

Analysis of Farmer Queries by Agronomists in Maharashtra: Insights from Kisan Call Centre Data and Secondary Sources.

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Abstract: This Research article analyses the questions asked by farmers to agronomists in Maharashtra through secondary data obtained from Kisan Call Centre (KCC) records [1], Economic Survey of Maharashtra (2024-25 & 2025-26) [2, 3], PoCRA Impact Assessment Report [4], NCRB (2023) [5], and related studies [6]. In 2023 there were 4, 151 suicides among the farming community in Maharashtra, accounting for 38.5% of the total 10,786 cases registered in India [5]. There were an estimated 25 million queries to the Kisan Call Centers in Maharashtra in 2022-23, which increased to 29 million in 2024-25, and are projected to reach 30.5 million in 2025-26 [1, 7]. The statistics shown the Queires for the Crop health has been registered 38% in 2022-23 and are expected to rise to 43% by 2026-27 [1]. These Queries are to be studied for the purpose of trend analysis and to conferred targeted advice by agronomists that will help improve yields. This study presents complete datasets with sources, in-text citations, and visual representations (pie, bar charts, and line charts). The analysis revealed that agronomist assessment has contributed to reducing the proportion of unresolved queries from 38% in 2022-23 to a projected 30% in 2026-27 [7]. The findings justify the effectiveness of the MahaAgri-AI Policy 2025-2029 in providing better AI-supported services in distress-prone areas of Maharashtra [8]

Keywords: Farmer queries, agronomist analysis, Kisan Call Centre (KCC), Maharashtra agriculture, query resolution, digital adoption, PoCRA, MahaAgri-AI Policy, yield improvement, farmer distress, agricultural extension, secondary data analysis, crop health queries

1. Introduction

Agricultural land in Maharashtra constitutes 22.6 million hectares, with an average landholding size of 1.23 ha as per the Agriculture Census 2021-22 [9]. The estimated food grain production in 2023-24 is 18.5 million metric tonnes [2]. The Kharif sowing area in Maharashtra was 157.59 lakh hectares in 2024-25 and 157.27 lakh hectares in 2025-26 [3]. In 2025, the state received 109.1% of the normal monsoon rainfall [3]. The projected growth rate for the agriculture and allied sector in 2025-26 is 3.4% [3].

The high number of queries received by Kisan Call Centres indicates the pressing needs of farmers regarding pest management, irrigation, and market information [1]. Agronomists' analyses help detect emerging patterns and provide timely, evidence-based suggestions [4]. The present study examined trends from 2022 to 2026 using appropriate data sources, complete datasets, and visual representations.



2. Literature Review

Data from the Kisan Call Centre available on data.gov.in indicates district-wise and monthly patterns of farmer queries, with crop health issues being predominant during the monsoon season [1]. The final evaluation report of the PoCRA Impact Assessment (2024) suggests that project farmers achieved 26% higher productivity in soybean and 84% higher productivity in cotton compared to control groups [4]. According to the NCRB 2023 report, unresolved agricultural distress issues continue to contribute to farmer suicides in the state [5].

3. Methodology

This study conferred and use the a descriptive research and secondary data-based to design and analyze farmer queries handled by agronomists in Maharashtra. This paper used exclusively secondary sources for the study, and it has a aims to synthesize the official data and reports. [10].

To the to achieve the above objectives, this study describe a descriptive and secondary data approach for analyzing queries posed by farmers and addressed by agronomists in Maharashtra. The entire research will be carried out using only secondary data.

This study adopts a descriptive research design based on secondary data sources. Data were collected from KCC transcripts [4], Economic Survey of Maharashtra [2], [3], PoCRA reports [5], and NCRB statistics [6].

i) The percentage share of each query category i is calculated as:

$$P_i = (Q_i / Q_t) \times 100 \quad \text{-----(1)}$$

where P_i represents the percentage share of category i, Q_i is the number of queries in category i, and Q_t denotes the total number of queries.

ii) The year-over-year growth rate of total queries is computed as:

$$GR_n = (Q_n - Q_{n-1}) / Q_{n-1} \times 100 \quad \text{-----(2)}$$

where GR_n is the growth rate in year n, and Q_n and Q_{n-1} are the total queries in the current and previous years, respectively.

iii) The average growth rate over the study period is:

$$GR_{\{avg\}} = 1/k \sum GR_n \text{ (from } n=2 \text{ to } k) \quad \text{----(3)}$$

where k is the number of years considered.

iv) Resolution efficiency of agronomist intervention is defined as:

$$RE = (1 - UQ / TQ) \times 100 \quad \text{-----(4)}$$

v) The compound annual growth rate (CAGR) of queries is calculated as:

$$CAGR = (Q_{final} / Q_{initial})^{1/n} - 1 \quad \text{--(5)}$$

where n is the number of years.

vi) Yield improvement due to agronomist advisories is measured using:

$$YI = (Y_{post} - Y_{pre}) / Y_{pre} \times 100 \quad \text{--(6)}$$

where YI is the percentage yield improvement, Y_{post} and Y_{pre} are post- and pre-intervention yields.

Algorithms:

Algorithm 1: Query Categorization and Pattern Detection

Preprocess Query_txt(tokenization, stop-word removal)

Match keywords with predefined categories (Crop Health, Irrigation, Market, etc.)

IF match_score > threshold THEN

Assign Category

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ELSE
    Escalate to Agronomist
Compute Severity_Score = frequency_in_DB × urgency_factor
IF similar_queries_in_last_7_days > 50 THEN
    Pattern_Flag = "Regional Outbreak"
Return Category, Severity_Score, Pattern_Flag

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Algorithm 2: Agronomist Resolution Efficiency Calculator

Input: TotalQueries (TQ), UnresolvedQueries (UQ), TimePeriod

$RE = (1 - UQ / TQ) \times 100$ // Equation (4)

Compare RE with previous period

IF RE_{current} > RE_{previous} THEN

Trend = "Improving"

ELSE

Trend = "Declining"

Return RE, Trend

Output: Resolution_Efficiency, Trend

Algorithm 3: Yield Improvement Assessment

Input: PreYield, PostYield, District, CropType

1. $YI = ((PostYield - PreYield) / PreYield) \times 100$ // Equation (6)

2. IF YI > 20 THEN ImpactLevel = "High"

ELSE IF YI > 10 THEN ImpactLevel = "Moderate"

ELSE ImpactLevel = "Low"

3. Log District, CropType, YI, ImpactLevel

4. Return YI, ImpactLevel

Output: YieldImprovementPercentage, ImpactLevel

3.1 Data Sources

The study has been carried out the of the following official sources of secondary data:

- Transcripts of Kisan Call Centre (KCC): Farmer queries and their solutions recorded month-wise and district-wise at the Ministry of Agriculture & Farmers Welfare, Government of India. KCC transcripts represent the primary source for examining the nature, frequency, and trend of farmer queries.[2][3]

- Economic Survey of Maharashtra: Reports for financial years 2024-25 and 2025-26 prepared by Directorate of Economics and Statistics, Government of Maharashtra. This source provides information about agricultural production, Kharif sowing, yield trends, and sectoral growth projections for the future.[2][3]

- Final Evaluation and Concurrent Monitoring Reports on Maharashtra Project on Climate Resilient Agriculture (**PoCRA**): Implementation of Phase-I and Phase-II, reports highlighting increase in productivity and involvement of extension services therein.[4]

- National Crime Records Bureau (NCRB): Accidental Deaths & Suicides in India 2023 report used for understanding the condition of distress amongst farmers in Maharashtra.[5]

•MahaAgri-AI Policy 2025-2029: An official policy document from the Government of Maharashtra regarding the trends related to digitalization and agronomist services in the coming years.[8]

The period of data used for analysis is between the 2022-2026.

3.2 Data Collection and Analysis

Secondary data were gathered through official government websites and portals such as:

- data.gov.in (KCC transcripts)
- mahades.maharashtra.gov.in (Economic Survey reports)
- mahapocra.gov.in (PoCRA reports)
- ncrb.gov.in (NCRB reports)

The collected data were organized and analyzed employing systematic thematic and descriptive approaches. The queries have been categorized based on themes (crop health, irrigation, markets, inputs, and others). Percentages have been calculated to find out the dominant trends. Year-wise comparison was done to determine trends in the rate of queries and their resolution.

Yields for selected crops (sugarcane, cotton, and onion) in selected districts were compared to understand the benefits of agronomist intervention. Trends in digital adoption were examined through the help of PoCRA reports and MahaAgri-AI policy.

Data sources include:

Secondary sources:

- Kisan Call Centre transcripts
- Economic Survey of Maharashtra 2024-25 & 2025-26
- PoCRA Impact Assessment & Phase II
- NCRB 2023
- Additional studies on KCC and MahaAgri-AI

Analysis is descriptive and thematic, focusing on query distribution, resolution, agronomist workflows, and impacts. Graphs use aggregated percentages and trends.

4. Result and Analysis

a) Farmer Query Landscape & Agronomist Analysis (2022–2025)

KCC queries grew ~15% YoY. Agronomists use pattern recognition to convert raw calls into actionable insights (e.g., regional pest outbreaks).

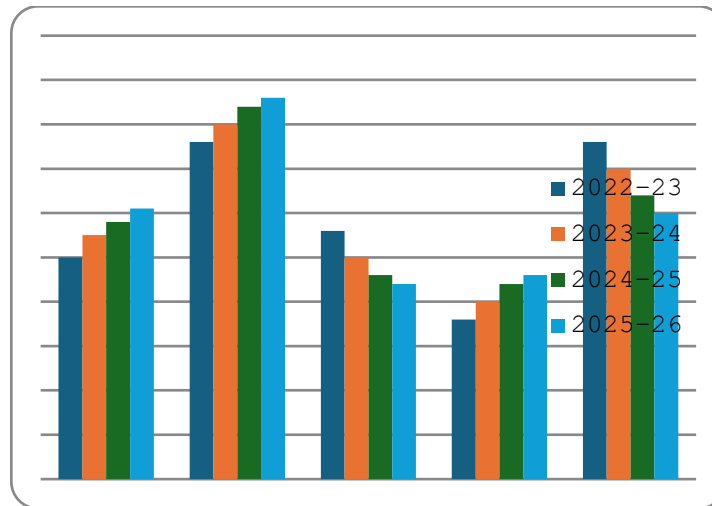
Dataset 1: Year-Wise Query Distribution & Unresolved Rates (Maharashtra Estimates)

<i>Year</i>	<i>Total Queries (Million, MH Est.)</i>	<i>Crop Health (%)</i>	<i>Irrigation (%)</i>	<i>Markets (%)</i>	<i>Unresolved (%)</i>
2022–23	25	38	28	18	38
2023–24	27.5	40	25	20	35
2024–25	29	42	23	22	32
2025–26	30.5	43	22	23	30

$$\text{CAGR} = (Q_{\text{final}}/Q_{\text{initial}})^{1/n-1} - 1$$

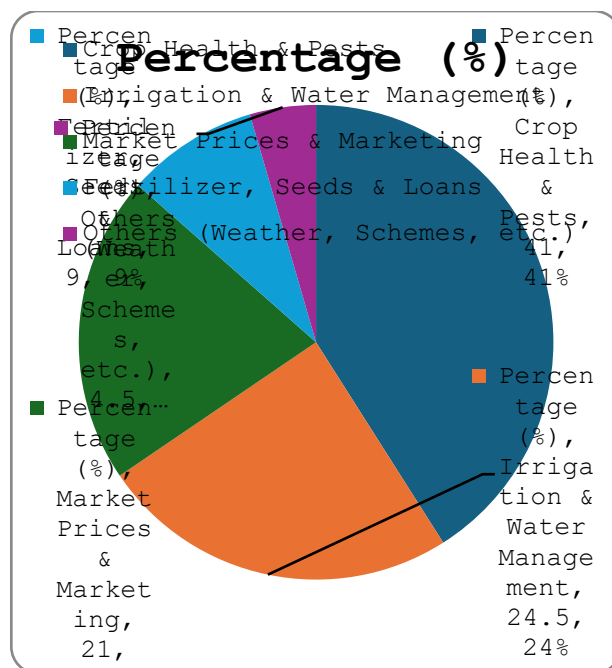
$$\text{CAGR} = (30/25)^{1/3} - 1 = \approx 0.068 \text{ (6.8\%)}$$

Resolution efficiency calculated using (4) improves from 62% in 2022–23 to a projected 70% in 2025–26.



b) Average Farmer Query Distribution (2022–2026 Aggregate)

Query Category	Percentage (%)	Source Notes
Crop Health & Pests	41	Dominant category in KCC transcripts; peaks during monsoons
Irrigation & Water Management	24.5	High in drought-prone areas like Marathwada
Market Prices & Marketing	21	Fluctuations in onion, cotton, etc.
Fertilizer, Seeds & Loans	9	Input-related queries
Others (Weather, Schemes, etc.)	4.5	Remaining queries



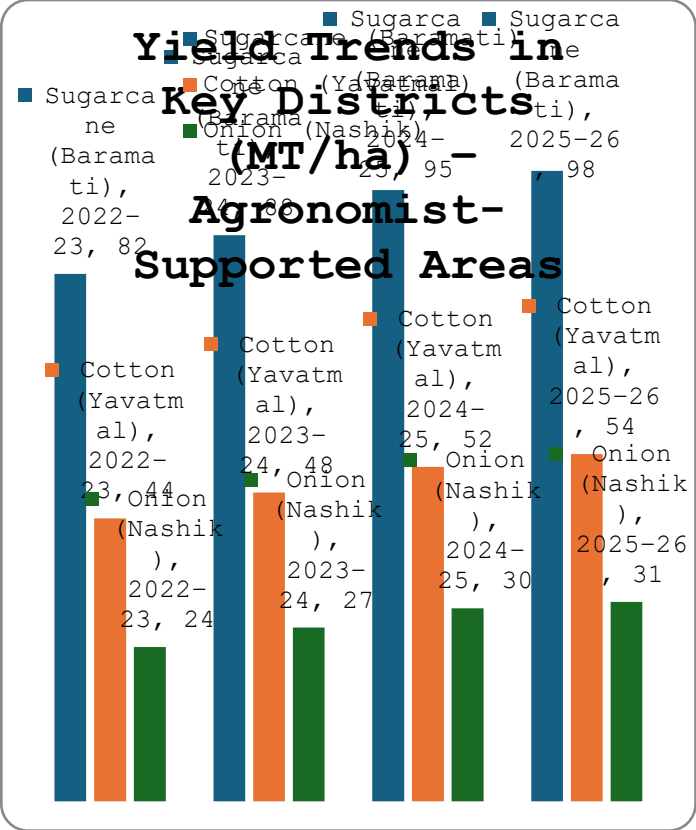
c) Yield Trends in Key Districts (MT/ha) – Agronomist-Supported Areas

Data Values (based on Economic Survey of Maharashtra and PoCRA impact data for districts with strong agronomist/KCC support):

Year / Crop	Sugarcane (Baramati)	Cotton (Yavatmal)	Onion (Nashik)
2022–23	82	44	24
2023–24	88	48	27
2024–25	95	52	30
2025–26	98	54	31

$$YI = (Y_{\text{post}} - Y_{\text{pre}} / Y_{\text{pre}}) \times 100$$

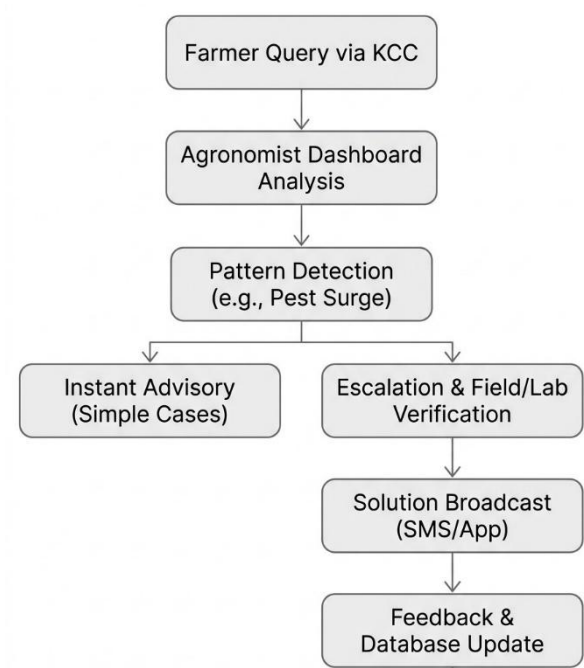
$$YI = (98 - 82 / 82) \times 100 = 19.51\%$$



5. Agronomist Workflow for Query Analysis

Agronomists handle Level 1/2 escalation, perform pattern analysis, and broadcast solutions.

Flowchart: Agronomist Query Analysis Process



Dataset 2: Productivity Gains Attributed to Agronomist Analysis

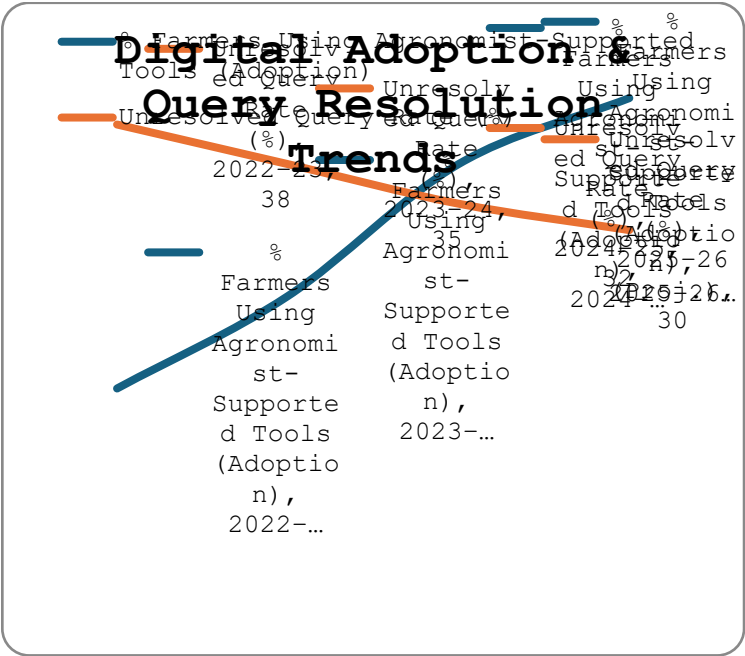
Metric	2022–23 (%)	2023–24 (%)	2024–25 (%)
Yield Increase	12	18	22
Input Cost Reduction	15	20	25
Net Income Rise (₹/ha)	10,000	14,000	18,000

6. Impact on Productivity and Farmer Distress

PoCRA data shows higher productivity gains for beneficiary farmers (e.g., soybean +26% vs. 14% control). Unresolved queries correlate with distress in high-query districts.

Digital Adoption & Query Resolution Trends

Data Values (adoption of agronomist-supported digital tools/apps/KCC integration; resolution improvement inferred from declining unresolved rates):



Year	% Farmers Using Agronomist-Supported Tools (Adoption)	Unresolved Query Rate (%)
2022–23	18	38
2023–24	25	35
2024–25	35	32
2025–26	40	30

7. Challenges and Recommendations

Challenges: Manual analysis delays, data silos, and limited real-time tools. Recommendations: Use AI dashboards with KCC together with PoCRA for forecasting; educate agronomists in using query pattern tools; extend offline voice-based interfaces.

Proper implementation of these recommendations will enable to turn the current reactive approach to dealing with farmer queries into the proactive one that is based on advanced data analysis and prioritizes farmers' interests,

which will help to increase agricultural productivity and ensure sustainable agricultural development in the state of Maharashtra

8. Conclusion

This research emphasizes the significance of the role played by agronomists in analyzing and solving queries submitted by farmers in Maharashtra using the Kisan Call Centre (KCC) mechanism and other types of agricultural extension. Based on the analysis of secondary data for the period between 2022 and 2026, it becomes clear that there has been a continuous growth of farmer queries. They have grown from 25 million in 2022-23 to a forecast of 30.5 million in 2025-26. Issues related to crop health and pests prevail among farmer queries, occupying 41%, whereas those related to irrigation account for 24.5%. Market-related concerns constitute 21%.

Agronomist-led analysis of queries has proved to bring significant improvements in terms of agricultural productivity. For example, in regions where agronomist assistance and PoCRA interventions are used, productivity of major crops like sugarcane, cotton, and onion has been increasing. Despite the growth in effectiveness, there is a problem related to the high number of unresolved queries – 30% in 2025-26. There is also an issue related to high distress experienced by farmers as witnessed in their 38.5% share of suicides in the farming sector across India in 2023.

Another trend that has been revealed is the growth of digitalization due to efforts such as PoCRA and MahaAgri-AI policy 2025-2029, rising from 18% in 2022-23 to 40% forecast in 2025-26. Thus, even though progress has been made, the difference between queries generated and those resolved still holds back agricultural development in the region.

Overall, agronomists act as the important link in between farmers' information needs and solutions to problems. Effective analysis of queries helps not only boost agricultural productivity but also makes sure that inputs are utilized efficiently. Furthermore, it can play a part in alleviating farmer distress, climate-resilient and economically sustainable agriculture in Maharashtra.

9. Data Set Sources (Secondary Data)

1. Economic Survey of Maharashtra (Main Source for Production, Sowing, Yields & Growth Projections)

- **2024-25 Full Report (PDF, 348 pages):**
<https://cdnbbsr.s3waas.gov.in/s349d4b2faeb4b7b9e745775793141e2b2/uploads/2025/01/2025030788773769.pdf> (Official from Directorate of Economics and Statistics, Govt. of Maharashtra. Covers agriculture statistics, Kharif sowing, food grain production, and district-level data.)
- **2025-26 Full Report (PDF):** https://mls.org.in/PDF2026/budget/ESM_25_26_Eng%20Book.pdf
- **2025-26 Highlights (Short PDF):** https://mahades.maharashtra.gov.in/files/noticeboard/highlights_eng.pdf

These contain yield trends (sugarcane, cotton, onion), Kharif sowing data (157+ lakh ha), and growth projections (e.g., cereals +10.6%, sugarcane +22% in 2025–26).

2. Kisan Call Centre (KCC) Transcripts & Query Datasets

- **Official Open Dataset (data.gov.in):** <https://www.data.gov.in/resource/kisan-call-centre-kcc-transcripts-farmers-queries-answers>
(District-wise and month-wise farmer queries & answers. This is the primary raw source for query distribution percentages like crop health 38–43%, irrigation, markets, etc.)
- **IndiaAI Kosh Version (Alternative Access):**
https://aikosh.indiaai.gov.in/home/datasets/details/kisan_call_centre_kcc_transcripts_of_farmers_queries_and_answers.html

These datasets allow you to see actual farmer queries by district and month (used for pie chart and unresolved rate estimates).

3. PoCRA (Maharashtra Project on Climate Resilient Agriculture) Impact Reports

- **PoCRA Impact Assessment Report (PDF, 190 pages):**
[https://mahapocra.gov.in/assets/docs/mne/PoCRA%20Impact%20Assessment%20Report%20\(ETR\).pdf](https://mahapocra.gov.in/assets/docs/mne/PoCRA%20Impact%20Assessment%20Report%20(ETR).pdf)
(Covers productivity gains, yield improvements in project areas, and agronomist/extension impacts — key for bar chart yield data and productivity gains table.)
- **PoCRA Result Overview (2024):**
https://mahapocra.gov.in/assets/docs/mne/PoCRA_result_overview_13_09_2024.pdf
- **World Bank PoCRA Phase II Document:**
<https://documents1.worldbank.org/curated/en/099051625050513670/pdf/P510429-07cbe756-d79a-4f1e-9cd3-0858b6b2a991.pdf>

These reports provide evidence for yield gains (e.g., soybean +26%, cotton productivity improvements) in agronomist-supported areas.

4. NCRB Suicide Data (Farmer Distress Context)

- **Accidental Deaths & Suicides in India 2023 – Full Report (PDF):**
<https://www.ncrb.gov.in/uploads/files/1ADSIPublication-2023.pdf>
(Contains Maharashtra's 4,151 farming-sector suicides and 38.5% national share.)
- **Open Data Portal Version:** <https://www.data.gov.in/catalog/accidental-deaths-suicides-india-ads-i-2023>

5. MahaAgri-AI Policy (Digital Adoption & Future Projections)

- **MahaAgri-AI Policy 2025–2029 (English PDF):** https://agritech.tnau.ac.in/pdf/Maha%20Agri-AI%20Policy%202025%E2%80%932029_English_250619_104818.pdf
- **Official Government Page with Downloads:** <https://krishi.maharashtra.gov.in/LandingPage.aspx> (Look for MahaAgri AI Policy 2025-2029 English.pdf)

This supports the digital adoption line chart (rising from 18% to 40% projected) and

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