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Extending Agricultural Advancements to Rural Bengal: Tools and Techniques

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Abstract -***Communication is in an inevitable aspect of every socially existing organism. Human civilization itself has been graced through successful communication among fellow beings. The rapid increase and spread of human population apparently all over the world prompted the need for alternative communication media. The essence of time drove the technological movement to device out faster communication modes. Thus modern day communication mode is an ever-evolving optimization phenomenon of the faster communication needs with resource and cost constraints.***

Key words: C*ommunication, Agriculture extension*

1. INTRODUCTION

India thrives on agriculture with about - % of its GDP (2010-2011) coming from the sector (See table-1).

Table-1: Population Chart

	Year	
	1990	**2005**
Total Population	846418	1103371
Total population in agriculture	492969	566140
% of economically active population in agriculture	64	57

Besides, problems of global warming and climate change, water scarcity and food security etc. are being addressed with relentless efforts and dedication by our agricultural scientists. They have been engaged in extensive research drives towards mitigating these alarming issues in context of our country. They have come with various techniques and plausible solutions to many of these problems. These findings/ technologies need to reach the clientele (majorly the farmers) in appropriate content, at correct target, in right time. This brings back the need for effective communication modes which hugely depends on the adaptive response of the receiving end. Thus a successful communication mode should be able to deliver customized information to cater the needs of the target audience. It is to be heeded that the literacy rate of India has risen with an accelerating pace since independence, when it was merely 12 percent to 75.06 percent in 2011 according to the official records. This has been possible due to some of the efficient policies implemented by the government such as mid-day meal schemes in schools, fundamental right to education under the constitution Act. The ameliorating literacy rate of India opens wide prospects for the print media to proliferate and reach every nook and corner of the population. We confine ourselves to the scenario of rural mass communication in West Bengal where also the role of print media is noteworthy (see table -2).

Table-2: School language and home language

% Children whose :	%
Home language is the same as school language	91.9
Home language is different from school language	8.1
Total	100

Note: In ASER 2011 for every state, reading tools were provided in the main medium of instruction in government schools. Children and their families were also asked about the language they speak at home. For home languages, a list of 122 languages was provided to all survey teams. This list includes 22 Scheduled languages and 100 Non-Scheduled languages. The data in this table is for children for whom we have information for both school language and home language. It is clear from Table-3 that Bengali newspaper circulation accounts to about 60 percent of the total circulation of the state. The rural population generally comprises of the native population of the place and thus prefers to use the local language. They mostly thrive on agricultural and allied occupations. Table-3 gives some of the popular periodicals and dailies in Bangla to popularize agricultural techniques and practices among the rural masses.

Table-3: List of rural periodicals and dailies.

Title	Place of publication
Uttar Banga	Darjeeling
Prantadesh, Krishi Darpan	24-Pargonas (N)
Aleya	Howrah
Palli Bandhu, Sambad Krishi-o-Bigyan,Bhagirathi Express, Ahoran Samachar, Sambad Krishi-o-Bigyan, Gram Shaha	Hoogly
Chashabas, Dhatrigram Samachar, Burdwan Jyoti, Krishi Samabay Patrika	Burdwan
Nadia Theke,Banglar Krishi Shilpa, Homeshikha Sabuj Sona	Nadia
Sabuj Bhabna, Barshik Murshidabad Beekkhan	Murshidabad
Palli Prachar, Jhargram Hityishi, Sangrami Krishijeebee Samachar	Midnapur
Anyadin, Antasalila Falgu	Dinajpur
Krishi Kalyan,Ganasiksha	Birbhum
Bindu Disarga, Bankura Sanskriti	Bankura

Thus a continuous evaluation and betterment of the articles in these periodicals can bring about positive impact on the dissemination of knowledge among the rural population. It is realized that while catering the rural population, the message should be comprehensive and undistorted, attention-grabbing, lucid with minimal use of scientific and technical jargons so that it becomes popular and enjoyable among the rural masses.

Table 4: Population vs literacy rate at various districts of West Bengal.

District	Population growth percentage between 2001 and 2011	Literacy % 2001	Literacy % 2011
24-Pargana (North)	12.86	78.07	84.95
24-Pargana (North)	18.05	69.45	78.57
Bardhwan	12.01	70.18	77.15
Murshidabad	21.07	54.35	67.33
Paschim Medinipur	14.44	70.41	79.04
Purba Medinipur	15.32	80.16	87.66
Hoogli	9.49	75.11	82.55
Nadia	12.24	66.14	75.58
Hawrah	13.31	77.01	83.85
Kolkata	-1.88	80.86	87.14
Jalpaiguri	13.77	62.85	73.79
Bankura	12.64	63.44	70.95
Birbhum	16.15	61.48	70.90
Uttar Dinajpur	22.90	47.89	60.13
Dakshin Dinajpur	11.16	63.59	73.86
Puruliya	15.43	55.57	65.38
Koch Bihar	13.86	66.30	75.49
Darjiling	14.47	71.79	79.92
Maldah	21.50	50.28	62.71
West Bengal	13.93	68.64	77.08

2. Communication

Communication comes from a Latin word '*communis*' which means 'common'. The purpose of communication is to establish commonness among the source and receiver in terms of the information. "Communication has as its central interest those behavioral situations in which a source transmits a message to a receiver(s) with conscious intent to affect the latter's behavior". – Miller (1968) Communication thus refers to the process of sharing information in order to establish a common understanding of the meaning, content and use of message among the parties involved or to modify their behavior. In a scarcely abstract notion, it refers to any action by which one mind can affect other mind/s. Thayar (1967) defined communication as: "Communication is the arrangement of environmental stimulus to produce certain desired behavior on the part of the organism". In context of extension education, definition by Supe:
"In Extension Education it refers to the process of transferring an idea, skill or attitude from one person to another accurately and satisfactorily." The process of communication involves a sequence of steps:

Fig-1: Steps of communication

These steps are discussed briefly:

Ideation: Source generates an idea in the mind. This is the content and the basis of the message. He must have something to say before he really says it. The sender must also keep in mind the party to whom the message is intended to be conveyed, and also the channel to be used.

Encoding: The idea is then 'encoded' in the form of words, pictures, sound, symbols or actions. Encoding is, thus, translation of an already conceived idea by the sender into a message appropriate for transmission. Encoding includes selection of the mode of communication.
Transmission: The encoded idea is transmitted to the receiver using the chosen mode of communication.

Receiving: The receiver receives the encoded message through the senses and perceives it in the mind. This step is dependent on the mode of communication and the receiver.

Decoding and Action: This is the final step of the communication. The receiver then decodes or converts the messages back into meaningful ideas in his / her own mind.

2.1 Effective Communication

The foremost step for effectively communicating with the audience is to assess the need of the audience, i.e. to realize what knowledge exactly would be helpful for the audience for any particular purpose. On successful evaluation of their knowledge needs, comes the second step of prioritizing the communication of the knowledge. The communicator has to decide upon the sequence of the topics to be delivered in order to educate the masses with the knowledge properly. Various factors come into deciding this part. Some of the components pertain to the audience as follows:

1) Perception – to select, organize, and interpret sensory input for giving meaning and order to the world around.

2) Biases – prejudice towards a particular belief or opinion. The information needs to be tailored in a way that adequate rational statements can overcome such prejudices.
3) Stereotypes – A widely held inaccurate image of the characteristics of particular groups of people which can interfere with the encoding and decoding of messages.

Additionally there are components which are expected in the content of the knowledge for effective communication. These are adequately outlined by the AIDA [--] rule:

A Attracting the ATTENTION of the target
I Raising INTEREST in the message or evidence
D Encouraging a DESIRE to act or to know more
A Prompting ACTION and presenting a solution

Keeping in view the above points, the content of the information to be communicated should be framed. Any given subject has a plethora of information say for e.g. Post-harvest technology of jute fibers, but a jute farmer doesn't require knowing the procedure for analyzing the crystallinity of the jute fibers but certainly needs to know the techniques for color, strength, fineness evaluation of the fiber. Thus the extent of information to be administered should depend upon the requirement and the understanding level of the audience. After that the communicator has to decide on the mode of communication. Selection of appropriate tools and methods of communication from a variety of modes such as posters, pamphlets, leaflets, hand-books, video, radio and TV broadcasts etc. in vital. Another important aspect is to assess the correct time and place to disseminate the information, like if one tries to communicate the jute cultivators about pest management of jute crop at the time when the jute cultivators are pre-occupied with the harvesting of the crop. Also the demonstration the field level would be a right option for such information disseminations. The communication process is never complete without the monitoring and evaluation of the preceding communication pathway. This is the final step involves analyzing the issues:

a. Expected outcome from the communication and how well was it met.
b. Creating awareness about the topic delivered.
c. Degree of success in skill development on the topic.
d. Change in attitude and behavior.

2.2 Communication with the rural mass

It refers to a planned dissemination of technologies to the rural masses through extension system and media with a view to bring about improvement in the livelihood of the society. Thus one of the vital components in such communication is relevant information like different soil types, crops, whether, pest complexes, marketing arrangements and entrepreneurship development, etc. The other one is to deliver the information in a form that is comprehensive and palpable for the subjected audience.

There are some suggestive measures which have generated from different forums to strengthen agricultural and rural communication:

- Disseminating the agricultural and allied information in local dailies
- Installation of television and radio sets in the village panchayat centres and scheduling daily broadcasts of experts' advice on pertinent issues.

- Farmers and women "characha mandals" should be organized at each village panchayat centre
- Booklets and leaflets should be published in which there should be description of solution to the problems and the working methods
- In the booklets, there should be details of agricultural equipment i.e., pump-sets, electrometers, tractor, engine, etc. things as well as the methods of their repairing
- Screening short telefilm of the development of rural masses
- The film-producers may involve the plot of rural development in their dramas
- Organization of exhibitions of rural and agricultural development through fairs and festivals in rural areas
- Organization of Farmers/Rural Exhibition regularly

2.3 Importance of communication through print media

Print media is still a vital means of communication in the context of rural India. It is possible to convey precise and timely information to large section of clientele through the print media. With the advancement in printing technologies, useful information pertaining to rural livelihood is been transferred to the masses.
The merits of printed materials over other mass media are:

- Gives the communicator more time to think
- Organize ideas
- Readers can go through the printed material at their own pace
- Readers can also preserve it for their future use
- Print media is cheaper that other modern day means of mass communication

The significant rise in the literacy level (Table-4) in India has brightened the prospects of information transfer through print media. According to Census of India, the literacy level in India has shown a there has been a substantial increase in the literacy rate from 18.33 percent in the year 1951 to 52.21 percent in 1991 and 65.38 per cent in 2001. During this period, the number of literates in all the age groups has increased more than ten-fold from 61 million to 654 million (Anonymous, 2001). The present literacy rate in the country for males is 75.86 while it is 54.16 for females. Thus, there is a steady improvement in literacy rate in the country.

2.4 Communication through Bangla print media

The present literacy level in West Bengal, stands at …@@@percent of which literacy rate in male and female is @@…. Per cent and …@@.. per cent, respectively. This implies that more than three fourth of the states population can make use of the printed material effectively. It poses a great challenge to the extension communicators in designing and operating educational programs aimed at literate population.

3. READABILITY

Readability is a concept which got its existence in the beginning of 20th century when the print media was gaining popularity. Readability formula was then developed by educators and reading specialists. Their primary application was in defining the appropriate reading level for textbooks for elementary and secondary schools.

Later the paradigm caught attention of many social scientists, psychologists, educationists, linguistics and mass communication professionals.
According to UNESCO, a piece of writing a readable if it could be read and understood by the readers for whom it was intended. Hence, readability is invariably understandability or comprehensibility of the message.

3.1 Major readability models (for English texts)

3.1.1 Lively and Pressey Formula (1923)

Bertha A. Lively and Sidney L. Pressey, both school teachers published the first reading ease formula in 1923. They used Thomdikes Teachers Word Book containing 10,000 most common words of English language to calculate the index of difficulty. The median of the index numbers indicated as the ease or difficulty of vocabulary (i.e. higher the median index number, the easier the vocabulary).

Weighted median index number	=	Median of Thorndike numbers, with zero value words counted twice

3.1.2 Vogel and Washburne Formula (1928)

In 1928, Vogel and Washburne studied a sample of 700 most liked children books. The scores of these children on the paragraph meaning section of the Stanford Achievement test allowed them to be placed in grade-level ranking. Linguistic features of the books were measured and correlated with the reading scores of the children who had read and liked the books. Vogel and Washburne considered four variables as relating to readability and arrived at an eqation which is as follows:

Reading test score = $- 0.085X_1 + 0.101X_2 + 0.60X_3 - 0.411X_4 + 17.43$

X_1 = Number of different words
X_2 = Number of prepositions
X_3= Number of words not on the Thorndike's list of 10,000 words and
X_4= Number of simple sentences in 75 sample sentences.

This formula, in addition to its modern appearance, yielded scores that correlated highly with reading test scores.

3.1.3 Gray and Leary Formula (1935)

The reading ease for the adults was addressed for the first time through this work. In the study, adults of limited reading were taken as respondents. The formula utilized the new variable of personal pronoun. They used Dale word list and evolved the following formula:

$X_1 = - 0.01029\ X_2 + 0.009012\ X_5 + 0.02094\ X_6 - 0.03313\ X_7 + 0.001485\ X_8 + 3.774$

Where,
X_1 = Average comprehension scores of a group of adults of limited reading ability
X_2 = Number of different hard words not found in the Dale list of 769 words
X_5 = Number of personal pronouns
X_6 = Average number of words per sentences
X_7 = Percentage of different words and
X_8 = Number of preposition phrases.

3.1.4 Dale-Chall Formula (1948)

A more precise formula was given by Dale and Chall in 1948. Their hypothesis was:

(i) a large word list would predict better that the Dale 769 word list used by large, particularly at the upper levels of difficulty,
(ii) the count of personal references, as used by Flesch, was unnecessary and
(iii) a shorter, more efficient formula could be developed using a word factor and a sentence factor.

$$X_{C50} = 0.1579X_1 + 0.0496X_2 + 3.6365$$

Where,
X_{C50} = Reading grade score of pupil who can answer correctly one-half the McCall-Crabb's test questions on a passage.
X_1 = Percentage of words outside the Dale list of 3000 words and
X_2 = Average sentence length in words.

3.1.5 Flesch Formula

Flesch developed the Reading Ease (RE) formula in 1951 after the refinement of various versions of his readability formula. His formula stated the following points:

i. The fewer the words in sentence, the easier it is to understand the sentence
ii. The fewer the syllables in a word, the easier it is to read and understand
iii. The more the words about the people, more interesting the writing will be
iv. More the sentences, addressed to the reader, the more interesting the writing will be

R.E (Reading Ease) = 206.835 + 0.846 (Number of syllable per 100 words) - 1.015 (Average number of words per sentence)

3.1.6 Lorge Formula (1949)

Lorge computed a series of multiple correlations between Gray-Leary factors and test scores and finally tried to give a simpler formula which can save labor but give nearly accurate results as follows.

$$X_1 = 0.06X_2 + 0.10X_3 + 0.10X_4 + 1.99$$

Where, X_1 = Grade placement, X_2 = Average sentence length in words, X_3 = Number of prepositional phrases per 100 words and X_4 = Number of different hard words per 100 words not in Dale's 769 word list.

3.1.7 Farr-Jenkins-Paterson Formula (1951)

This is a faster version of the Flesch Reading Ease formula developed by Farr et al (1951). They proposed that the syllable count of one syllable words could reduce analysis time and remove knowledge of syllabication on the part of the analyst.

Farr-Jenkins-Paterson Index = 1.5999 (number of one syllable words per 100 words) – 1.015 (average sentence length in words) – 31.517

3.1.8 Fog index (1982)

Fog Index = (Average number of word sentence) + (Number of words of 3 syllables or more) X 0.4

- The ideal score is 7 or 8
- Above 12 is too hard for most people to read

4. READABILITY OF INDIAN LANGUAGES

4.1 Comparison of Indian languages with the European Languages

In the context of readability, the written form of a language is of prime importance as it governs the ease of the decoding the symbol (written script) into sensible information in mind. European scripts are pseudo-phonetic, while most of the Indian languages like Sanskrit, Bangla, Hindi and Marathi, etc. are syllabic scripts with glyphs representing clusters and ligatures.

4.2 Readability of Bangla language for rural mass

Bangla is an Indo-Aryan language that evolved in the South Asia from successor to Sanskrit, Pali, and Prakrit. Historians claim that Bengali became a separate language around 1000 CE. The development of Bangla can be broadly classified into three periods: Old Bengali (1000 - 1400 CE), Middle Bengali (1400 - 1800 CE), and New Bengali (since 1800 CE). However a school of thought believes that Bangla is a rather old language which came into existence even before 500 BC. Bangla is written differently and spoken more differently as it exhibits a strong case of diglossia between the formal, written language and the vernacular, spoken language as many South Asian languages.

Bangla has two standard written forms

1) Shadhubhasha ("language of sages") is the written language with longer verb inflections and a more Sanskrit-derived vocabulary but its use is declining in modern texts.

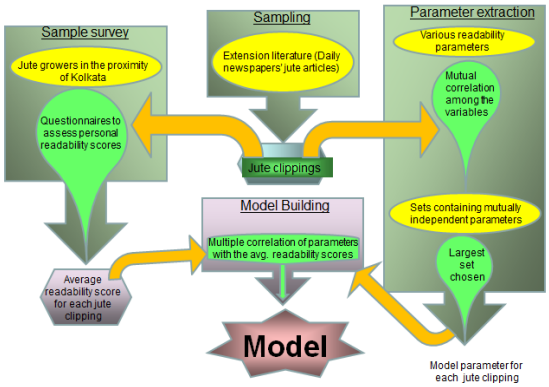
2) *Choltibhasha* ("running language"), a written Bengali style that reflects a more colloquial idiom, is increasingly the standard for written Bengali. It is modeled on the form of the regional dialect spoken in the districts bordering on the lower reaches of the Hooghly River particularly the Shantipur region in Nadia district, West Bengal, and is thus sometimes called the "Nadia standard". Spoken Bengali is modeled on *Choltibhasha*. This form of spoken Bengali stands alongside other spoken dialects, or Ancholik Bengali ("regional Bangla") and Gramin Bengali (""rural Bangla").

Preliminary study on readability of formal Bangla text (Das and Chaudhuri, 2000) showed that Bangla texts have highest correlations with Flesch formula, Fog index and Fog index recalculated (Powers – Summer – Kearl). This idea was extended from formal to other rural and regional dialects (i.e., stressing more on *Choltibhasha*) of written Bangla text.

4.2.1 Model for Bangla language readability in the rural context

Flesch model (section 4.1.5) was chosen to form a basis of the model for readability index of *chaltibhasha* Bangla texts (especially in rural newspaper articles).

Fig-2: Conceptual framework for the study



Three parameters have been chosen for the model:

1. total number of syllables (S)
2. total number of words (W)
3. total number of sentences (T)

Which were in accordance with the Flesch model.
The variables of the Bangle agricultural text were done using Spearmen's correlation:

For the evaluation of the above parameters of the Bangla extension texts, the text was transliterated in English language and a program was written which calculated:

(S) Total number of syllables by counting the number of successively repetitive vowels in the text.

(W) Total number of words by counting the number spaces (including tabs and newlines) in the text.

(T) Total number of sentences by counting the number of full-stops in the texts.

The two variables of Flesch model:

Syllable/word (S/W)

Word/sentence (W/T)

Resultant parameter values:

a = $-8.803 X10^{-13}$; b = 1; c = $1.613 X 10^{-12}$

Based on the data, the model fitted becomes

f(x,y) = $-8.803 X10^{-13}x + y + 1.613 X 10^{-12}$

Where, x = S/W and y = W/T

Text sample No.	No. of words (W)	No. of sentences (T)	No. of syllables (S)	Av. Sentence length (W/T)	No. of syllable per word (S/W)	Av. score
B1	95	10	203	9.5	2.14	2.55
B2	88	5	197	17.6	2.24	3.05
B3	73	7	182	10.43	2.49	1.9
B4	74	6	167	12.16	2.29	2.6

Table- 5: Words, sentences data

Table-6: Collection of reader's response

Key informants	Age	Occupation	Qualification	B1	B2	B3	B4
1	43	Jute/rice	10^{th} pass	2	3	1	3
2	55	Jute/veg.	10^{th} pass	4	4	1	2
3	27	Jute	10^{th} pass	3	2	2	3
4	31	Jute	8^{th} pass	2	3	3	3
5	30	Jute/veg.	H.S.	2	3	2	4
6	48	Jute/veg.	Primary	2	3	1	3
7	57	Jute /veg	10^{th} pass	3	4	1	4
8	65	Jute	6^{th} pass	1	3	2	2
9	28	Jute /rice	8^{th} pass	2	2	1	2
10	45	Jute	10^{th} pass	2	3	2	2
11	45	Jute /rice	5^{th} pass	2	3	3	5
12	50	Jute /veg.	H.S.	3	4	1	3
13	55	Jute /rice	10^{th} pass	4	3	1	2
14	48	Jute	Primary	2	2	1	1
15	25	Jute	8^{th} pass	3	2	3	2
16	36	Jute	Primary	3	3	2	1
17	48	Jute	10^{th} pass	2	3	2	1
18	30	Jute /veg.	H.S.	3	4	2	5
19	33	Jute /veg.	9^{th} pass	3	3	4	2
20	52	Jute	5^{th} pass	3	4	3	2
Average				2.25	3.05	1.90	2.6

4. CONCLUSIONS

Knowledge management is a key issue in the 21st century inevitable for sustainable development. Ample of research and technological advancements have been made till date but perhaps its rate of dissemination could not catch up with it. It thus demands the bolstering of our communication mechanism in order to efficiently disseminate the knowledge among the population so as to get the fruits of out innovations and accomplishments.

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