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Effectiveness Of Virtual Agricultural Channels Broadcasted Through Youtube As Perceived By The Farmers

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ABSTRACT

YouTube is one of the most widely used social media platforms for accessing agricultural information, general news, and entertainment. This study aimed to assess farmers' perceptions of the effectiveness of virtual agricultural channels broadcasted through YouTube in Dumuria Upazila, Khulna District, Bangladesh. Data were collected from 80 respondents using a snowball sampling technique through personal interviews conducted between August 25, 2022, and February 27, 2023 using an interview schedule. Information on farmers' perceptions gathered, and ten popular YouTube channels were selected for evaluation. Descriptive statistics were used for data analysis, while Spearman's rank correlation coefficient measured the relationships between independent and dependent variables. The findings revealed that 86.25% of respondents perceived virtual agricultural channels on YouTube as less effective overall. However, individual channel evaluations indicated that Shykh Seraj and Math Krishi were considered highly effective, whereas Agamir Krishi and Krishi Bioscope were perceived as less effective. Among the 13 characteristics analyzed, education, extension media contact, knowledge of virtual agricultural channels, contact with other virtual media, and extent of exposure to YouTube-based agricultural content showed a positive significant relationship with perceived effectiveness. Conversely, age, family size, and farming experience demonstrated a negative significant relationship. The primary challenge limiting the effectiveness of these virtual channels was the high cost and inaccessibility of required materials (77.5%), while the least common issue reported was the accuracy of information (52.5%). These findings highlight the need to enhance the accessibility, affordability, and reliability of YouTube-based agricultural content to better support farmers in Bangladesh.

Keywords: Farmer Perception; Agricultural Extension; Digital Media; Technology Adoption; Information Accessibility

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ARTICLE INFO
Received: 12 November 2024 | Revised: 28 November 2024 | Accepted:16 December 2024 | Published Online: 7 January 2025
DOI: https://doi.org/10.55121/nc.v4i1.387

CITATION
Lastname, The initials of the firstname., Lastname, The initials of the firstname., Lastname, The initials of the firstname., et al., 2025. Effectiveness Of Virtual Agricultural Channels Broadcasted Through Youtube As Perceived By The Farmers. New Countryside. 4(1): 57–69. DOI: https://doi.org/10.55121/nc.v4i1.387

1. Introduction

Bangladesh, covering 147,570 square kilometers, is an emerging nation with one of the world's largest agro-based economies. Since gaining independence in 1971, agriculture has remained a central pillar of its economy, employing 45% of the labor force and contributing 17% to the GDP [1]. Approximately 84% of the rural population depends on agriculture for their livelihood, either directly or indirectly. However, the sector faces challenges due to limited resources, evolving agricultural production methods, and increasing demand for high-quality products [2]. Access to agricultural information is critical for raising awareness about advanced technologies and improving farmers' decision-making processes [3,4].

The rapid evolution of information technology has transformed communication methods, enabling faster and more accurate information dissemination [5]. Traditional communication channels such as print media, radio, and television coexist with modern digital platforms, including social media, mobile applications, and web-based networks [6]. The choice of communication medium depends on factors such as media awareness, credibility, message richness, feedback mechanisms, and urgency [7]. The quality of ICT infrastructure significantly influences the adoption and effectiveness of these channels [8].

Social media has become a dominant force in information dissemination, surpassing traditional media outlets [9]. A dictionary defines social media as electronic communication platforms that facilitate the exchange of information, ideas, and content [10]. Scientists emphasize its interactive nature, allowing users to create, share, and discuss agricultural information [11]. Farmers utilize social media to connect with peers, seek advice, and share experiences. Among these platforms, YouTube has emerged as a significant tool for agricultural knowledge transfer, offering audiovisual content accessible to both literate and illiterate farmers [12]. The platform enables direct communication with agricultural experts, facilitates farmer-to-farmer knowledge exchange, and provides an avenue for content creation and audience engagement.

Despite its potential, the effectiveness of YouTube for agricultural extension is influenced by factors such as internet accessibility, language barriers, and content reliability [13]. In Bangladesh, agriculture remains a vital sector, yet farmers face persistent challenges related to resources, information, and technology access. However, the increasing penetration of internet and smartphones has expanded the use of social media for agricultural learning and marketing. Several YouTube-based agricultural channels, including Math Krishi, Agamir Krishi, Krishi Bioscope, Deepto Krishi, Shykh Seraj, and Agro One, have gained popularity, providing valuable insights into farming practices, marketing strategies, and technological advancements.

Virtual agricultural channels offer a viable alternative to traditional extension services, particularly in remote areas where physical outreach is limited. These channels contribute to knowledge dissemination and socioeconomic development by improving access to market information and innovative agricultural techniques. Nevertheless, the primary challenge lies not in the availability of technology but in translating knowledge into practical applications for economic and social advancement [14]. The success of agricultural communication depends on how effectively farmers respond to the information received.

Previous studies have assessed the effectiveness of agricultural programs broadcasted through radio and television [14–18]. However, limited research exists on the effectiveness of YouTube-based virtual agricultural channels as perceived by farmers. This study seeks to fill that gap by evaluating the impact of these channels on farmers' knowledge acquisition and agricultural decision-making.

The research problem focuses on assessing the extent to which the target group utilizes the information they receive. In essence, effectiveness is determined by how well the provided content meets the needs and expectations of its recipients.

Specific objectives

i. To determine the effectiveness of virtual agricultural channels broadcasted through YouTube as perceived by the farmers.

ii. To ascertain the relationships between the selected characteristics of the farmers and their perceived effectiveness of virtual agricultural channels.

iii. To identify the major problems faced by the farmers in receiving and utilizing the information through YouTube.

2. Methodology

This study employed a descriptive and diagnostic research design, as outlined by Kothari [19], to assess the perceived effectiveness of virtual agricultural channels broadcasted via YouTube. The descriptive aspect of the research aimed to systematically capture and present the characteristics of these digital platforms, while the diagnostic component sought to analyze their impact on farmers' knowledge, decision-making, and agricultural practices. By adopting this approach, the investigation provided valuable insights into how farmers perceive and utilize YouTube-based agricultural content for improving their farming techniques and overall productivity.

The study was carried out in ten purposively selected villages within Dumuria upazila of Khulna district, Bangladesh, namely Khornia, Dumuria, Sajiara, Kalikapur, Senpara, Vulbaria, Jhaltola, Dattavanga, Bahirakra, and Boratia. Dumuria is among the largest upazilas in the Khulna district in terms of land area and is known for having progressive farmers compared to other upazilas in the region. Additionally, its proximity to Khulna University makes it a strategically significant location for agricultural studies.

The target population for this study comprised local farmers who had access to various virtual agricultural channels broadcasted through YouTube. To ensure the selection of relevant participants, the Upazila Agriculture Officer (UAO) of Dumuria, Khulna played a key role in identifying suitable farmers for the research. A total of 80 farmers were purposively selected using the snowball sampling technique, which allowed for the identification of participants through referrals from initial respondents. The study primarily focused on evaluating the effectiveness of virtual agricultural channels on YouTube, as perceived by the farmers, which was considered the dependent variable. In contrast, thirteen selected characteristics of the farmers were analyzed as independent variables to explore their potential influence on the perceived effectiveness of these digital platforms (**Table 1**) [20].

In this study, effectiveness was defined as the suitability and applicability of the information provided by virtual agricultural channels in the farmers' specific contexts. A total of ten popular agriculture-related YouTube channels were selected for evaluation. Each farmer in the sample was asked to assess the effectiveness of these channels using a four-point Likert-type scale, where 0 indicated "not at all effective," 1 represented "less effective," 2 denoted "moderately effective," and 3 signified "highly effective." The effectiveness scores obtained by the respondents ranged from 0 to 30, with 0 reflecting no perceived effectiveness and 30 representing the highest level of effectiveness. Based on their scores, the respondents were categorized into three groups to facilitate comparative analysis (**Table 2**). To determine the relative effectiveness of the selected YouTube-based agricultural channels, an Effectiveness Index (EI) was computed using a specific formula.

Table 1. Distribution of the Respondents According to Their Selected Characteristics.

Selected Characteristics (Measuring unit)	Categories	Scores	Respondents (N=80)		Range	Mean±SD
			Number	Percent	Min.–Max.	
Age (Year)	Young	0–35	32	40.00	23–65	39.51±9.76
	Middle aged	36–50	37	46.25		
	Old aged	>50	11	13.75		
Education (scores)	Illiterate	0	0.0	0.0	1–18	9.9±4.27
	Primary	1–5	14	17.5		
	Secondary	6–10	37	46.25		
	Higher Secondary	11–12	17	21.25		
	Above HSC	>=13	12	15		
Family size (Number)	Small sized family	Up to 4	60	75	2–6	3.7±1.15
	Medium sized family	5–6	20	25		
	Large sized family	≥7	0	0		
Farming experience (Year)	Low experience	10	24	30	2–50	17.68±9.79
	Medium experience	11–20	32	40		
	High experience	>20	24	30		

Table 1. *Cont.*

Selected Characteristics (Measuring unit)	Categories	Scores	Respondents (N=80)		Range	Mean±SD
			Number	Percent	Min.–Max.	
Farm size (hectare)*	Landless	<.02	0	0	0.12–10.74	1.31±1.74
	Marginal	.02–.20	5	6.25		
	Small	.21–1	43	53.75		
	Medium	1–3	25	31.25		
	Large	>3	7	8.75		
Annual family income ('000' BDT)	Low Income	1–100	76	95	5–120	31.12±26.80
	Medium Income	101–300	04	05		
	High Income	>300	0	0		
Organizational participation (Score)	No Participation	0	36	45	0–6	0.9±1.06
	Low Participation	1–6	44	55		
	Medium participation	7–12	0	0		
	High Participation	13–18	0	0		
Agricultural training (Number)	No training	0	13	16.25	0–5	1.93±1.27
	Low training	1	17	21.25		
	Medium training	2–3	41	51.25		
	High training	>=4	9	11.25		
Cosmopolitanism (Score)	No	0	39	48.75	0–5	1.25±1.38
	Low	1–8	41	51.25		
	Medium	9–16	0	0		
	High	17–24	0	0		
Extension media contact (Score)	Low	1–14	0	0	5–21	12.1±2.81
	Medium	15–28	64	80		
	High	29–42	16	20		
Knowledge level on virtual agricultural channels broadcasted through YouTube	Low	1–5	7	8.75	4–15	9.7±2.66
	Medium	6–10	41	51.25		
	High	11–15	32	40		
	Very High	16–20	0	0		
Exposure to virtual agricultural channels broadcasted through YouTube	Low	1–10	48	60	5–14	10.05±2.21
	Medium	11–20	32	40		
	High	21–30	0	0		
Contact with other virtual media	Low	1–8	7	8.75	3–13	6.46±2.34
	Medium	9–16	69	86.25		
	High	17–24	4	5		

*Farm size was categorized according to Krishi Diary (2023), AIS, MoA [20].

Table 2. Distribution of the Respondents Based on Their Perceived Effectiveness Scores Related to Virtual Agricultural Channels Broadcasted Through YouTube.

Categories	Score	Respondents (N=80)		Range		Mean	SD
		Number	Percent	Min.	Max.		
Less effective	1–10	69	86.25	3	14	7.81±	2.49
Moderately effective	11–20	11	13.75				
Highly effective	21–30	0	0				
Total		**80**	**100**				

$$\mathrm{EI}(\%) = \frac{\text{Obtained EI Scores}}{\text{Possible Highest EI Scores}} \times 100 \quad (1)$$

$$\text{EI Score} = N_{he} \times 3 + N_{me} \times 2 + N_{le} \times 1 + N_{ne} \times 0 \quad (2)$$

Where, El represents the Effectiveness Index. The variable N_{he} refers to the number of respondents who rated the channels as highly effective, N_{me} denotes those who rated them as moderately effective, N_{le} indicates the number of respondents who found them less effective, and N_{ne} represents those who considered the channels not effective.

The Effectiveness Index (EI) score in this study could range from 0 to 240, as it was derived from the responses of 80 participating farmers. A score of 0 indicated that the virtual agricultural channels had no perceived effectiveness, whereas a maximum score of 240 signified high effectiveness as rated by the farmers. To assess the relative impact of different YouTube-based agricultural channels, the Effectiveness Index (EI) percentage was calculated. Based on these percentages, the selected channels were ranked to determine their effectiveness as perceived by the farmers, allowing for a comparative evaluation of their influence on agricultural knowledge and practices.

The independent variables, representing the selected characteristics of the farmers, were measured using standardized measurement units, ensuring consistency and accuracy in data collection. The specific measurement techniques and units for each variable are outlined in **Table 1**.

A total of seven relevant problems were identified for this study based on pre-test results (**Table 4**). Farmers in the study area were asked to indicate whether they had encountered each problem by responding with a simple 'yes' or 'no'. The frequency of citations for each problem was recorded, and based on these responses, the problems were ranked to determine their relative significance as perceived by the farmers.

The researcher collected data from the respondents through face-to-face interviews, ensuring direct interaction and clarification of any queries. A pre-tested interview schedule was used to enhance the reliability and accuracy of the responses. The data collection process took place over a span of six months, from August 25, 2022, to February 27, 2023. After data collection, all responses were systematically entered and analyzed using SPSS version 25, a widely used statistical software for social science research. Various statistical measures were employed to describe and interpret both the independent and dependent variables of the study. These included frequency distributions, percentages, range, rank order, mean, and standard deviation, which helped in summarizing the characteristics of the dataset effectively. Furthermore, to explore the relationship between the selected characteristics of the farmers and their perceived effectiveness of virtual agricultural channels on YouTube, Spearman's Ranked Correlation Coefficient (ρ) was applied. This statistical method was chosen due to its suitability for analyzing ordinal data and non-linear relationships, allowing the researcher to identify significant correlations between farmer attributes and their evaluation of digital agricultural content.

Table 4. Distribution of Respondent Farmers According to the Problems Confronted by Them Related to Effectiveness of Virtual Agricultural Channels.

Problems	Extent of problems		Rank
	Score	Percentage	
i. Information is not relevant	55	68.75	2nd
ii. All the information is not correct	42	52.50	6th
iii. Information is not easy to understand	44	55.00	5th
iv. Lack of feedback or replying answer of questions	48	60.00	4th
v. Not expert in using internet	49	61.25	3rd
vi. Required materials are expensive and not easily accessible	62	77.50	1st
vii. Some information is confusing	48	60.00	4th

3. Results and Discussion

3.1. Extent of Perceived Effectiveness of the Virtual Agricultural Channels Broadcasted Through YouTube

The perceived effectiveness scores, as calculated in the study, ranged from a minimum of 3 to a maximum of 14. The average perceived effectiveness score among the respondent farmers was found to be 7.81, with a standard deviation of 2.49. To better understand variations in farmers' perceptions, the respondents were categorized into three distinct groups based on their perceived effectiveness scores (**Table 2**). This classification helps in analyzing differences in how farmers perceive and assess the effectiveness of the studied agricultural practices.

The data presented in **Table 2** reveal that a significant majority (86.25%) of the respondent farmers perceived virtual agricultural channels broadcasted through YouTube as less effective in delivering useful agricultural information. In contrast, only a small proportion (13.75%) of the respondents considered these channels to be moderately effective. Notably, none of the farmers in the study regarded these channels as highly effective sources of agricultural knowledge.

A similar study conducted by Sandeep et al. reported varying levels of perceived effectiveness regarding agricultural information dissemination [21]. Their findings indicated that approximately two-fifths (39.17%) of respondents believed that the effectiveness of agricultural information was at a medium level. This was followed by 38.33% of respondents who rated the information as less effective. Additionally, smaller proportions of respondents perceived the information as very highly effective (8.33%), highly effective (7.50%), and very less effective (6.67%). These findings highlight differences in farmers' perceptions across different studies, which may be influenced by factors such as accessibility, content relevance, and individual experiences with digital agricultural platforms.

3.1.1. Rank Order of the Virtual Agricultural Channels

The ten selected virtual agricultural channels broadcasted through YouTube are presented in **Figure 1.** Based on the perceptions of the respondent farmers, Shykh Seraj (62.5%) and Math Krishi (62.08%) were considered highly effective sources of agricultural information. Meanwhile, a notable proportion of farmers rated Others (including Krishi TV, Uddokter Khoje, and Jubo Agro) at 60.83% and Deepto Krishi at 57.08% as moderately effective.

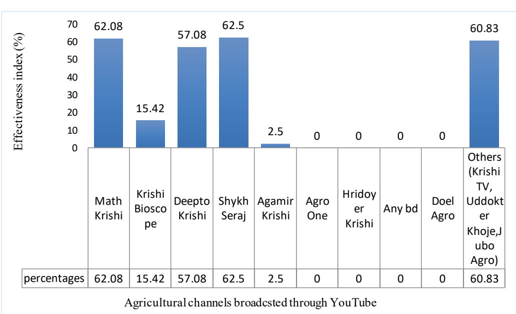

Figure 1. Relative Position of the Virtual Agricultural Channels Based on EI.

In contrast, Agamir Krishi was perceived as less effective by only 2.5% of the respondents, while Krishi Bioscope was rated as very less effective by 15.42% of them. Furthermore, none of the farmers reported exposure to Agro One, Hridoyer Krishi, Any BD, or Doel Agro. As a result, these channels could not be evaluated for their effectiveness by the respondents (**Figure 1**).

Figure 1 highlights that the content provided by ShykhSeraj (62.5%) and Math Krishi (62.08%) was perceived as the most effective by the respondent farmers. The Shykh Seraj YouTube channel is managed by Shykh Seraj, a well-known agricultural and environmental journalist in Bangladesh. His extensive work in media has significantly contributed to raising awareness about agriculture beyond national borders. He is widely recognized among people from all walks of life, particularly farmers, due to his popular television program *Hridoye Mati O Manush*. Farmers in the study area expressed that the content produced by Shykh Seraj is highly effective, easy to comprehend, and directly beneficial for their agricultural activities.

Similarly, Math Krishi, another highly rated channel, is run by Md. Mosaddek Hossen, who previously served as the Upazila Agriculture Officer (UAO) in Dumuria Upazila, Khulna. His dedication, strong work ethic, and ability to build strong connections with farmers contributed to the channel's popularity. Farmers in the study area frequently engaged with his content, leading to a substantial number of viewers for Math Krishi.

Apart from these two leading channels, some farmers reported being exposed to virtual agricultural videos on YouTube but did not specify the exact channels they followed. The researcher grouped these unspecified channels under the category "Others", which ranked third in perceived effectiveness (60.83%). Among the specifically named channels, Deepto Krishi was also recognized for its growing popularity, with 57.08% of respondents considering it a valuable source of agricultural information.

However, Krishi Bioscope and Agamir Krishi had limited influence, with only a small proportion of farmers finding them effective. Specifically, Krishi Bioscope was rated as very less effective by 15.42% of respondents, while Agamir Krishi was perceived as less effective by only 2.5% of farmers. Interestingly, there are several other YouTube channels dedicated to agriculture, such as Agro

One, Hridoyer Krishi, Any BD, and Doel Agro, each of which has over 900,000 subscribers and more than 1,000 uploaded videos. Despite their large online presence, none of the farmers surveyed in the study area reported being exposed to these channels, indicating a possible gap in outreach or accessibility among local farmers.

These findings underscore the importance of content relevance, accessibility, and trusted sources in determining the effectiveness of virtual agricultural channels among farmers. Channels with strong community engagement and credible presenters tend to have a higher impact compared to those with generic content, regardless of their overall subscriber count.

3.2. Selected Characteristics of the Respondents

The study revealed that the majority of respondents (46.25%) were middle-aged, followed closely by young individuals (40%), while a smaller proportion (13.75%) were categorized as elderly (**Table 1**). This indicates that a significant majority (86.25%) of the respondents belonged to the economically active age group. Age plays a crucial role in the accessibility and utilization of agricultural information. Younger and middle-aged farmers tend to be more receptive to innovative agricultural practices, whereas older farmers are generally more conservative and less inclined toward adopting new technologies. These findings are consistent with those of Okwu et al. [22], who also observed a higher proportion of young and middle-aged farmers compared to elderly ones.

In terms of educational attainment, the largest segment of farmers (46.25%) had completed secondary education, followed by those with higher secondary (21.25%), primary (17.5%), and above secondary education (15%) (**Table 1**). Notably, all respondents were literate, with no instances of illiteracy reported. Education level is a key determinant in farmers' ability to access, understand, and adopt modern agricultural technologies. These findings align with the study by Amin et al. [15,16], which also identified secondary education as the most common educational level among respondents.

Regarding family size, three-fourths (75%) of the respondents had small-sized families, while the remaining one-fourth (25%) had medium-sized families (**Table 1**). The average family size (3.7) in the study area was found to be lower than the national average of Bangladesh (4.06) as reported by the Bangladesh Bureau of Statistics [23]. This suggests an awareness of population control and planned family formation among the farmers in the region. However, these findings contrast with the results of previous works [15–18,24], where medium-sized families were more prevalent than small-sized ones.

In terms of farming experience, 40% of the farmers were categorized as having a moderate level of experience, while both low and highly experienced farmers accounted for 30% each. Farmers with moderate experience demonstrated a greater willingness to explore new agricultural techniques compared to highly experienced farmers, who tend to rely on their established practices with confidence. This pattern underscores the role of experience in shaping farmers' openness to innovation in agricultural practices.

The study findings indicate that a majority (53.75%) of the farmers owned small-sized farms, followed by those with medium-sized farms (31.25%). The proportion of farmers with marginal and large-sized farms was 6.25% and 8.75%, respectively, with no landless farmers reported (**Table 1**). Given that most respondents owned small to medium-sized farms, they exhibited a positive inclination toward utilizing YouTube as an information source for enhancing their agricultural techniques. These findings align with those of previous studies [15,16,25]. Furthermore, Sandeep et al. established that farm size has a significant and positive influence on farmers' engagement with social media platforms [21].

Income distribution among respondents revealed that 95% of the farmers belonged to the low-income category, with only 5% reporting medium income levels. None of the respondents were classified as high-income earners (**Table 1**). The prevalence of low-income farmers may be attributed to the fact that 60% of them operated marginal to small farms, limiting their capacity to adopt capital-intensive modern agricultural technologies often recommended on platforms such as YouTube. These findings are consistent with those of Okwu et al. [22], who similarly reported that most farmers fall within the low-income range.

Participation in agricultural organizations was generally low among respondents, with 55% exhibiting low participation and 45% reporting no participation at all.

None of the farmers belonged to medium or high participation categories (**Table 1**). The primary reasons cited for this lack of engagement were time constraints and limited interest in organizational activities. The results show some resemblance to those of Ahmed et al. [14], who found that 74% of farmers had low participation, followed by 20% with no participation, and only 6% engaged at a medium level, with no respondents falling into the high participation category. However, the current study's findings contrast with those of previous works [15–18], which reported that most farmers exhibited medium participation, with fewer in the low participation category.

Regarding agricultural training, 51.25% of the respondents had received medium-level training, while 21.25% had undergone high-level training. The proportion of farmers with low training was 11.25%, whereas 16.25% had no agricultural training at all (**Table 1**). The findings correspond with those of previous works [15–18], which similarly reported that most farmers had received low to medium training, with only a small proportion attaining high levels of agricultural training.

Cosmopolitanism among the respondents was predominantly low, with 51.25% categorized as having low cosmopolitanism, while 48.75% exhibited no cosmopolitanism. None of the respondents reported medium to high levels of cosmopolitanism (**Table 1**). These findings contrast with those of previous works [15–18], who observed that most farmers exhibited medium to high cosmopolitanism.

Extension contact among farmers was found to be substantial, with 80% of respondents categorized as having medium extension contact, while 20% had high extension contact (**Table 1**). This suggests that a majority of the farmers either received advisory services from extension personnel or were aware of the agricultural support available through extension agencies. The results are in agreement with the findings of previous works [15–18], which also documented similar trends in farmers' engagement with extension services.

With respect to knowledge of virtual agricultural channels, 51.25% of respondents demonstrated a medium level of knowledge, whereas none exhibited a very high level of understanding. The proportion of farmers with low and high knowledge levels was 8.75% and 40%, respectively (**Table 1**). These findings align with those of previous works [14–18], which also reported that most farmers fell into the low to medium knowledge categories, with only a limited number possessing a high level of agricultural knowledge.

Exposure to virtual agricultural content on YouTube was generally low among the respondents, with 60% reporting low exposure and 40% demonstrating medium exposure. None of the farmers were classified as having high exposure (**Table 1**). These findings are comparable to those of Hossain [24], who reported that 72.5% of farmers had low exposure, while 27.5% had medium exposure, with none falling into the high-exposure category. However, the findings diverge from those researchers who found that most farmers had medium exposure to virtual agricultural content [25,26].

In terms of engagement with other virtual media, 86.25% of the farmers exhibited medium contact, while 8.75% and 5% had low and high levels of contact, respectively (**Table 1**). This suggests that while most farmers engage with virtual agricultural content, the intensity of their engagement remains moderate.

3.2.1. Rank Order of Other Virtual Media Based on Exposure Index

The study revealed that respondent farmers had access to various virtual media platforms, including Google, Facebook, WhatsApp, Instagram, Twitter, TikTok, Snapchat, and Likee (**Figure 2**). Among these, Facebook had the highest level of exposure, with 30.75% of respondents actively using the platform. This was followed by TikTok (23.22%) and WhatsApp (16.24%). Conversely, Snapchat had the lowest level of exposure, with only 0.97% of farmers utilizing it.

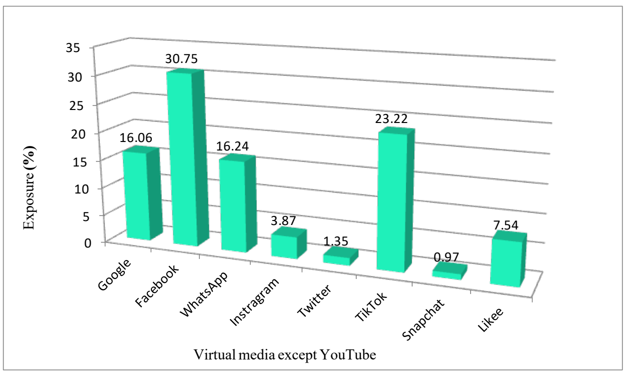

Figure 2. Rank Order of Other Virtual Media Based on Exposure Index.

Other online platforms mentioned by the respondents included Likee (7.54%), Google (16.06%), Instagram (3.87%), and Twitter (1.35%). The relatively higher usage of Facebook, TikTok, and WhatsApp suggests that these platforms are preferred for accessing and sharing agricultural information, likely due to their user-friendly interfaces, multimedia content support, and widespread adoption in rural communities. In contrast, the limited use of platforms like Snapchat and Twitter may indicate their lower relevance or accessibility among farmers in the study area.

3.3. Relationship Between the Selected Characteristics of the Respondent Farmers and Their Perceived Effectiveness to Virtual Agricultural Channels Broadcasted Through YouTube

The data presented in **Table 3** indicate that among the 13 selected characteristics, five variables—education, extension media contact, knowledge of virtual agricultural channels on YouTube, contact with other virtual media, and exposure to virtual agricultural channels—demonstrated a positive and significant relationship with farmers' perceived effectiveness of YouTube-based agricultural content. This suggests that as farmers' education levels, engagement with extension media, familiarity with virtual agricultural platforms, interaction with other digital media, and overall exposure to YouTube's agricultural content increase, their perception of its effectiveness also improves. These findings highlight the crucial role of education and digital literacy in enhancing farmers' ability to extract value from virtual agricultural resources.

Conversely, a significant negative relationship was observed between perceived effectiveness and three factors: age, family size, and farming experience. This indicates that older farmers, those with larger families, and those with extensive farming experience are less likely to perceive YouTube-based agricultural content as effective. The decline in perceived effectiveness among experienced farmers may stem from their reliance on traditional farming methods and a reluctance to adopt digital innovations. Similarly, older farmers may face technological barriers or prefer conventional sources of agricultural information. These findings underscore the importance of targeted digital literacy programs and extension services to enhance the accessibility and perceived utility of virtual agricultural platforms, particularly for older and highly experienced farmers who may be resistant to digital transformation in agriculture.

Table 3. Relationship Between the Selected Characteristics of the respondent farmers and Their Perceived Effectiveness of Virtual Agricultural Channels.

Dependent Variable	Independent Variable	Correlation coefficient
Perceived effectiveness of virtual agricultural channels broadcasted through YouTube	Age	–0.763 **
	Education	0.359**
	Family size	–0.543**
	Farming experience	–0.571**
	Farm size	–0.116
	Annual family income	–0.119
	Organizational participation	0.141
	Agricultural training	0.084
	Cosmopolitanism	0.032
	Extension media contact	0.202 *
	Knowledge on virtual agricultural channels broadcasted through YouTube	0.206*
	Extent of exposure to virtual agricultural channels broadcasted through YouTube	0.543 **
	Contact with other virtual media	0.261 **

** Correlation is Significant at the 0.01 level (2-tailed) * Correlation is Significant at the 0.05 level (2-tailed)

It was established that several factors, including education, farm size, annual income, organizational participation, cosmopolitanism, agricultural knowledge, and training received, had a significant influence on the perceived effectiveness of agricultural information disseminated via radio [15,16]. In contrast, age, family size, and extension media contact did not exhibit any significant relationship with the effectiveness of radio-based information dissemination. Similarly, it was found that education, farm size, annual family income, cosmopolitanism, agricultural knowledge, training received, and extension media contact were positively correlated with the perceived effectiveness of agricultural information broadcasted through television [17,18]. However, age was the only variable that showed a negative correlation with television-based information effectiveness. Notably, family size and organizational participation did not have any significant impact on the perceived effectiveness of agricultural information delivered via television.

These findings highlight the role of socio-economic and informational factors in shaping farmers' perceptions of agricultural communication through different media channels. The positive influence of education, economic capacity, and digital exposure suggests that better-informed and economically stable farmers are more likely to perceive radio and television broadcasts as effective sources of agricultural knowledge. On the other hand, the negative correlation with age suggests that older farmers may be less receptive to information delivered through conventional electronic media, reinforcing the need for tailored communication strategies to ensure effective knowledge dissemination across different demographic groups.

3.4. Problems Faced by the Farmers

The study identified seven key challenges faced by farmers in accessing and utilizing virtual agricultural information (**Table 4**). The most significant challenge reported was the high cost and limited availability of required materials, affecting 77.5% of respondents. This suggests that while farmers may have access to agricultural information, the financial and logistical constraints in acquiring necessary inputs hinder effective implementation.

The least severe issue, though still noteworthy, was the concern that not all information available online is accurate, as reported by 52.5% of respondents. Other challenges included the perceived irrelevance of some information (68.75%), lack of expertise in using the internet (61.25%), insufficient feedback or delayed responses to queries (60%), confusing or ambiguous information (60%), and difficulties in understanding the provided content (55%).

These findings underscore the need for more accessible, context-specific, and user-friendly agricultural content tailored to the needs of farmers. Addressing these challenges through initiatives such as affordable input supply chains, digital literacy programs, interactive advisory platforms, and content verification mechanisms could enhance the effectiveness and reliability of virtual agricultural information services.

The study findings indicate that the most pressing challenge faced by farmers in utilizing YouTube-based agricultural information is the high cost and inaccessibility of required materials. Given the financial constraints of many farmers in the country, investing in modern agricultural inputs remains a significant barrier. Consequently, their engagement with YouTube for agricultural guidance is limited, as they may perceive the recommended practices as impractical due to affordability issues.

The second and third most prevalent challenges were the perceived irrelevance of information and a lack of digital literacy. Many farmers, particularly those with lower levels of formal education, struggle to navigate the internet effectively or identify relevant agricultural content on YouTube. This digital divide reduces their ability to extract meaningful insights, diminishing the platform's perceived usefulness.

Another significant challenge, ranked fourth, was the lack of feedback or direct responses to queries. Content creators often focus on producing new videos and may not have the capacity to address individual comments and questions from viewers. As a result, farmers who seek personalized guidance may feel disengaged, reducing their interest in virtual agricultural channels.

Among all the identified challenges, concerns regarding the accuracy of information ranked lowest in frequency. This suggests that while some farmers may question the reliability of online content, other issues—such as accessibility, relevance, and interactivity—pose greater obstacles to the effective adoption of YouTube-based agricultural knowledge. Addressing these barriers through affordable input availability, digital literacy training, curated content, and interactive advisory mechanisms could enhance the impact of virtual agricultural platforms.

4. Conclusions

The study concludes that a majority (86.25%) of respondents perceived virtual agricultural channels on YouTube as having limited effectiveness. The primary challenges identified were the high cost and inaccessibility of required materials, followed by the perceived irrelevance of information and a lack of digital literacy among farmers. These barriers significantly hindered the practical application of agricultural knowledge obtained from YouTube.

Among the 13 selected respondent characteristics, most exhibited a significant relationship with the perceived effectiveness of virtual agricultural channels. However, farm size, annual family income, organizational participation, agricultural training, and cosmopolitanism did not demonstrate a statistically significant impact. To make YouTube a more effective agricultural knowledge platform in Bangladesh, several targeted actions are essential. Expanding rural internet access and establishing community digital centers can improve connectivity. Collaborations with local agricultural universities can support the development of region-specific content based on local crop calendars and practices. Subsidized digital literacy programs, led by the Department of Agricultural Extension, can help farmers, especially women and older adults, access and apply online information. Content in local dialects, combined with affordable input recommendations and interactive tools like QR codes and helplines, will enhance relevance and adoption. Regular monitoring and farmer feedback should guide continuous improvement.

This study offers valuable insights into the perception of YouTube-based agricultural channels among Bangladeshi farmers. However, methodological limitations (small, non-random sample), limited qualitative depth, and a lack of concrete recommendations reduce its overall impact. Still, it opens an important discussion on the digital divide in agricultural extension and sets the stage for more rigorous future research.

Author Contributions

Conceptualization, M.B.A. and S.P.; methodology, M.B.A.; software, M.M.I. and S.P.; validation, M.B.A., M.M.I. and S.P.; formal analysis, S.P.; investigation, S.P. and M.K.; resources, S.P.; data curation, M.M.I.; writing—original draft preparation, S.P.; writing—review and editing, M.B.A. and M.M.I.; visualization, S.P.; supervision, M.B.A. and M.M.I.; project administration, none; funding acquisition, none. All authors have read and agreed to the published version of the manuscript." Authorship must be limited to those who have contributed substantially to the work reported.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

If anyone is interested about research data can directly contact the corresponding author of this article via email given in the author byline.

Acknowledgments

The author expresses her heartfelt gratitude to all the esteemed professors and staff members of the Agrotechnology Discipline, Khulna University, for their invaluable instruction, kind cooperation, and inspiration, as well as to the farmers and respondents who generously provided data and information during interviews for the successful completion of this study.

Conflicts of Interest

The authors declare no conflict of interest.

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