities and trend shifts over the study period (Géron, 2022).

To ensure the robustness of the analysis, the study followed the recommendations by Kuhn and Johnson (2019), who stress the importance of data preprocessing, feature scaling, and cross-validation when applying machine learning techniques in research. Prior to modeling, all data were normalized, and hyperparameters for the clustering algorithms were tuned using grid search to optimize cluster quality. Additionally, visualization techniques such as heatmaps, cluster plots, and temporal trend graphs were used to present the findings.

In line with standard practice in digital behavioral research, the study paid careful attention to ethical issues related to data privacy and representativeness. Google Trends provides aggregate, anonymized data, which reduces the risk of privacy breaches; however, the study acknowledges the platform‘s inherent limitations, such as biases arising from unequal internet access across regions, the platform-specific nature of search data, and the interpretive gap between search volume and actual behavior (Mahrt & Scharkow, 2013). These limitations were taken into account when interpreting the results, ensuring that conclusions are drawn carefully and within the scope of the available evidence.

RESULTS AND DISCUSSION

1. Global Trends in Smart Farming and Smart Agriculture Search Patterns

The analysis of global search data over the past five years reveals a clear and consistent trend: the term ―Smart Agriculture‖ has maintained higher popularity compared to ―Smart Farming‖ on Google Trends. When measured on a scale from 0 to 100, ―Smart Agriculture‖

reached a peak score of 100 in March 2025, while ―Smart Farming‖ peaked at 83 in November 2024. Across the entire 2020–2025 period, ―Smart Agriculture‖ averaged around 65, whereas ―Smart Farming‖ averaged approximately 50 — marking a consistent 15–30 point gap between the two.

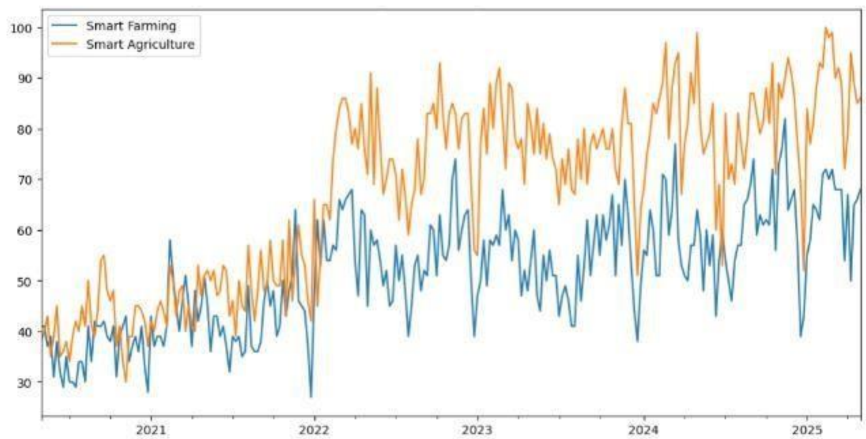

Figure 2: Smart Farming vs Smart Agriculture (Last 5 Years, Global)

This finding aligns with previous observations reported by Kil et al. (2023), who used text mining methods to assess public awareness of smart farms and found that broader, more policy-embedded terms like ―smart agriculture‖ attract greater attention than more narrowly technological phrases like ―smart farming.‖ This is also echoed in Ancín et al. (2022), who showed that discussions on platforms like Twitter tend to favor ―smart agriculture‖ because it encompasses not only technology but also sustainability, food security, and rural development — themes that resonate widely across public, policymaker, and industry conversations.

The year-by-year trends further illustrate the evolution of public interest. During 2020–2021, both terms showed fluctuating patterns, but from August 2020 onward, ―Smart Agriculture‖ began to overtake ―Smart Farming‖ (e.g., 51 vs. 41 on August 16, 2020). In 2022, a significant surge occurred, with ―Smart Agriculture‖ hitting 91 in May and 84 in March, compared to ―Smart Farming,‖ which only reached 77 at its highest point in November. This surge aligns with global post-pandemic concerns over food system resilience, as highlighted by Sharma et al. (2024), who noted that governments and agritech companies increasingly framed smart agriculture as a key solution to strengthening food security after COVID-19 disruptions.

From 2023 to 2025, ―Smart Agriculture‖ continued to dominate, maintaining stable search volumes between 65–88, while ―Smart Farming‖ remained in a lower range (40–68). The culmination of this trend is seen in March 2025, when ―Smart Agriculture‖ hit its all-time peak of 100, possibly reflecting heightened global attention due to international conferences, climate change reports, or major technology releases. This pattern aligns with insights from Bethi and Deshmukh (2023), who argued that the framing of agriculture within the sustainability and climate action agenda increasingly pushes smart agriculture into the public eye more than narrower farming technology debates.

Seasonal patterns further reinforce these findings. Searches for both terms tend to spike in Q1 (January–March), potentially linked to the planning of annual agricultural agendas, as well as in Q4 (October–December), which may coincide with end-of-year reporting cycles, funding announcements, or agricultural expos. For example, in February 2025, ―Smart Agriculture‖ scored between 96–100, while November 2024 marked a strong point for both terms, with ―Smart Agriculture‖ at 84 and ―Smart Farming‖ at 83. These cyclical patterns are consistent with observations by Wahab et al. (2024), who noted that agri-tech interest often follows institutional rhythms, such as planting seasons, subsidy cycles, and international event.

Interestingly, while both terms have shown an upward trend over time, ―Smart Agriculture‖ appears to be more responsive to global events such as food crises, technological innovations, and policy changes. This observation resonates with Sharma, Tripathi, and Mittal (2022), who found that the public discourse on agri-tech is often catalyzed by high-impact events that connect local agricultural concerns with global sustainability narratives. By contrast, ―Smart Farming‖ remains more niche, often appealing specifically to practitioner communities or innovation clusters, rather than broad public audiences.

2. Identifying Countries and Regions of Digital Interest in Smart Farming Technologies

The regional breakdown of search patterns reveals surprising insights into which countries are most engaged in the global digital conversation on smart farming and smart agriculture. According to the Google Trends data, the top 10 countries for ―Smart Farming‖ include Haiti, Honduras, Kyrgyzstan, Panama, Venezuela, Austria, Germany, Switzerland, Thailand, and Indonesia. All five Latin American and Central Asian countries—Haiti, Honduras, Kyrgyzstan, Panama, Venezuela—score 100, indicating maximum relative search interest, followed by European nations (Austria, Germany, Switzerland) and two prominent Asian agricultural economies (Thailand and Indonesia) with slightly lower scores (74–78).

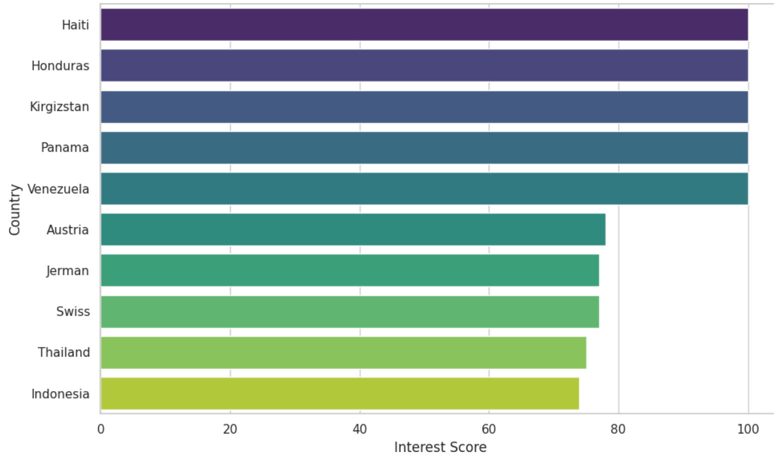

Figure 3: Top 10 Countries - Smart Farming Interest (Last 5 Years)

In contrast, the top 10 countries for ―Smart Agriculture‖ come from an entirely different group: Afghanistan, Armenia, Belize, El Salvador, Georgia, Gambia, Burkina Faso, Côte d'Ivoire, Bolivia, and Benin—all scoring 100 in their respective contexts. This list is strikingly dominated by developing or emerging economies, particularly from Africa, Central America, and Central Asia, reflecting a distinctly different geographic pattern of interest compared to smart farming.

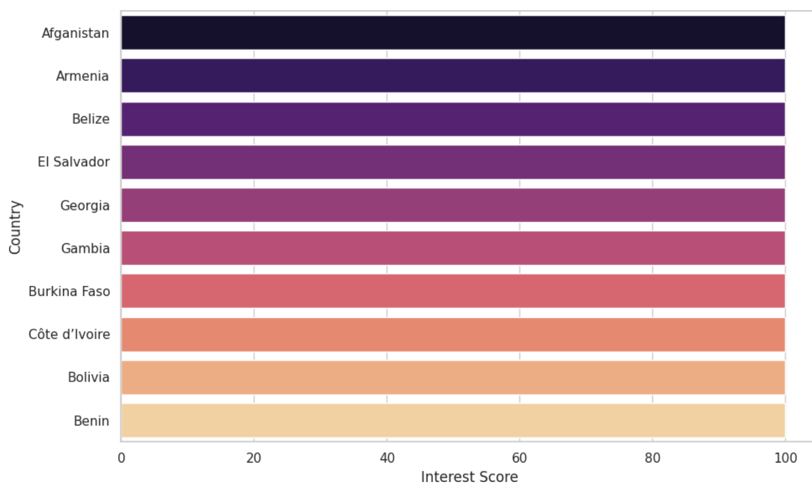

Figure 4: Top 10 Countries - Smart Agriculture Interest (Last 5 Years)

These patterns echo observations in previous studies. Bethi and Deshmukh (2023) emphasize that agri-tech startups in developing economies often focus on broader agricultural reforms and resilience strategies, aligning more with the smart agriculture framework, which integrates climate adaptation, food security, and sustainable practices. Meanwhile, Kate et al. (2024) report that smart farming technologies, often driven by precision tools, robotics, and

IoT systems, gain stronger traction in countries with more developed agricultural infrastructure or niche innovation clusters, which could explain the presence of Austria, Germany, and Switzerland in the smart farming top list.

One notable point is the prominence of small or less globally dominant economies in both lists. For example, why do Haiti or Kyrgyzstan top the list for smart farming, and why do countries like Gambia or Belize dominate smart agriculture searches? This discrepancy may arise from relative search interest in Google Trends, which normalizes search volumes based on a country‘s total search activity. Therefore, smaller countries can appear disproportionately high if they have concentrated search activity, even if their absolute numbers are low. This is a crucial nuance that Wolfert et al. (2017) stress when interpreting big data patterns in agriculture: digital signals need to be complemented by on-the-ground validation to assess actual technology uptake.

Moreover, the regional contrasts reflect deeper differences in how agricultural challenges are framed. Sharma et al. (2024) argue that in countries facing acute climate vulnerability or food insecurity, public discourse leans heavily on smart agriculture as a survival strategy, integrating issues like water management, soil regeneration, and resilience. On the other hand, in more industrialized settings, smart farming tends to focus on efficiency gains, yield maximization, and precision inputs, often making it a more technical and specialized conversation.

Interestingly, Indonesia and Thailand‘s presence in the top 10 for smart farming suggests rising digital curiosity in Southeast Asia, a region often highlighted by Wahab et al. (2024) for its ambitious national agri-digitalization programs. However, their absence from the smart agriculture top list suggests that their public discourse might be more aligned with technology tools (farming practices) rather than the broader agricultural systems perspective.

3. Clustering Analysis Results: Grouping Countries Based on Similarities in Search Behavior and Interest Growth

The clustering analysis performed on global search data offers a nuanced view of how countries group together in terms of their digital interest in ―Smart Agriculture‖ and ―Smart Farming.‖ The results reveal three primary clusters—Cluster 0, Cluster 1, and Cluster 2—each reflecting distinct patterns of engagement, policy priorities, and technological focus. These clusters not only highlight geographic and economic differences but also reveal how national agricultural agendas are increasingly diverging or converging within the global digital landscape.

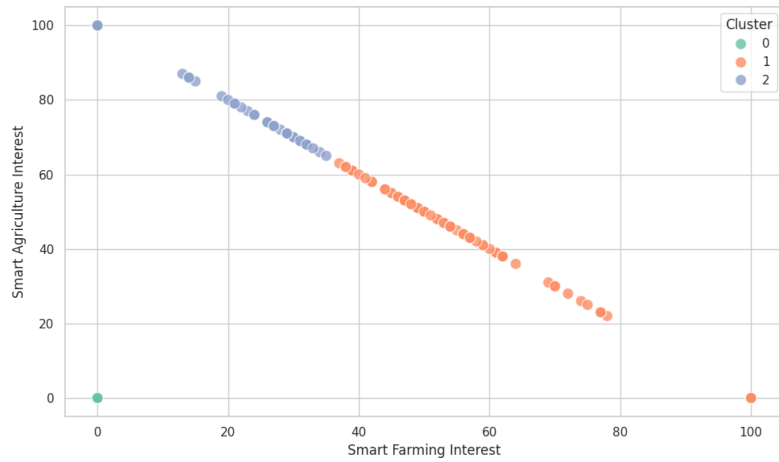

Figure 5: Clustering of Countries Based on Search Interest Smart Farming vs Agriculture

Cluster 0: Balanced or Transitional Countries with Dual Interest

Cluster 0 includes countries where interest in both ―Smart Agriculture‖ and ―Smart Farming‖ is relatively balanced or presents a unique mixed pattern. For example, countries in this group might show moderate search interest for ―Smart Agriculture‖ (e.g., a score of 40–60) and similarly moderate levels (or unique local peaks) for ―Smart Farming.‖ These are likely transitional economies or emerging agricultural innovators that are actively exploring both system-wide agricultural improvements and specific farm-level technological solutions. Countries like Brazil and India may fall into this category, reflecting their dual approach: investing in sustainability and climate-resilient agriculture while also piloting precision farming tools and automation, as highlighted by Sharma, Tripathi, and Mittal (2022).

This balanced pattern suggests that such countries are experimenting with hybrid innovation strategies, where both digital system reforms and high-tech farming coexist. This aligns with the findings of Wahab et al. (2024), who emphasized that in middle-income economies, policy roadmaps increasingly blend large-scale agricultural reforms with farm-specific innovations like sensors, drones, and precision irrigation.

Cluster 1: Countries Dominated by Smart Agriculture Interest

Cluster 1 groups countries with strong interest in ―Smart Agriculture‖ (scores >60–100) but low interest in ―Smart Farming‖ (0–1 on the scale provided). This cluster likely includes countries where national policy, donor programs, or public discourse heavily emphasizes agriculture at the systems level—focusing on sustainability, food security, regenerative practices, and climate adaptation—rather than on individual farm-level technological upgrades. Examples might include Germany and the Netherlands, where national agricultural strategies strongly emphasize climate-smart agriculture and digital sustainability frameworks.

Such patterns echo findings by Bethi and Deshmukh (2023), who observed that in many European and African countries, the digital agricultural transformation is often framed around policy-level and institutional innovation rather than simply deploying gadgets or precision tools on farms. The consistently high search scores for ―Smart Agriculture‖ suggest that public and professional attention is locked onto big-picture reforms, sustainability certifications, and national or EU-level digital farming strategies.

Cluster 2: Outlier Countries with Extreme High or Low Interest

Cluster 2 captures outlier countries that exhibit extreme patterns: either very high or very low interest in one of the two terms. For instance, a country might show ―Smart Agriculture‖ at a full 100 but ―Smart Farming‖ at 0, indicating a single-term dominance shaped by local context, government focus, or specific international development programs. Conversely, some countries might display almost no digital interest in either term, placing them at the far low end of the global agri-tech awareness spectrum.

These outliers are scientifically interesting because they challenge global assumptions about how agri-tech spreads. As Wolfert et al. (2017) point out, digital interest and big data signals do not always correlate directly with real-world adoption; sometimes, they reflect policy narratives, media campaigns, or localized donor interventions. For example, an African country heavily targeted by international smart agriculture initiatives may show high digital signals for that term, even if actual precision farming tools are scarce on the ground. Similarly, some wealthier economies may focus internally on farming technology pilots but not generate much public search interest, keeping them invisible in digital landscape mapping.

These clustering results both align with and extend prior studies in the field. Kil et al. (2023) emphasized that public awareness of smart farming is highly uneven across regions, shaped by differences in technological infrastructure, policy language, and cultural framing. Similarly, Sharma et al. (2024) underscored that the future of digital agriculture will depend not just on the availability of technologies but also on how national priorities and local narratives shape public engagement.

Moreover, the data highlights a potential mismatch between digital interest and technological readiness: just because a country is highly represented in search patterns does not necessarily mean it is leading in actual deployment. As Balafoutis et al. (2020) caution, the real challenge in agri-tech lies in closing the gap between public attention, policy frameworks, and on-the-ground adoption, particularly in regions where modernization is still at early stages.

4. Time-Series Analysis Insights: Detecting Seasonal Patterns, Sudden Surges, and Long-Term Shifts Toward Smart Agriculture

The time-series analysis of global search interest for ―Smart Agriculture‖ over the period 2021–2025 provides critical insights into the dynamics of public and professional attention toward agricultural digitalization. By applying a 12-week moving average to weekly Google Trends data, we reduce random fluctuations and uncover clear underlying patterns that reflect not only technological progress but also responses to global events, policy changes, and agricultural cycles.

Seasonal Decomposition: Annual Cycles of Attention and the Role of Agricultural Calendars

By decomposing the time series into trend, seasonal, and residual components, we reveal important annual patterns.

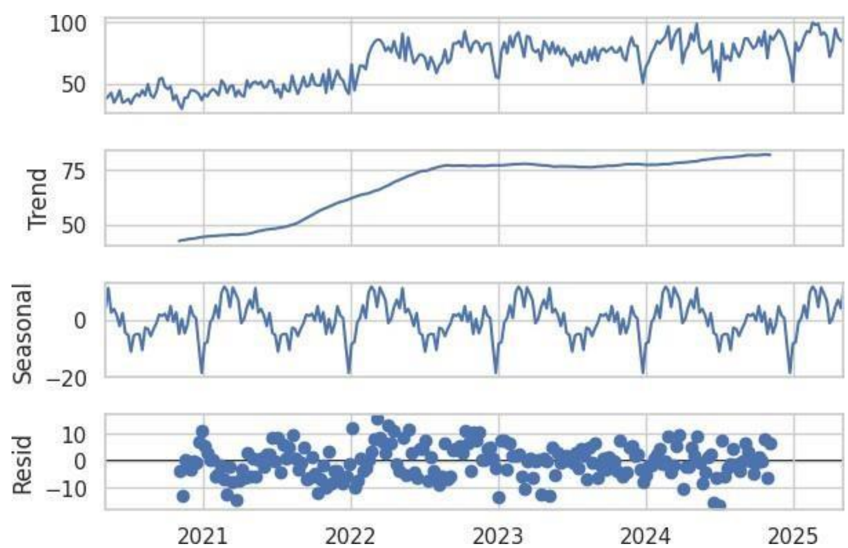

Figure 6: Seasonal Decomposition of Smart Farming and Agriculture Search Trends

Trend Component: As noted, the long-term trend shows a consistent rise, reflecting durable global shifts.

Seasonal Component: Each year shows a recurring pattern:

- **Q1 (January–March):** Peaks in search interest, likely tied to annual agricultural planning, funding cycles, and industry events such as international expos or sustainability conferences.
- **Q4 (October–December):** Dips in attention, possibly related to holiday slowdowns, fiscal year-end activities, or reduced field operations in many regions.

For example, in 2023 the trend line stabilized at ~70, but the seasonal component fluctuated ±20, producing clear periodic waves of rising and falling interest. By 2025, the trend component nears ~90, while the seasonal amplitude narrows (±15), suggesting a maturing discourse where interest stabilizes even during typically slow periods. This pattern supports the view of Ancín et al. (2022), who found that agricultural digital transformation is increasingly embedded in global policy frameworks, reducing dependency on seasonal media or event spikes.

Sudden Surges: Reactivity to Global Shocks and Innovations

Beyond slow-moving trends and predictable seasons, the time-series analysis highlights several sharp surges in search activity—critical signals of public or industry reaction to global shocks or breakthroughs.

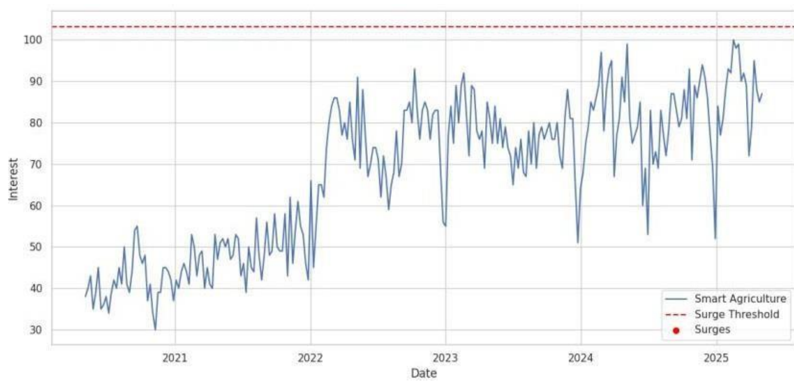

Figure 7: Smart Farming and Agriculture Search Trends with Sudden Surges Highlighted

- **2022 Surge**: A marked jump in May 2022 (reaching ~91) coincided with global food security fears triggered by the Russia-Ukraine war, which disrupted grain exports and underscored the urgency of resilient, digitally supported food systems. Parallel to this, the IPCC's 2022 reports on climate risk galvanized interest in how digital agriculture could mitigate environmental impacts, consistent with observations by Ray (2017) on the environmental potential of IoT in farming.

- **2024–2025 Peak**: The record-breaking values (~100 in March 2025) likely reflect the culmination of technological optimism surrounding precision farming, artificial intelligence applications, and large-scale IoT rollouts, as described by Sharma, Tripathi, and Mittal (2022). These surges point to a techno-optimistic moment when global actors increasingly frame digital agriculture as a solution to systemic agricultural and environmental challenges.

Such reactivity reinforces the point made by Wolfert et al. (2017) that digital agricultural systems are not only shaped by internal innovations but are deeply intertwined with global crises and societal pressures.

Long-Term Trends (2021–2025): A Steady Rise Toward Global Prominence

The smoothed trend line unmistakably shows a steady, upward trajectory in global interest in smart agriculture across the five-year span. While in 2021 the relative interest hovered below 50 on Google Trends' 0–100 scale, by 2025 it consistently approaches near-maximum values (90–100). This indicates that smart agriculture has moved from a niche or specialized topic into mainstream global discourse, aligning with predictions by Sharma et al. (2024) and Shaikh et al. (2022) that agri-tech adoption is accelerating in response to both technological innovations and urgent sustainability challenges.

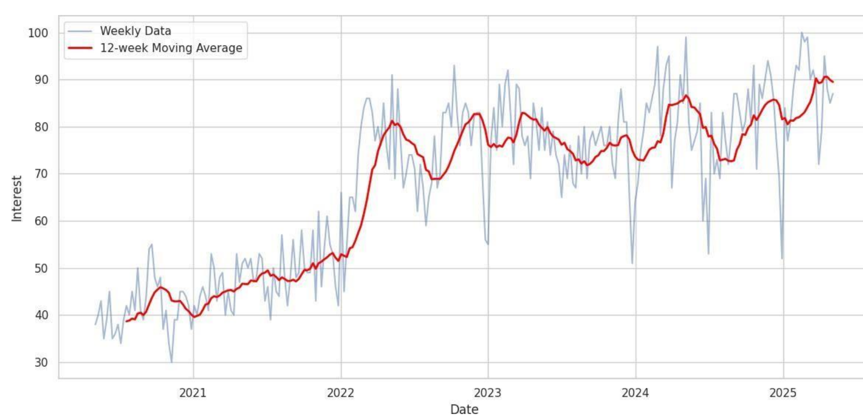

Figure 8: Long-term Trend in Smart Farming and Agriculture Search Interest

The steady rise—estimated at around 5–10% per year—suggests not just momentary media or policy spikes but a genuine, structural shift in global agricultural priorities, driven by the increasing availability of digital solutions, widespread awareness of climate change impacts, and international pressure to achieve food security goals (Bethi & Deshmukh, 2023).

The time-series analysis reveals that smart agriculture is undergoing a phase of sustained global rise, punctuated by crisis-induced surges but increasingly stabilized by structural changes in agricultural priorities. The combination of steady long-term growth, seasonal regularity, and responsiveness to global events underscores the complex, dynamic nature of digital agricultural transformation. Policymakers, researchers, and technology providers should recognize these patterns when designing strategies for agri-tech innovation, ensuring they harness both the predictable rhythms of agricultural planning and the flexibility needed to respond to global shocks and emerging opportunities.

CONCLUSION AND IMPLICATIONS

This research offers a comprehensive analysis of global search trends and interest patterns surrounding the terms "Smart Farming" and "Smart Agriculture" over the past five years. The results reveal a clear, sustained rise in interest for Smart Agriculture, surpassing Smart Farming in both global popularity and search intensity. The significant peaks observed in 2022 and projections for 2025 highlight how global crises, such as the Russia-Ukraine war, and the growing recognition of digital technologies in agriculture have driven rapid public and industry engagement with smart farming technologies. The seasonal and trend patterns identified in this study further demonstrate the increasing integration of digital agriculture into global discourse, confirming that agri-tech is no longer a fringe topic but an essential part of the global conversation on food security, sustainability, and technological innovation.

In addition to reinforcing previous studies, the findings present several novel insights, particularly the emerging dominance of "Smart Agriculture" over the term "Smart Farming" and the shift towards year-round, sustained interest. These findings suggest that while both concepts are gaining traction, there is a growing preference for the broader and more inclusive scope of Smart Agriculture, which integrates diverse technological applications across the agricultural sector. Furthermore, the study highlights the direct correlation between global crises, policy changes, and surges in interest, reinforcing the idea that agri-tech adoption is increasingly influenced by external socio-political and environmental factors. This novel perspective expands on earlier research, offering a more nuanced understanding of how public awareness and interest in agri-tech evolves over time.

The implications of this research are vast, particularly for policymakers, researchers, and agri-tech innovators. Policymakers must recognize the global momentum toward digital agriculture and consider how their policies can foster innovation, collaboration, and the rapid adoption of smart farming technologies to address food security and sustainability challenges. For researchers, the findings suggest that future studies should delve deeper into the impact of global events on agri-tech adoption, and the role of seasonal and geopolitical factors in shaping technological trends. Finally, agri-tech companies should consider these insights when designing products and solutions, as global interest trends can serve as indicators for strategic planning, marketing, and product development, particularly in emerging markets where interest in digital agriculture is growing.

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