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Exploring the Benefits of e-Extension Tools: Perspectives from Extension Personnel

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study, conducted in Uttar Pradesh during 2023-2024, aims to evaluate the benefits of e-Extension tools among extension personnel in Uttar Pradesh, focusing on Krishi Vigyan Kendra (KVKs) host by Acharya Narendra Deva University of Agriculture and Technology (ANDUAT). Uttar Pradesh was selected purposively due to its high number of KVKs, totalling 89, and the study focused on those hosted by Acharya Narendra Deva University of Agriculture and Technology

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(ANDUAT), which has the maximum number of KVKs in the state. Data were collected from 137 extension personnel using a Google Form questionnaire. The findings reveal a predominantly positive perception of e-Extension tools, with a majority recognizing their advantages in promoting communication, enhancing extension work, and providing quick access to agricultural information. Specifically, 67.15% of respondents perceived high benefits, while 26.28% perceived medium benefits, and only 6.57% perceived low benefits. Despite these positive perceptions, concerns were noted regarding the cost-effectiveness and ability of e-Extension tools to address all technical problems, as well as their impact on interpersonal relationships between extension personnel and farmers.

Keywords: e-Extension; perceived benefits; technology adoption; extension personnel.

1. INTRODUCTION

The advent of digital technologies has revolutionized various sectors, including agriculture, where e-Extension tools have emerged as a pivotal innovation [2]. These tools encompass a range of digital resources and platforms designed to enhance the delivery of agricultural extension services. By leveraging Information and Communication Technologies (ICT), e-Extension tools facilitate the dissemination of knowledge, improve communication between extension personnel and farmers, and support the adoption of innovative agricultural practices [2]. The traditional agricultural extension model, often characterized by face-to-face interactions and on-field demonstrations, faces numerous challenges such as limited reach, high costs, and logistical constraints [3]. In contrast, e-Extension tools offer a more efficient and scalable alternative, providing timely and accessible information to a broader audience [4-17]. These tools include online platforms, mobile applications, social media, and other digital communication channels that enable extension personnel to share information on best practices, market trends, weather forecasts, and pest management, among other topics [8,9].

Despite the potential benefits of e-Extension tools, their adoption and effective utilization depend significantly on the perceptions and attitudes of extension personnel. Understanding how these professionals perceive the benefits of e-Extension tools is crucial for developing strategies to enhance their adoption and integration into extension services [10]. Positive perceptions can lead to greater acceptance and proactive use of these tools, ultimately contributing to improved agricultural productivity and sustainability [11].

This research paper aims to explore the perceived benefits of e-Extension tools among extension personnel. By investigating their views, the study seeks to identify the advantages that these tools bring to their work, the challenges they face, and the potential impact on agricultural extension services. Through a comprehensive analysis of extension personnel's perceptions, this study will provide valuable insights into the role of e-Extension tools in modernizing agricultural extension and fostering agricultural development [12]. Key areas of focus include the efficiency and effectiveness of communication facilitated by e-Extension tools, the enhancement of knowledge dissemination, and the overall impact on the productivity and quality of extension services. By highlighting the perceived benefits and identifying areas for improvement, this research aims to contribute to the broader discourse on digital transformation in agriculture and support the ongoing efforts to harness technology for agricultural advancement.

1.1 Study Area

This study was conducted in Uttar Pradesh during the year 2023-2024. Uttar Pradesh was chosen purposively because it has the maximum number of Krishi Vigyan Kendra (KVKs) across India, totalling 89. In Uttar Pradesh, four types of organizations host KVKs: Non-Governmental Organizations (NGOs), Indian Council of Agricultural Research (ICAR) Institutes, State Agricultural Universities, and other educational institutes. Among these, Acharya Narendra Deva University of Agriculture and Technology (ANDUAT) was selected for the study because it hosts the maximum number of KVKs in the state.

2. METHDOLOGY

2.1 Data Collection

Data was collected using a Google Form questionnaire from the extension personnel of the KVKs under ANDUAT. Out of 158 extension personnel, 137 responded to the questionnaire, resulting in a sample size of 137. The data was classified, tabulated, and analyzed to ensure meaningful interpretation and accurate inferences. Various statistical methods were used to analyze the data effectively.

By focusing on the extension personnel from ANDUAT's KVKs, the study aims to gather insights into the perceived benefits of e-Extension tools from those directly involved in agricultural extension activities. This targeted approach helps to understand the specific context and challenges faced by extension workers in Uttar Pradesh, providing a robust basis for drawing conclusions and making recommendations for future improvements in e-Extension practices.

3. RESULTS AND DISCUSSION

The study gathered responses from 137 extension personnel to assess their perceptions of the benefits of e-Extension tools. Here is a summary of the findings for each statement:

1. **e-Extension tools promote communication among KVKs, research institutes, and other research stations.** A vast majority (52.55% strongly agree and 41.61% agree) perceive that e-Extension tools significantly enhance communication among different agricultural entities. Only 5.84% are undecided, with no disagreement recorded.
2. **e-Extension tools offer real advantages over traditional methods of training and extension.** About 70.08% of respondents agree (32.85% strongly agree and 37.23% agree) that e-Extension tools offer real advantages over traditional methods. However, 11.68% are undecided, and 18.25% (13.14% disagree and 5.11% strongly disagree) do not see these advantages.
3. **e-Extension tools are not capable of providing solutions to all technical problems pertaining to agriculture and allied activities.** Most respondents (38.69% strongly agree and 30.66% agree) acknowledge the limitations of e-Extension tools in solving all technical problems, with 13.87% undecided and 16.79% (10.22% disagree and 6.57% strongly disagree) disagreeing.
4. **All kinds of information exchange are not possible through the use of e-Extension tools.** A majority (32.12% strongly agree and 46.72% agree) feel that e-Extension tools have limitations in information exchange, though 15.33% are undecided and 5.84% disagree.
5. **Extension work can be greatly enhanced by the use of e-Extension tools.** A strong consensus (35.77% strongly agree and 50.36% agree) believes that e-Extension tools can significantly enhance extension work, with 13.87% undecided and no disagreement recorded.
6. **Gathering useful data for extension work can be simplified by using e-Extension tools.** While 50.37% agree (20.44% strongly agree and 29.93% agree) that e-Extension tools simplify data gathering, a significant portion (28.47%) is undecided, and 21.17% (13.87% disagree and 7.30% strongly disagree) disagree.
7. **The internet is an important source for collecting current information on every aspect of agriculture.** Most respondents (27.01% strongly agree and 40.88% agree) recognize the internet as a crucial source for current agricultural information, though 16.79% are undecided, and 15.33% (8.76% disagree and 6.57% strongly disagree) do not agree.
8. **e-Extension tools are quick for accessing online agriculture information.** All respondents agree that e-Extension tools provide quick access to online agricultural information, with 31.39% strongly agreeing and 68.61% agreeing.
9. **e-Extension tools update extension personnel about agriculture development programs and activities.** A majority (62.78%) believe that e-Extension tools effectively update them on agriculture development programs (27.74% strongly agree and 35.04% agree), though 25.55% are undecided, and 11.68% (7.30% disagree and 4.38% strongly disagree) disagree.

Table 1. Statements wise distribution of Extension Personnel according to their perceptions of the benefits of e-Extension tools

n=137

S. N.	Statement	S.A.		A.		U.D.		D.A.		S.D.A.	
		f	%	f	%	f	%	f	%	f	%
1.	e-Extension tools promote communication among KVKs, research institutes and other research station.	72	52.55	57	41.61	08	05.84	00	00.00	00	00.00
2.	e-Extension tools offer real advantages over traditional methods of training and extension.	45	32.85	51	37.23	16	11.68	18	13.14	07	5.11
3.	e-Extension tools are not capable providing solution to all technical problems pertaining to agriculture & allied activities.	53	38.69	42	30.66	19	13.87	14	10.22	09	6.57
4.	All kinds of information exchange are not possible through use of e-Extension tools.	44	32.12	64	46.72	21	15.33	08	5.839	00	00.00
5.	Extension work can be greatly enhanced by use of e-Extension tools.	49	35.77	69	50.36	19	13.87	00	00.00	00	00.00
6.	Gathering useful data for extension work can be simplified by using e-Extension tools.	28	20.44	41	29.93	39	28.47	19	13.87	10	7.30
7.	Internet is an important source for collecting the current information on every aspects of agriculture.	37	27.01	56	40.88	23	16.79	12	8.759	09	6.57
8.	e-Extension tools are quick for accessing online agriculture information.	43	31.39	94	68.61	00	00.00	00	00.00	00	00.00
9.	e-Extension tools updates extension personnel about the agriculture development programmes and activities.	38	27.74	48	35.04	35	25.55	10	7.299	06	04.38
10.	Internet cannot facilitate the extension personnel to access global market information.	17	12.41	19	13.87	27	19.71	39	28.47	35	25.55
11.	e-Extension tools remove a lot of cost.	24	17.52	32	23.36	21	15.33	38	27.74	22	16.06
12.	Application of e-Extension tools save time.	37	27.01	42	30.66	29	21.17	17	12.41	12	8.76
13.	e-Extension tools are potentially faster tools of TOT for remote and diversified areas where agricultural extension services are not easily and frequently available.	41	29.93	47	34.31	35	25.55	18	13.14	16	11.68
14.	e-Extension tools reduce effectiveness of communication between extension personnel and farmers.	48	35.04	53	38.69	24	17.52	12	8.759	00	00.00
15.	e-Extension tools involve more cost for	51	37.23	43	31.39	27	19.71	16	11.68	00	00.00

S. N.	Statement	S.A.		A.		U.D.		D.A.		S.D.A.	
		f	%	f	%	f	%	f	%	f	%
	installation and maintenance.										
16.	e-Extension tools application is useful to show demonstrated way of doing thing.	21	15.33	28	20.44	32	23.36	29	21.17	27	19.71
17.	e-Extension tools presentation cannot helps in explaining complicated topics to farmers.	31	22.63	58	42.34	27	19.71	13	9.489	08	5.84
18.	e-Extension tools are helpful in effective carrying out extension activities like training, demonstration, field day, kisan mela, campaign, etc.	24	17.52	35	25.55	21	15.33	38	27.74	19	13.87
19.	Through creative use of e-Extension tools, quality of technology dissemination can be enhanced.	37	27.01	52	37.96	18	13.14	19	13.87	14	10.22
20.	e-Extension tools help in creating desire among agricultural learners to learn new subjects.	33	24.09	48	35.04	26	18.98	17	12.41	13	9.489
21.	Anyone can learn to use e-Extension tools if they have motivation.	25	18.25	47	34.31	32	23.36	18	13.14	15	10.95
22.	e-Extension tools promote self-learning.	39	28.47	42	30.66	19	13.87	22	16.06	15	10.95
23.	e-Extension tools reduce interpersonal relationships between extension personnel and farmers.	44	32.12	63	45.99	24	17.52	08	5.839	00	00.00
24.	Feedback is fast through e-Extension tools than traditional methods.	46	33.58	51	37.23	29	21.17	11	8.029	00	00.00
25.	Instantaneous feedback is possible by using e-Extension tools.	58	42.34	47	34.31	15	10.95	07	5.109	10	7.30

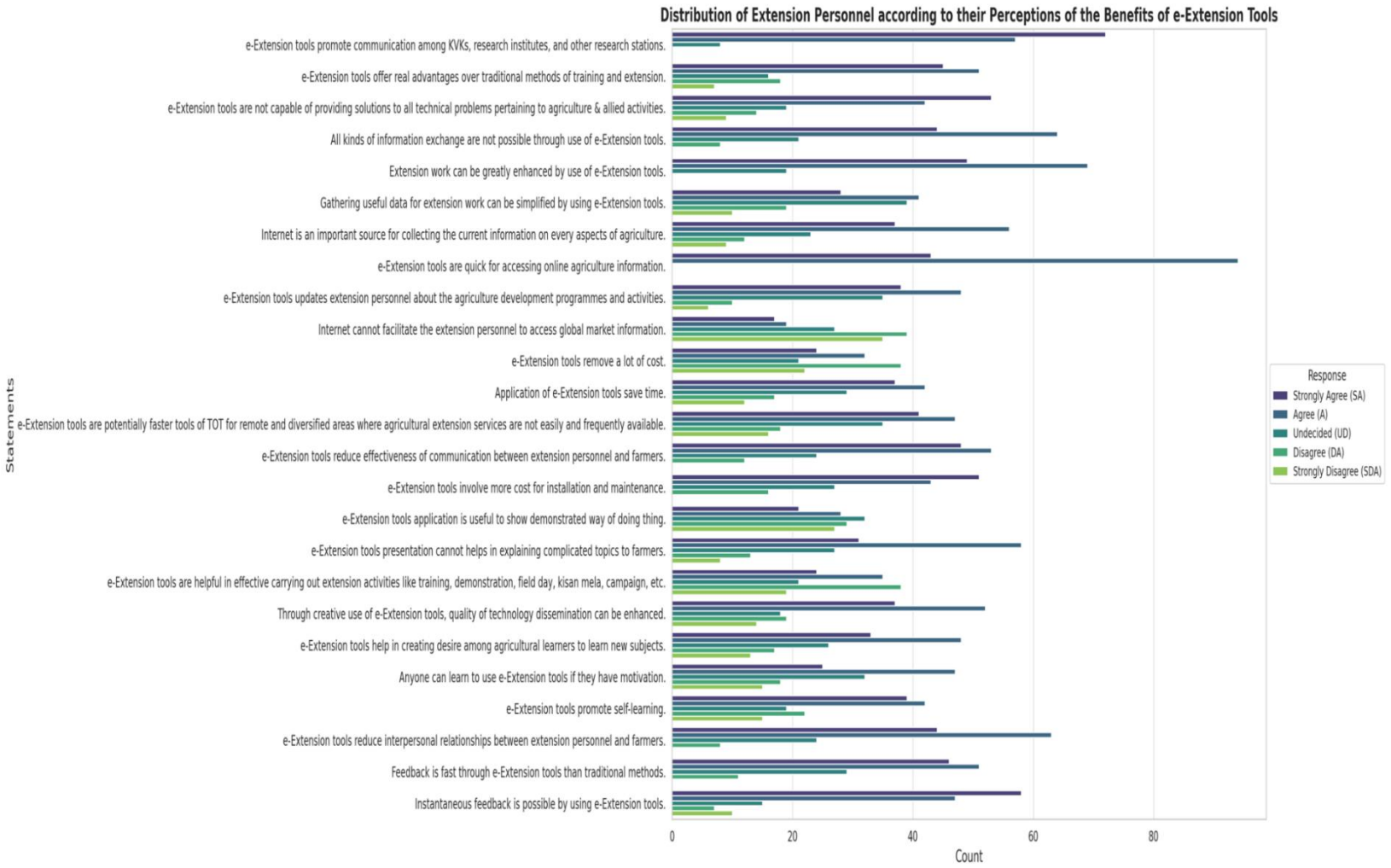

Fig. 1. Statements wise distribution of Extension personnel

10. **The internet cannot facilitate the extension personnel to access global market information.** A majority (54.02%) disagree (28.47% disagree and 25.55% strongly disagree) with the statement that the internet cannot facilitate global market information access, though 26.28% (12.41% strongly agree and 13.87% agree) think it cannot, and 19.71% are undecided.
11. **e-Extension tools remove a lot of costs.** Opinions are mixed, with 40.88% agreeing (17.52% strongly agree and 23.36% agree) that e-Extension tools reduce costs, while 43.8% (27.74% disagree and 16.06% strongly disagree) disagree, and 15.33% are undecided.
12. **Application of e-Extension tools saves time.** A majority (57.67%) feel that e-Extension tools save time (27.01% strongly agree and 30.66% agree), though 21.17% are undecided, and 21.17% (12.41% disagree and 8.76% strongly disagree) disagree.
13. **e-Extension tools are potentially faster tools of TOT for remote and diversified areas where agricultural extension services are not easily and frequently available.** A majority (64.24%) believe in the potential of e-Extension tools for remote areas (29.93% strongly agree and 34.31% agree), though 25.55% are undecided, and 24.82% (13.14% disagree and 11.68% strongly disagree) disagree.
14. **e-Extension tools reduce the effectiveness of communication between extension personnel and farmers.** A significant majority (73.73%) feel that e-Extension tools reduce communication effectiveness (35.04% strongly agree and 38.69% agree), though 17.52% are undecided, and 8.76% disagree.
15. **e-Extension tools involve more cost for installation and maintenance.** Most respondents (68.62%) agree that e-Extension tools incur higher installation and maintenance costs (37.23% strongly agree and 31.39% agree), with 19.71% undecided and 11.68% disagreeing.
16. e-Extension tools application is useful to show demonstrated ways of doing things. Opinions are divided, with 35.77% agreeing (15.33% strongly agree and 20.44% agree) and 40.88% disagreeing (21.17% disagree and 19.71% strongly disagree) on the usefulness of e-Extension tools for demonstrations, with 23.36% undecided.
17. **e-Extension tools presentations cannot help in explaining complicated topics to farmers.** A notable portion (64.97%) agrees (22.63% strongly agree and 42.34% agree) that e-Extension tools presentations cannot help in explaining complicated topics, though 19.71% are undecided, and 15.33% (9.49% disagree and 5.84% strongly disagree) disagree.
18. **e-Extension tools are helpful in effectively carrying out extension activities like training, demonstration, field day, kisan mela, campaign, etc.** Opinions are mixed, with 43.07% agreeing (17.52% strongly agree and 25.55% agree), while 41.61% (27.74% disagree and 13.87% strongly disagree) disagree, and 15.33% are undecided.
19. **Through creative use of e-Extension tools, the quality of technology dissemination can be enhanced.** A majority (64.97%) feel that quality of technology dissemination can be enhanced (27.01% strongly agree and 37.96% agree), though 13.14% are undecided, and 24.09% (13.87% disagree and 10.22% strongly disagree) disagree.
20. **e-Extension tools help in creating a desire among agricultural learners to learn new subjects.** A majority (59.13%) agree that e-Extension tools help create a desire to learn (24.09% strongly agree and 35.04% agree), though 18.98% are undecided, and 21.90% (12.41% disagree and 9.49% strongly disagree) disagree.
21. **Anyone can learn to use e-Extension tools if they have motivation.** A majority of respondents (52.56%) agree (18.25% strongly agree and 34.31% agree) that motivation is key to learning how to use e-Extension tools. However, 23.36% are undecided, and 24.09% (13.14% disagree and 10.95% strongly disagree) do not believe that motivation alone is sufficient for learning these tools.
22. **e-Extension tools promote self-learning.** A majority (59.13%) agree (28.47% strongly agree and 30.66% agree) that e-Extension tools promote self-learning, though 13.87% are undecided, and 27.01% (16.06% disagree and 10.95% strongly disagree) disagree.
23. **e-Extension tools reduce interpersonal relationships between extension personnel and farmers.** A significant

majority (78.11%) agree (32.12% strongly agree and 45.99% agree) that e-Extension tools reduce interpersonal relationships, while 17.52% are undecided, and 5.84% disagree.

24. **Feedback is faster through e-Extension tools than traditional methods.** A majority (70.81%) agree (33.58% strongly agree and 37.23% agree) that feedback is faster through e-Extension tools, though 21.17% are undecided, and 8.03% disagree.
25. **Instantaneous feedback is possible by using e-Extension tools.** A majority (76.65%) agree (42.34% strongly agree and 34.31% agree) that e-Extension tools enable instantaneous feedback. However, 10.95% are undecided, and 12.41% (5.11% disagree and 7.30% strongly disagree) do not believe that e-Extension tools can provide immediate feedback.

The results of the study highlight a generally positive perception among extension personnel regarding the benefits of e-Extension tools, with significant majorities recognizing their effectiveness in promoting communication, enhancing extension work, and providing quick access to agricultural information. Most respondents agree that e-Extension tools simplify data gathering and offer advantages over traditional methods, although there are mixed feelings about their cost-effectiveness and capability to address all technical problems. While e-Extension tools are appreciated for their potential to update personnel on agricultural developments and facilitate faster feedback, there are concerns about their impact on interpersonal relationships and the effectiveness of communication with farmers. Additionally, the tools are perceived to promote self-learning and create a desire to learn new subjects, yet opinions vary on whether anyone can learn to use them solely with motivation. The study indicates that while e-Extension tools hold substantial promise for enhancing agricultural extension services, there are areas that require further attention and improvement, particularly in addressing their limitations and costs, and in balancing technological efficiency with maintaining interpersonal connections.

The data indicates that the majority of extension personnel perceive a high benefit from e-extension tools, with 67.15% reporting this perception. This suggests that these tools are widely recognized as advantageous for their work. Additionally, 26.28% perceive a medium benefit, while only a small percentage (6.57%) perceive a low benefit. These findings underscore the overall positive impact and utility of e-extension tools in enhancing extension activities and outcomes for personnel in the field. A similar finding is also reported by Babu and Glendenning [8] and Mittal et al. [9].

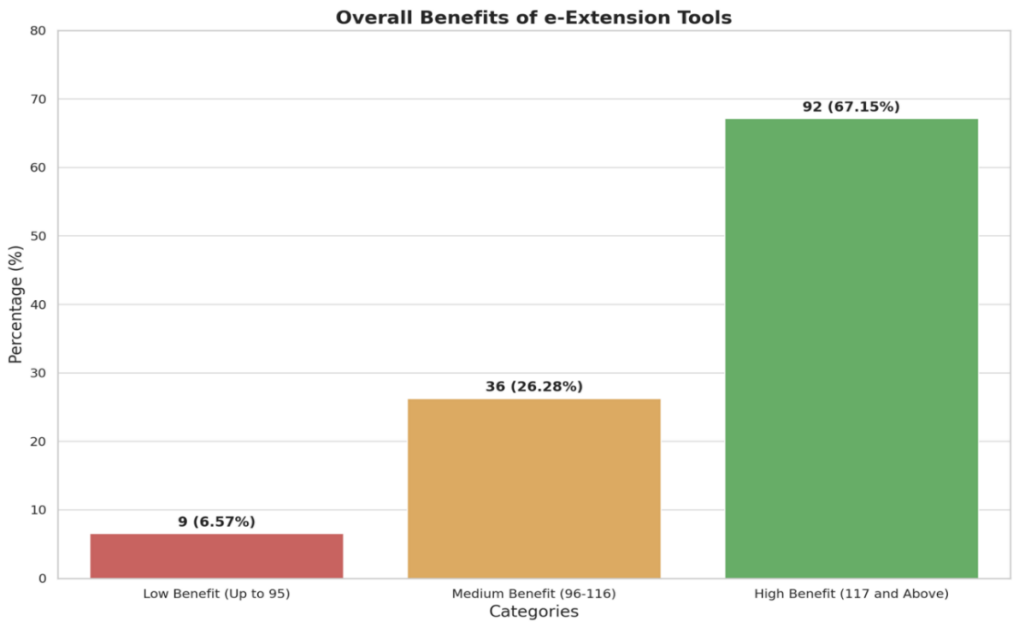

Fig. 2. Distribution of Extension Personnel according to their overall benefits of e-Extension tools

Table 2. Distribution of Extension Personnel according to their overall benefits of e-Extension tools

n=137

S. N.	Categories	f	%
1.	Low Benefit (Up to 95)	9	06.57
2.	Medium Benefit (96-116)	36	26.28
3.	High Benefit (117 and Above)	92	67.15
	Total	137	100

Mean=106.27, SD= 10.96, Min=82, Max= 123, f=frequency, %= percentage

4. CONCLUSION AND PERSPECTIVE

The study aimed to explore the perceived benefits of e-Extension tools among extension personnel in Uttar Pradesh, specifically within the Krishi Vigyan Kendras (KVKs) under Acharya Narendra Deva University of Agriculture and Technology (ANDUAT). The findings reveal a generally positive perception of e-Extension tools, with a significant majority recognizing their advantages in promoting communication, enhancing extension work, and providing quick access to relevant agricultural information. Most extension personnel agree that these tools simplify data gathering and offer real advantages over traditional methods of training and extension. However, there are mixed feelings regarding the cost-effectiveness of e-Extension tools and their ability to address all technical problems in agriculture. Concerns were also noted about the potential reduction in interpersonal relationships between extension personnel and farmers due to the reliance on digital tools. Despite these challenges, e-Extension tools are highly valued for their capacity to promote self-learning, update personnel on agricultural developments, and facilitate faster feedback mechanisms. The distribution of perceptions indicates that while the majority perceive high benefits, a notable proportion see medium to low benefits, highlighting the need for ongoing support and targeted interventions to maximize the efficacy of e-Extension tools. Addressing the limitations, cost issues, and maintaining a balance between technological efficiency and interpersonal connections will be crucial in enhancing the overall impact of e-Extension tools.

In conclusion, e-Extension tools hold substantial promise for modernizing agricultural extension services and improving their reach and effectiveness. The positive perceptions among extension personnel underscore the potential of these tools to significantly contribute to agricultural development. Future efforts should focus on addressing the identified challenges and ensuring that all extension personnel can fully benefit from the advantages offered by e-Extension tools. By doing so, the agricultural extension system can be further strengthened, ultimately leading to improved agricultural productivity and sustainability.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist

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