UTILIZATION PATTERN OF DIVERSE ICT TOOLS BY COASTAL FARMERS DURING THE WARNING STAGES OF CYCLONES

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ABSTRACT

Despitenumerous advanced scientific technologies, we are still at the mercy of some uncontrollable natural calamities. A tropical cyclone is one of the most devastating hydrological disasters among them. Along with violent wind, torrential rain, high wave, destructive storm surges and coastal flooding, the cyclone is responsible for considerable losses to Indian agriculture. After all, farmers are informed, aware, and cope with these difficulties successfully with past experiences, warn through various ICT tools, social media and organizational sources (Pratik and Vinaya, 2022). The study was carried out with a specific objective to determine the utilization pattern of information sources in the cyclone's early warning stages. Purposively the stateof Odisha was selected because it is vulnerable to cyclonic events. 8 villages from 2 coastal districts of the state were considered for the study, and 20 respondents from each village made the sample size 160. The primary data was collected through a well-structured interview schedule and analyzed using appropriate statistical tools. Results divulged that Televisionwas available to 96.25 percent of the respondents, followed by Mobile phones (71.25%), Smartphone (67.50%), Radio (35.63%), Laptop (22.50%), Personal computer (14.38%) and Tablets (5.53%). TV news was the major social media with mean score (3.55) ranked first, followed by SMS (3.50) and Whatsapp (3.26) which the majority of the farmers regularly retrieve information.In contrast,Blog, with a mean score (2.04) was the least used social media by a small proportion of farmers to gain information before cyclones.With comparision to information access through various social media sources, independent variables such as Education, social participation, annual family income, source of credit were found to be positively significant at 1% level of significance, p<0.01, while mass media exposure and extension contact were at 5% level of significance. In the community, there were 5 primary organizational sources, out of which 51.87% of respondents informed through all of the organization where 19.38% of respondents were from 4 sources, followed by 11.88% from 3 sources, 13.75% from 2 sources and 3.12% from a single source. Early warning and information create a great advantage in dealing with such climatic vagaries.

Keywords : *cyclone, early warning, ICT tools,odisha,social media*

INTRODUCTION

Climate change is a pervasive phenomenon, and its effects are felt across the globe. Climate change leads to depletion and deterioration of natural resources, declining productivity, disturbing the socio-economic scenario, and rural migration, which are the major factors for roadblocks in agriculture (Rao& Ramesh, 2023).Tropical Cyclones are one of the most disastrousnatural calamities that cause massive causalities in India due to geographical setting, climate, topography, and population (Mallick *et al.,* 2023). The catastrophes contribute significantly to substantial losses in Indian agriculture. Though huge damage farmers are adaptive to cyclones' impact, they know, inform, combat and cope with these difficulties successfully with their past experiences, and warn through various ICT tools, social

media and organizational sources.India Meteorological Department (IMD), an apex organization, imparts four early warning stages to state government officials (IMD, 2013; District Administration Yanam, 2023). Early warning stages with their colour codes are explained in Figure 1.The 1ststage of warning is "Pre Cyclone Watch". It is predictedbefore72 hours of the expected commencementofadverse weather conditionsin the north Indian Ocean.The Second warning stage, "Cyclone Alert" is forecasted before 48 hours of the adverse weatherevents over the Ocean. In the second stage,information regarding the cyclone's intensity, direction, location, movement and intensificationisinformed to the coastal community, mass media channelsandfishermen. "Cyclone Warning" is the 3rdwarning stage which is announced at least 24 hours in advance of the formationofatropical cyclone over the Ocean. In this stage, IMD forecaststheexact

landfall location, and at every 3 hours interval, it updates the latest position of the cyclone, time of landfall with their impact and advice to challenge it. "Post Landfall Outlook" the fourth stage of warning, is issued before 12 hours of landfall to inform about intensity of rainfall, strong wind, and storm surge, and to prepare for adverse conditionslikelyto be felt in the coastal areas. Social media represent a modern digital platform encompassing diverse evolving tools designed for communication, interaction, and information sharing among

individuals during early warning stages (Barau & Afrad, 2017).Also, various social organizations continuously warn people in rural areas. The government also takes initiatives to broadcast cyclone warning information through All India Radio, telecast newsonNational Television (Doordarshan) for national and regional hook-upsand evacuate vulnerable people to safe places. This article divulgestheextent of the use of various ICT tools by coastal farmers to cope with tropical cyclones.
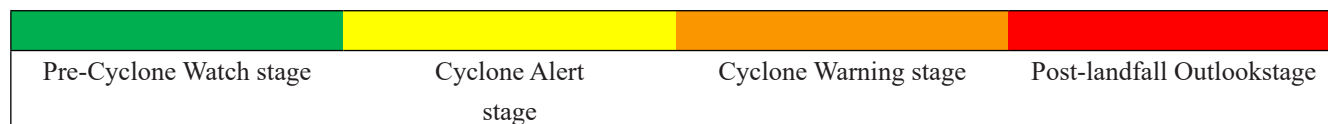
Pre-Cyclone Watch stage	Cyclone Alert stage	Cyclone Warning stage	Post-landfall Outlookstage

Fig. 1 : Various colour codes to determine cyclone warning stage by the national disaster management since post-monsoon season, 2006

OBJECTIVE

To assess utilization pattern of diverse ICT tools by coastal farmers

METHODOLOGY

An ex-post-facto research design was decided to analyze farmers' perceptions regarding ICT tools in climate-vulnerable states. For that, the state of Odisha was selected purposively. As the highest number of cyclones made landfall in recent years,thetwo most devastated districts, namely, Puri and Ganjam, were also chosen purposively. Blocks, villages, and respondents were selected using a multistage sampling method.Further, two blocks from a district and two villages from a block were taken randomly using a computer-based research randomizer technique.Randomly20 respondents wereselectedfrom each village,consisting of 160 respondents asthesample for the study.An enumerated database of affected farmerswas prepared based on their experience in past years.A well-structured interview schedule was designed to collect primary data on the possession and utilization of ICT tools. The possession of ICT tools and receipt of warnings were measured through frequency and percentage.Access to information was categorized into four categories:Regularly, Occasionally, Rarely, and Never. Different social media sources respondents accessed were ranked using the weighted mean score. Through multivariate regression model the degree of association between independent variables and access of various social media sources were determined.Multivariate regression model used by (Bandhavya *et al.,* 2022; Kumari *et al.,* 2022; Shukla *et al.,* 2022; Verma *et al.,* 2023) to examine effect of independent variables on dependent one.

RESULTS AND DISCUSSION

The farmers' possession of various ICT tools was varied; as evident from Figure 2. Total percentage is more

than 100 because of multiple responsesby the respondents with respect to ICT tools. The findings clearly depict that 96.25% of respondents possessed Television, implying that almost all farm families havecolour TV in their houses. In the same line, 71.25% of respondents had a simple mobile phone that could access voice calls and SMS services. (Shukla *et al.,* 2022) reported that more than two-thirds (68.89%) of respondentsfromSitapur district of Uttar Pradeshperceived information from mobile phones. More than two-thirds (67.50%) ofthe respondents had smartphones with multimedia facilities, while nearly one-third (35.63%) possessed Radio. Laptop and Personal computer possession among the respondents were 22.50% and 14.38%, respectively. Last but not least,only 5.62% of respondents had Tablets. The result is in line with (Sarangi& Mahapatra, 2018), who found that 100 % of teachers possessed Radio, 2G mobile, and 3G mobile, and 42.66% had personal computersoftheir own.
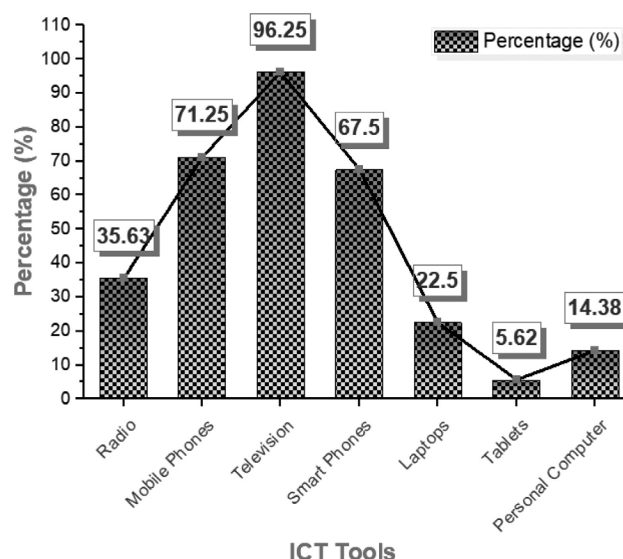

Fig. 2 : Possession of different ICT tools

A critical look at Table 1 representsthat mostfarmers (73.13%) regularly accessed TV News for information during cyclone warning stages. Different News channels telecast hourly updates to aware the viewers. The finding is the same line with (Naik *et al.,* 2022), who found that (99.16%) ofthe farmers getting information for weather forecasting by television daily, followed by CD/DVD players, mobile, tablets, and computers in the Anantapur district of Andhra Pradesh. Similarly, (66.25%) respondents used SMS followed byWhatsapp(57.50%), Youtube(52.50%), and Newspaper (42.50%)regularly for cyclone-related information. Only (18.75%)of farmers regularly listened to Radio,and the least (6.25%) accessed cyclone-related Blogs in the study locale. The use of radio has decreased in comparison to mobile phones and television. This was because listening to radio is more common among elderly family members in rural households. (Anand *et al.,* 2022). Currently, WhatsApp is being dominated in the information and communication sector. WhatsApp is a social networking platform that connectsprogressive and small farmers to provide information(Nain *et al.,* 2019). Result from various studies such as Syiem *et al.* (2015); Kumar *et al.* (2017);Roy *et al.*(2018),and Jat *et al.* (2021) depicted that mobile phone was vigorously used over radio for getting varieties of information.

From the Table 1, it was confined that (27.50%) of farmers listened to radio occasionally, followed by Youtube (26.25%), SMS (21.25%) and so on.(34.38%) respondents rarely accessed Newspapers, followed by Twitter (33.13%), Blog (32.50%), Facebook (31.25%) etc. Miserably it was found that the majority of the respondents (46.25%) never used Blog, followed by Twitter (40.63%), Website (38.75%), Facebook (35.00%), and Radio (23.75%) and so on for retaining information during cyclone warning stages.

Table 1 : Access to information through various social media sources   (n=160)

Sr. No.	Mass media	Regularly f (%)	Sometimes f (%)	Rarely f (%)	Never f (%)	Total score	Weighted mean	Rank
1	**TV News**	117 (73.13)	22 (13.75)	13 (8.13)	08 (5.00)	568	3.55	**I**
2	**SMS**	106 (66.25)	34 (21.25)	14 (8.75)	06 (3.75)	560	3.50	**II**
3	**Whatsapp**	92 (57.50)	23 (14.38)	40 (25.00)	05 (3.13)	522	3.26	**III**
4	**YouTube**	84 (52.50)	42 (26.25)	13 (8.13)	21 (13.13)	509	3.18	**IV**
5	**Newspapers**	68 (42.50)	28 (17.50)	55 (34.38)	09 (5.63)	475	2.97	**V**
6	**Radio**	30 (18.75)	44 (27.50)	48 (30.00)	38 (23.75)	386	2.41	**VI**
7	**Facebook**	26 (16.25)	28 (17.50)	50 (31.25)	56 (35.00)	344	2.15	**VII**
8	**Website**	18 (11.25)	33 (20.63)	47 (29.38)	62 (38.75)	327	2.04	**VIII**
9	**Twitter**	12 (7.50)	30 (18.75)	53 (33.13)	65 (40.63)	309	1.93	**IX**
10	**Blog**	10 (6.25)	24 (15.00)	52 (32.50)	74 (46.25)	290	1.81	**X**

Comparison of various social media platforms through weighted mean

It is visualized from Figure 2 that among various social media sources, TV News ranked first with a weighted mean score of 3.55 preferred the most for information during different stages of cyclones. SMS service, with a mean value of 3.5 ranked second for accessing information because with basic mobile phones, short written text can be disseminated with descriptions of weather conditions and other agricultural information to the vulnerable farmers (Aker, 2011; Tankodara et al., 2022; Bhuva et al., 2021; Sipai et al., 2020 and Jyothi et al., 2020).
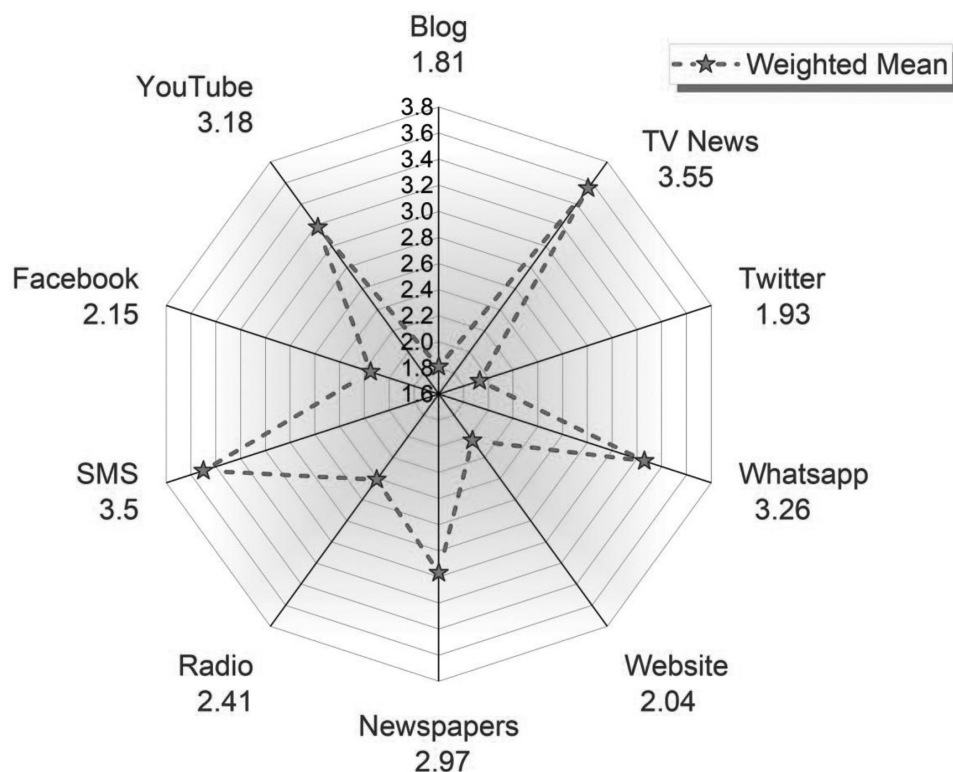
Fig. 3 Weighted mean score of various social media platforms

Whatsapp (3.26) ranked third as respondents mostly preferred it for gaining information. Also, mobile applications like AccuWeather &Rainsat provide a daily forecast along with forecast for 48 hours or the entire week to certain network users(Caine *et al.* 2015). In the same way,YouTube, with a score (3.18) got fourth rank followed by Newspapers (2.97), Radio(2.41), Facebook (2.15) and so on. With a mean value of 1.81, Blog was ranked last (10th) as very few farmers preferred to retain information.

Table 2 : Multivariate regression analysis of independent variables with access to information through various social media sources   (n=160)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	99% CI	
	B	Std. Error	Beta			LB	UB
(Constant)	64.399	3.522		18.283	.000	55.209	73.589
Age	.045	.096	.046	.466	.642	-.205	.294
Family size	-.466	w.310	-.077	-1.503	.135	-1.274	.343
Education	2.238	.432	.301	5.180	.000***	1.111	3.365
Experience in farming	-.087	.103	-.085	-.840	.402	-.355	.182
Social participation	2.387	.530	.249	4.503	.000***	1.004	3.769
Annual family income	5.379E-5	.000	.257	4.638	.000***	.000	.000
Source of credit	1.979	.692	.144	2.861	.005***	.175	3.783
Mass media exposure	.250	.115	.154	2.167	.032**	-.051	.551
Extension contact	.355	.143	.174	2.491	.014**	-.017	.728
*** Indicates significance at 1 % level, in a two tail test, ** Indicates significance at 5 % level							
CI- Confidence Interval, LB- Lower Bound, UB-Upper Bound; R Square= 0.661, Adjusted R Square= 0.641							

The above model is significant at 1% level of significance with F value (35.523) in ANOVA table. The regression analysis fitted to the data with R^2 value 0.661 to analyse the access to information through various social media sources unraveled interesting findings (Table 2). Education was statistically significant at p<0.01, with 't' statistics value 5.180.Therefore, the probability of access to information waslikely to increase by a factor of 0.301(β-value) with aunit increase in education, because educated respondents were aware about various social media sources. Social participation is also follows same trend and found to be significant at p<0.01, with 't' stat value 4.503. The probability of access to information through various social media sourceswaslikely to increase by a factor of 0.249 (β-value) with aunit increase insocial participation. Therefore it can be concluded that social active respondents having more information sources. In the same line annual family income is significant at 1% levelwith 't' stat value 4.638. The probability of access to information through various social media sourceswaslikely to increase by a factor of 0.257 (β-value) with increase inaunit. Mass media exposure and extension contact were in 5% level of significance, with p value (0.032), (0.014) respectively. 't' stat value for mass media exposure is 2.167, while for extension contact 2.491. Both are positively significant, it means increase in a unit value the probability of access to information through various social media sourceswaslikely to increase by a factor of 0.154 and 0.174 (β-value)respectively.

Table 3 : Receipt of information through organizational sources

Sources	Category	Frequency (f)	Per cent
Govt. Offices, Private Agencies, Multipurpose Cyclone Shelters, Loudspeakers, Neighbors	One source	05	03.12
	Two sources	22	13.75
	Three sources	19	11.88
	Four sources	31	19.38
	Five sources	83	51.87
*Multiple response given by respondents for the organizational sources			

In the study locale, there were five organizational sources from which respondents got information and warning before any natural calamities. Organizations such as Govt. Offices, Private Agencies, Multipurpose Cyclone shelters, Loudspeakers, and Neighbors are major sources of information in village areas. It is evident from the result presented in Table 3 that more than half (51.87%) of respondents received warnings from all the sources available. 19.38% of

respondents were informed through 4 sources,11.88% from 3 sources, 13.75% from 2 sources and 3.12% of respondents only got information from a single source.

CONCLUSION

Natural calamities like cyclones are inevitable,soitbecomes essential to embracethem. Coastal farmers often find themselves vulnerable to these disasters. Though farmers have past experience and knowledge, modern technologies enhance their preparedness for cyclones and develop adaptability to cope with such unpredictable events. An effort was made to identify the usability of various ICT tools and organizational sources by the coastal farm families to withstand the effect of cyclones. It was found that most respondents were aware of Various ICT tools and social media platforms. Almost all respondents preferred television for getting information in the study locale. The usability of radio was decreasing due to less demand for other advanced ICT tools. Half of the respondents in the study locale retrieved warning information from various sources before the cyclone. Poor farmers residing in the coastal areas who were unaware should be informed through various government and private organizations. ICT tools to disseminate warning information can be widely popularised in other vulnerable areas and states. Future researchers may study more intensely about the behavior of the farmers towards ICT tools used as information sources.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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