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Centurion University

Shaping Lives...
Empowering Communities...

centurion university of technology and management

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About the Journal

Centurion Journal of Multi-disciplinary Research

Centurion Journal of Multi-disciplinary Research is a refereed journal, which serves as a platform for exploring the current issues, challenges and linkages in the broad areas of development, technology, engineering and management. There is a special focus on skill development and education, its recognition and promotion in the country, especially with the 'Make in India' initiative by the government of India. The objective of the journal is to facilitate bringing together research based contributions in science, technology, management and skills that has direct implication for the development of under-privileged communities and empowering them. The journal links theory and practice in the above areas so as to have policy and programme implications, particularly in under-developed contexts. In addition to articles from individuals or collectives, the journal publishes book reviews.

Aims and Scope of CJMR

CJMR is a multi-disciplinary, refereed journal serving as a forum for exploring theoretical and empirical understanding in the broad areas of development, management, science and technology. Perspective building in the area of skill development and education is another area which the journal would like to promote.

Centurion Journal of Multi-disciplinary Research aims at:

- Providing a platform for debate and dissemination of research findings, conceptual developments and new research areas and techniques that promise to change analyses and perspectives on science and technology, development, management, skill in developing societies;
- Disseminating and promoting research, good practice and innovation in all aspects of science, technology, management and skill development to its main audiences, including educators, researchers, graduate students, policy makers, and practitioners; and
- Encouraging multi-disciplinary cooperation and understanding, and enhancing quality research.

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Centurion Journal of Multidisciplinary Research

Editorial

This issue of Centurion Journal of Multidisciplinary Research covered different areas such as, Social sciences, Biological Sciences and Chemistry.

Social Sciences:

India has entered into the digital era. Use of internet and Digital commerce has grown significantly in last two decades. Still India is lagging behind countries like China, Indonesia, Korea, Malaysia, Philippines, and Thailand due to the lack of state-of-the-art infrastructure and internet reach. The telecommunication industry needs to be strengthened to improve India's place in the digital commerce map. Not only in digital commerce, internet and modern digital technologies have played a significant role in the storylines of different movies and created an impact, especially amongst the young audiences. The use of video-sharing websites like YouTube has surged as a consequence of using modern technologies in cinema. Other than internet, private FM stations in India have also become an integral part of the social life. They play a significant role in social awareness campaigns. Their strategies include creativity, innovation, and interactivity with lots of experimentations. The social awareness campaigns through FM can reach millions and change the mindset of people.

Newspapers and media magazines can play a critical role in the life of people. In 1928 Shashi Bhusan Rath converted Asha into a daily newspaper. It was then known as 'Dainik (Daily)Asha'. It was the first Oriya daily newspaper of Orissa.While the mortality rate of newspapers is high, Dainik Asha completed its 100 years. The Dainik Asha has contributed to propagating nationalistic ideas and strengthening the freedom movement in Odisha. Its role in the freedom struggle, efforts for unification of Odia-speaking regions and the development of journalism in the State is still remembered.

Biological Sciences:

There are more than 500,000 plant species. There is no plant which does not have any use. However, around 10% of the plants are commonly used for medicinal purposes. Humans are using plants for medicinal purpose since long time. It is important to document the applications of the plants. Indigenous use of different parts of ethnomedicinal plants are important for sustainability (SDG 3: Good health and wellbeing).

Millets are rain fed crops, and do not require standing water in the fields. Millets do not need lot of fertilizers or pesticides to have a good harvest. Thus, millet is an environment-friendly crop. It also has lot of nutrients. Its grains contain more protein, vitamins, minerals, fiber content and energy as compared to those of other cereals. To address the issue of zero hunger (SDG 1) and health and well-being (SDG3) recently lot of emphasis have been given to production of millets. As millets require minimum amount of fertilizer and pesticides, they contribute significantly on life on earth (SDG 15). Integrated nutrient management is important for the sustainable production of finger millet.

Chemistry:

The measurement of acoustic parameters is useful to predict the solute-solvent, ion-solvent and solvent-solvent interaction in aqueous solutions containing electrolytes. Different acoustic parameters can be determined using density, viscosity and ultrasonic velocity data. Acoustics can help to characterize ionic solutions having very high ionic strength.

This issue will definitely enhance our knowledge base and give the readers the flavor of multidisciplinary research.

Dipankar Bhattacharyay

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Articles

Network competence and the broadband difference: A state of the art for a seamless online shopping experience in Asian emerging markets

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Abstract

There has been a phenomenal growth in digital commerce in the past two decades in the Indian market. It is the availability of a good telecommunication network with high-speed broadband that made it possible to enable consumers for having a seamless online shopping experience. But, from an empirical analysis using paired t-Test, it has been discovered that the state-of-the-art infrastructure and internet reach in India is significantly poor than in countries like China, Indonesia, Korea, Malaysia, Philippines, and Thailand. Hence, it can be concluded here that to become a strong backbone of digital commerce in India the telecommunication industry needs to strengthen a lot more than what has been achieved in the past several years.

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Keywords: Digital Marketing, E-Commerce, t-Test, Telecommunication, Information Technology

1. Introduction

Unquestionably, the telecommunication industry in India has grown rapidly, especially in the past three decades. In terms of market share, India's telecommunication sector stands in the second position worldwide. Additionally, the mobile revolution has completely changed the lives of every Indian and as per the latest data released by The World Economic Forum, it has almost the same degree of effects on the entire global economy. The mobile industry is contributing around 8-10% of Indian Gross Domestic Product (GDP) to the tune of approximately several hundreds of billions of US$ according to The Economic Times. As per the data provided by Groupe Speciale Mobile Association (GSMA), the telecommunication sector has created around 4 million additional jobs by the last financial year. The evolution of the telecommunication sector enabled information and communication through the internet revolution to integrate into the everyday lives of the Indian population. As a result, the e-commerce industry in India witnessed an upward growth trajectory. Based on the data available from India Brand Equity Foundation, India is expected to overtake the United States by becoming the second largest E-commerce market globally in or before 2034. The E-commerce industry in India is growing at a phenomenal rate of approximately 20% CAGR. Forrester Research says that the E-commerce sales rose between 7-8% during the last financial year. It is expected to become a US$350 billion market by 2030 and the improvement in network competence of the telecommunication sector and broadband speed are the most vital factors behind this growth. The present research paper is an attempt to use an interdisciplinary approach and deepen the understanding of students, academicians, and industry experts on how network competence and the broadband difference have happened during past years in the Indian context in comparison with selected Asian emerging markets.

2. The Evolution of the Telecommunication Industry in India

The Indian telecommunication industry is surprisingly over 170 years old and unbelievably the introduction of telecommunication networks in India dates back to 1851. The first landline in India was made operational by the then Government at a place near Kolkata and formally the telecommunication services were introduced in 1881. It was subsequently merged with the Indian postal department in 1883 and started being called the department of Post and Telegraph (P&T). After 1947, when India got independence, a body named PTT comprising Posts, Telegraph, and Telephone was formed through nationalization by the Government of India under the Ministry of Communications. The telecommunication sector in India was under the full ownership of the Government of India till 1984 after which the private companies were allowed to produce telecommunication devices only. The Department of Post and Telegraph got separated in the year 1985 and the Department of Telecommunications which is popularly known as DoT today was formed. The density of telecommunication in India that includes wireless plus wire lines has improved from a mere level of 3.06% in 2001 to a level of more than 90% by 2020. The subscriber base of GSM and CDMA mobility services combined has grown from a low level of under 2 million in 2000 to a level of more than 1200 million by 2020. This substantial increment in the number of consumers and consequently revenues in the telecommunication sector of India has unquestionably contributed significantly to not only the GDP of the country but also helped create a big chunk of employability.

All these changes happened only after the implementation of the New Economic Policy of 1991 after which the telecommunication sector was declared open for the private players. Then when the Government

of India announced National Telecom Policy in 1994 it stimulated the growth in this industry as it facilitated the provision of competitive services at affordable rates, export promotions, an inflow of Foreign Direct Investments (FDI), etc. But the need was always felt for a dedicated regulatory body for this sector during these years and it was satiated with the establishment of the Telecom Regulatory Authority of India (TRAI) in 1997. In a nutshell, the Indian telecommunication industry has transformed itself from a government-owned monopoly market to a competitive market with multiple operators with the TRAI owned by the Government of India as the regulator that has been issuing various measures from time to time for its growth. The growth of the Indian telecommunication industry has even been fueled by the launch of technologies like 4G and the emergence of cloud technologies. Apart from it, the dramatic decline in telephone tariffs over the past several years has also made telecommunication services affordable for the masses. There has been an introduction of a large number of mobile value-added services (MVAS) and new technology-enabled devices to support these services. Further, the mobile number portability (MNP) launched in 2011 that allowed subscribers to retain their existing telephone number while changing the service provided benefitted a lot to promote healthy competition. In addition to it, the 'Telecomm Unsolicited Commercial Communication Regulations' notified by TRAI protected the rights of subscribers by giving options to exercise preferences, easy registration of numbers for telemarketers and separate number allocation for them starting with 140, sharing of a database, provision for blacklisting, call filtering, SMS services by service providers and efficient complaint redressal system.All of these efforts have enabled create the state of the art infrastructure for an environment of seamless digital commerce.And it is not that it has happened in India only, instead, it has happened all over the globe, especially it has happened very rapidly in the emerging markets. Due to the transfer of technology according

to local geographical needs, there has been a sustainable growth in mobile commerce (Muller1990). The business scenario has improved significantly by creating new demands for business due to changes in telecom and computers as per the studies done separately by researchers including (King1990, Uehara 1990, Glynn 1992, Mutoh 1994). In the present study, we are going to analyze this paradigm shift in telecommunication penetration in the Indian context in comparison to selected emerging markets of the Asian region.

3. Research Design

To provide analytical support to the view that a network competence and broadband difference created state of art backbone for digital commerce in the country, empirical analyses are unquestionably the most suitable. This part of the article is meant for describing the empirical evidence and its interpretations. Though the broad objective of this analysis is to articulate an understanding of the development of telecommunication and information technology in India compared to selected Asian emerging markets, the specific objectives of this exercise are as per the following:

1. To identify the countries for making a comparative study with India.
2. To identify the parameters of development in telecommunication and information technology.
3. To make a comparative analysis of the Indian market with selected emerging markets.

Now, the first task as per the objectives of this study is to identify the countries for making a comparative study with India. For this purpose, the Morgan Stanley Capital International (MSCI) country classification has been used. For the worldwide investment community, MSCI provides

critical decision support services and tools that have over 50 years of expertise in data, technology, and research. The basic job of MSCI is to enable its clients with understanding key drivers of returns and risk so that they can make effective portfolios. All of the solutions that MSCI makes are industry-leading and research enhanced in its core so that the clients are enabled to gain insights across the investment process. As per the latest reports released by MSCI, the following table best describes country classification based on three categories: developed markets, emerging markets, and frontier and standalone markets.

Table 3.1: MSCI Country Classification 2021

Developed Markets			**Emerging Markets**		
Americas	Europe & Middle East	Pacific	Americas	Europe & Middle East, Africa	Pacific
Canada	Austria	Australia	Brazil	Czech Republic	China
USA	Belgium	Hong Kong	Chile	Egypt	India
	Denmark	Japan	Colombia	Greece	Indonesia
	Finland	New Zealand	Mexico	Hungary	Korea
	France	Singapore	Peru	Kuwait	Malaysia
	Germany			Poland	Philippines
	Ireland			Qatar	Taiwan
	Israel			Saudi Arabia	Thailand
	Italy			South Africa	
	Netherlands			Turkey	
	Norway			UAE	
	Portugal				
	Spain				
	Sweden				
	Switzerland				
	UK				

Data Source: www.msci.com,

In the present study, the countries that are marked as emerging markets and are in the pacific region have been selected for making the comparative analysis because of similar economic characteristics. Now, once the countries are decided for making a comparative analysis as per the objectives of the study next task is to identify the parameters of comparison. For this purpose, the World Bank indicators database has been accessed and the following parameters have been detected.

Table 3.2: Description about Selected Indicators

Sl. No.	Name of the Variable	Description
1	Fixed telephone subscriptions (per 100 people)	Fixed telephone subscriptions refer to the sum of the active number of analog fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents, and fixed public payphones.
2	Secure Internet servers (per 1 million people)	The number of distinct, publicly-trusted TLS/SSL certificates found in the Netcraft Secure Server Survey.
3	Individuals using the Internet (% of the population)	Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc.
Data Source: World Bank Indicators Database		

Once the countries are decided and the parameters for making the comparative analysis are identified, as per the objectives of the study, the next task is to make the actual analysis. For this purpose, the difference between the means method is the most ideal one. One of the most robust statistical techniques in this context i.e. paired t-test for difference of means has been employed in this study to determine the significance of the difference between Indian industry and industry of the country in comparison. It has been found that since the inherent job in this study is to test a predefined hypothesis, an appropriate method of hypothesis testing would be ideal to implement. For this

purpose, t-Test: Paired Two Sample for Means has been chosen. One can use a paired test when there is a natural pairing of observations in the samples, such as when a sample group is tested twice — once in the base country and then in the country in comparison. This analysis tool and its formula perform a paired two-sample Student's t-Test to determine whether observations that are taken before a treatment and observations taken after a treatment are likely to have come from distributions with equal population means. This t-test form does not assume that the variances of both populations are equal. In this case, the treatment is an implementation of economic reforms and we are required to study the mean value of the chosen indicators in the base country and the country in comparison. The t-Test: Paired Two Sample for Means works as follows: For example, India has data for the total subscriber base of telephone lines from 1960 to 2020, then we can compare this data with any country in which data for this parameter is available in the same period. The t-Test: Paired Two Sample for Means requires an equal number of observations in both samples and that is why if we take 1960 to 2020 for India i.e. 61 observations; then we are required to go for getting the same period of data in the chosen parameter for the country in comparison. The mean values of selected variables in India and the country in comparison then have to be compared by calculating the t-value and then comparing it with the critical value of t at the given degrees of freedom and chosen significance level (0.05 in this case). The null and alternative hypotheses taken in the present analysis can be stated as follows:

Null Hypothesis - H0: There are no significant differences in changes in values of the chosen parameter for India and the country in comparison during the period in consideration.

Alternative Hypothesis - H1: There are no significant differences in changes in values of the chosen parameter for India and the country in comparison during the period in consideration.

4. Analysis and Findings

Let us analyze the results of the first parameter.

Table 4.1: Fixed Telephone Subscriptions (per 100 people)

Years	India	China	Indonesia	Korea	Malaysia	Philippines	Thailan
1960	0.07	NA	0.09	NA	0.59	NA	0.14
1961	0.07	NA	0.09	NA	0.59	NA	0.14
1962	0.07	NA	0.09	NA	0.59	NA	0.14
1963	0.07	NA	0.09	NA	0.59	NA	0.14
1964	0.07	NA	0.09	NA	0.59	NA	0.14
1965	0.12	NA	0.12	0.76	0.83	0.27	0.17
1966	0.12	NA	0.12	0.76	0.83	0.27	0.17
1967	0.12	NA	0.12	0.76	0.83	0.27	0.17
1968	0.12	NA	0.12	0.76	0.83	0.27	0.17
1969	0.12	NA	0.12	0.76	0.83	0.27	0.17
1970	0.18	NA	0.12	1.49	0.96	0.49	0.26
1971	0.18	NA	0.12	1.49	0.96	0.49	0.26
1972	0.18	NA	0.12	1.49	0.96	0.49	0.26
1973	0.18	NA	0.12	1.49	0.96	0.49	0.26
1974	0.18	NA	0.12	1.49	0.96	0.49	0.26
1975	0.24	0.18	0.16	2.99	1.39	0.69	0.52
1976	0.25	0.19	0.16	3.54	1.56	0.72	0.55
1977	0.26	0.19	0.18	4.21	1.78	0.83	0.59
1978	0.28	0.20	0.20	5.08	2.07	0.83	0.65
1979	0.30	0.21	0.22	6.11	2.42	0.84	0.72
1980	0.31	0.21	0.25	7.11	2.87	0.89	0.77
1981	0.32	0.22	0.28	8.45	3.46	0.91	0.79
1982	0.34	0.23	0.31	10.41	4.05	0.96	0.88
1983	0.36	0.24	0.32	12.10	4.72	0.95	0.92
1984	0.38	0.26	0.33	13.88	5.59	0.96	1.02
1985	0.40	0.29	0.37	15.97	6.15	0.94	1.20
1986	0.43	0.32	0.40	18.23	6.50	0.96	1.51
1987	0.46	0.35	0.44	20.69	6.85	0.95	1.67
1988	0.50	0.42	0.47	24.49	7.33	0.97	1.83
1989	0.54	0.49	0.48	27.75	7.92	0.98	2.08
1990	0.58	0.58	0.59	30.93	8.80	0.99	2.34

Years	India	China	Indonesia	Korea	Malaysia	Philippines	Thailan
1991	0.65	0.71	0.70	33.60	9.81	1.02	2.71
1992	0.75	0.95	0.88	35.56	11.01	1.02	3.10
1993	0.87	1.42	0.98	37.64	12.37	1.29	3.80
1994	1.04	2.22	1.27	39.37	14.33	1.63	4.67
1995	1.24	3.28	1.67	41.07	16.27	2.02	5.86
1996	1.48	4.39	2.09	42.84	17.94	2.50	6.92
1997	1.78	5.57	2.46	44.21	19.58	2.85	7.93
1998	2.12	6.87	2.71	43.09	19.82	3.34	8.18
1999	2.55	8.48	2.91	54.49	19.55	3.79	8.37
2000	3.07	11.22	3.15	54.59	19.95	3.93	8.88
2001	3.58	13.88	3.37	54.03	19.86	4.16	9.52
2002	3.79	16.39	3.57	53.62	19.29	4.07	10.23
2003	3.78	19.98	3.66	52.07	18.51	4.02	10.27
2004	4.09	23.56	4.65	48.60	17.65	4.06	10.48
2005	4.37	26.33	5.97	49.09	16.99	3.90	10.75
2006	3.50	27.48	6.46	45.89	16.57	4.13	10.75
2007	3.32	27.16	8.40	46.92	16.28	4.41	10.61
2008	3.16	25.15	12.90	49.52	16.57	4.48	11.11
2009	3.04	23.05	14.59	54.50	16.31	4.44	10.78
2010	2.84	21.51	16.93	57.61	16.34	3.55	10.17
2011	2.63	20.71	15.75	59.19	15.79	3.72	9.87
2012	2.44	20.09	15.29	60.13	15.79	3.59	9.40
2013	2.27	19.18	12.20	60.25	15.39	3.18	8.89
2014	2.08	17.82	10.28	58.25	14.77	3.08	8.31
2015	1.95	16.42	4.02	56.83	14.83	3.16	7.73
2016	1.84	14.61	4.11	54.99	15.76	3.65	6.82
2017	1.74	13.64	4.18	52.54	21.16	3.96	14.38
2018	1.62	13.45	3.10	50.63	23.56	3.87	8.73
2019	1.54	13.32	3.57	48.27	23.18	3.94	7.78
2020	1.45	12.64	3.36	46.54	23.07	NA	7.17
Mean=	1.29	9.48	2.98	30.52	9.90	2.09	4.51
t Value=	_	-6.29	-3.59	-10.33	-9.79	-9.23	-7.89
p Value=	_	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*

Data Source: World Bank Indicators Database

'*' = Significant@0.05 Level

Note: Data for Taiwan is not available in World Bank Indicators Database

In the above table, it can be seen that the fixed telephone subscriptions in India have increased over the years but the increment is significantly lower than in countries like China, Indonesia, Korea, Malaysia, Philippines, and Thailand. It indicates that the telecommunication revolution that has happened in India is still not that effective in comparison to these countries under consideration.

Table 4.2: Secure Internet Servers (per 1 million people)

Years	India	China	Indonesia	Korea	Malaysia	Philippines	Thailand
2010	1.67	1.20	1.64	175.32	44.92	5.04	11.21
2011	2.27	1.96	2.43	208.52	57.59	7.05	15.14
2012	4.51	3.77	5.31	268.33	101.42	11.79	30.88
2013	6.15	5.13	7.82	337.11	122.30	12.47	38.87
2014	8.44	9.71	11.78	406.61	151.11	16.11	51.94
2015	11.69	19.56	17.68	557.72	233.85	20.95	69.39
2016	38.30	47.60	306.22	721.00	945.65	40.53	146.48
2017	123.10	207.65	1280.65	1198.94	4917.78	87.85	578.29
2018	187.80	443.51	1282.97	2065.12	5713.14	92.85	953.86
2019	389.20	729.74	1683.85	4543.84	6723.93	111.31	1403.81
2020	479.92	948.57	1877.59	5945.40	7494.44	113.56	1908.07
Mean=	113.91	219.85	588.90	1493.45	2409.65	47.23	473.45
t Value=	_	-2.08	-2.57	-2.56	-2.60	1.68	-2.40
P Value=	_	0.06	0.02*	0.02*	0.02*	0.12	0.03*

Data Source: World Bank Indicators Database
'*' = Significant@0.05 Level
Note: Data for Taiwan is not available in World Bank Indicators Database

In the above table, it can be seen that the secure internet servers in India have increased over the years but the increment is significantly lower than in Indonesia, Korea, Malaysia, and Thailand. The average growth however is not significantly different from China and the Philippines.

Table 4.3: Individuals Using the Internet (% of population)

Years	India	China	Indonesia	Korea	Malaysia	Philippines	Thailand
1990	0.00	0.00	0.00	0.02	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.05	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.10	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.25	0.03	0.00	0.01
1994	0.00	0.00	0.00	0.31	0.10	0.01	0.04
1995	0.03	0.00	0.03	0.82	0.15	0.03	0.07
1996	0.05	0.01	0.06	1.62	0.85	0.06	0.12
1997	0.07	0.03	0.19	3.60	2.31	0.14	0.36
1998	0.14	0.17	0.26	6.78	6.75	1.10	1.09
1999	0.27	0.71	0.44	23.55	12.31	1.43	2.43
2000	0.53	1.78	0.93	44.70	21.38	1.98	3.69
2001	0.66	2.64	2.02	56.60	26.70	2.52	5.56
2002	1.54	4.60	2.13	59.40	32.34	4.33	7.53
2003	1.69	6.20	2.39	65.50	34.97	4.86	9.30
2004	1.98	7.30	2.60	72.70	42.25	5.24	10.68
2005	2.39	8.52	3.60	73.50	48.63	5.40	15.03
2006	2.81	10.52	4.76	78.10	51.64	5.74	17.16
2007	3.95	16.00	5.79	78.80	55.70	5.97	20.03
2008	4.38	22.60	7.92	81.00	55.80	6.22	18.20
2009	5.12	28.90	6.92	81.60	55.90	9.00	20.10
2010	7.50	34.30	10.92	83.70	56.30	25.00	22.40
2011	10.07	38.30	12.28	83.76	61.00	29.00	23.67
2012	11.10	42.30	14.52	84.07	65.80	36.24	26.46
2013	12.30	45.80	14.94	84.77	57.06	48.10	28.94
2014	13.50	47.90	17.14	87.56	63.67	NA	34.89
2015	14.90	50.30	22.06	89.90	71.06	NA	39.32
2016	16.50	53.20	25.45	92.84	78.79	NA	47.50
2017	18.20	54.30	32.34	95.07	80.14	NA	52.89
2018	20.08	59.20	39.90	96.02	81.20	NA	56.82
2019	41.00	64.57	47.69	96.16	84.19	NA	66.65
2020	NA	70.64	53.73	96.51	89.56	NA	77.84
Mean=	6.36	21.64	10.68	55.46	39.89	8.02	19.64
t Value=	_	-5.03	-3.49	-7.96	-7.46	-2.76	-5.62
p Value=	_	0.00*	0.00*	0.00*	0.00*	0.01*	0.00*

Data Source: World Bank Indicators Database

'*' = Significant@0.05 Level

Note: Data for Taiwan is not available in World Bank Indicators Database

In the above table, it can be seen that the number of individuals using the internet in India has increased over the years but it is significantly lower than the countries like China, Indonesia, Korea, Malaysia, Philippines, and Thailand.

5. Conclusion

As per the empirical evidence traced in the present study, it has been proved that due to the intervention of the Government in the telecommunication sector through different generations of reforms a phenomenal growth in network competence and the broadband difference has been witnessed but still there is a long way the industry needs to go. It is because the performance of the countries in comparison is significantly better in almost all parameters selected. Hence, it can be concluded here that to become a strong backbone of digital commerce in India the telecommunication industry needs to strengthen a lot more than what has been achieved in the past several years.

The present study has a limitation in that it is based on a few indicators only from telecommunication and information technology and the results have been derived from inferential analyses like t-Test only. These limitations are expected to be overcome by future researchers on this topic.

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Effectiveness of Social Awareness Campaigns on Private FM Radio concerning Red FM and My FM of Bhopal City

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Abstract

Private FM stations in India are known for their creativity, innovation, and interactivity with lots of experimentations. The researcher wanted to know how private FM stations deal with social issues. How do they sensitize people on social issues? What are their strategies to promote social awareness campaigns? How do they design and execute those awareness-raising campaigns which could create a buzz among the audience and how effective those campaigns are. This study tries to find out the answer to these questions through a sample survey of 196 listeners as respondents and structured interviews of Programming Heads of Red FM and My FM radio station of Bhopal City of Madhya Pradesh under a descriptive research design. The study concludes that

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the majority of respondents were students and they tune in to FM radio for music only. Listening to any particular show or RJ is not their priority. In fact, because of too many ads and gossip about RJs on private FM channels listeners prefer listening to online music. Though people have choices of listening to online music today still almost half of the respondents (49 percent) listen to radio daily. As compared to Akashvani (also known as AIR) listenership of the Private FM channel is higher. Though a majority of respondents (48 percent) have never participated in any of the awareness campaigns on FM radio half of the respondents said that awareness campaigns on FM channels have changed their mindset to some extent. Fifty-seven percent of respondents accepted that social media is a perfect platform to promote awareness campaigns for FM radio. A social campaign based on waste management an initiative of Red FM called "Kabad se Jugad" had the highest recall value. Red FM won several awards and is appreciated on national and international platforms for this initiative. The study highlights that effective social initiatives not only change the mindset of people but also get recognition from every corner of the world and social media is one of the best tools to popularize something/someone.

Keywords: FM radio, Social awareness campaigns, Listeners, Social media, Corporate social responsibility

Introduction

Media is a plural form of medium that means various means of expressing one another. Radio is one of them. Portability, reach, accessibility, interactivity, cost-effectiveness and close connectivity with listeners are some major characteristics of radio which make it distinct and popular among audiences. Even illiterate people can enjoy listening to the radio. The reach of public radio up to 99.19 percent population shows the popularity of radio as a medium more than television and print media in India. In this competitive era, only those who can survive who update themselves, do experiments and audience analysis gives space to creative independence. The private FM radio industry follows these thumb rules which is why it became popular among listeners.

According to Walter Benjamin relation between radio and its public has always been based on a mutual act of faith (Bonini, 2014). Before the telephone only means of interaction between announcers and listeners was letters.The advent of new media technologies has reversed the communication flow and re-established a balance in favor of the public. Contemporary radio has become a participative tool. Seeing is believing, with the advent of social media when RJs as active users and producers of media content share pictures of on-ground activities related to social awareness campaigns on their walls and pages, they get huge responses from their listeners. Social media is playing a major role in the mouth publicity of social awareness programs through sharing, likes, and comments. Popular events become trending stories among social media users. Digital media especially social media has added a new dimension to radio and made it visible and more interactive.

Journey of Radio

After print media, electronic media came into existence with the advent of radio in the 20th century followed by television. According to Kumar (2010), early radios acted as devices for naval ships to communicate with other ships and with land stations; the focus was on person-to-person communication. Flichy (Kumar, 2010, p. 251) stated that:

'It took ten years for wireless telegraphy, whose sole use was the point-to-point telecommunication, from ship to ship and ship to shore, to become a broadcasting system that was one of the main media for mass culture.'

If success has many fathers then radio is one of the world's greatest successes. Credit for the advent of the radio should be given to; Heinrich Hertz, Nikola Tesla, Ernst Alexanderson, Reginald Fessenden, Edwin Armstrong, Gugliemo Marconi, and Lee DeForest for fathering radio into groups (A short history of radio, 2003-04).

The journey of radio is very fascinating and has its root in the telegraph. Radio has been the witness of several ups and downs. The history of

radio invention is full of controversies. Even though Guglielmo Marconi is credited as the inventor of the radio, as he got the very first wireless telegraphy patent in England in 1896 but a year later Nikola Tesla filed a patent for his basic radio in the U.S. Fight for being the true father of radio among Marconi and Tesla lasted for several years and in 1943, the year of Tesla's death, a landmark ruling by the U.S. Supreme Court invalidated the Marconi's patent because the fundamental radio circuit had been anticipated by Tesla (Peterson, 2013). The journey from AM band (amplitude modulation) to FM band (frequency modulation) is also full of conflicts and tragedies. Before the 1920s radio was used to communicate with ships that were out at sea. The real strength and importance of radio became apparent during World War I when the military used it as a tool for sending and receiving messages among armed forces**.** Radio was one of the most popular media in the first half of the 20th century. This medium was not only used as a powerful news source during World War I and II but was also used as a propaganda and agenda-setting tool (Kuyucu, 2014). The Golden Age of radio lasted from the 1930s to the late 1940s. Coincidently that was the time of the great depression in North America. A wide range of programs on the radio like live music, comedy, soap operas, and game shows served people as an escape from those troubled times. At that time radios were kept in larger wooden cases. Their size was big because of vacuum tubes; later those vacuum tubes were replaced by transistors and integrated circuits. Radio was made popular by amateur radio operators who quickly crowded the airwaves broadcasting messages to anyone within the range. Only after the intervention of the government through the regulatory process of licensed amateur radio operators could be stopped. This regulation also gave the president the power to shut down all stations, a power notably exercised in 1917 upon the United States' entry into World War I to keep amateur radio operators from interfering with military use of radio waves for the duration of the war. Although the transmitting ban on amateur stations wasn't lifted until

October 1, 1919, restrictions on private and amateur listening ended on April 15th of that year (White, 1919-25). During World War, I radio became popular among listeners. The increase in the number of listeners in turn justified the establishment of stations, especially for broadcasting entertainment and information programs. This led to the first commercial radio in 1920 called KDKA in Pittsburgh, USA. While radio broadcasting in Britain and Europe was initiated by a public service network and was controlled by the government. In the United States of America, NBC and CBS were established as private commercial stations. After the 1920s radio stations were launched in various parts of the world rapidly and almost everywhere in the world amateur radios were started first.

Radio in India

Radio broadcasting in India can be divided into three categories- Public radio, Private radio, and Community radio. Like other countries of the world, radio broadcasts started in India by amateur young enthusiasts who were inspired by Europe and the United States of America. They formed two radio clubs in 1923- Radio Club of Bombay and Calcutta Radio Club. Indian Broadcasting Company (IBC) was formed by these young minds in 1927. Although this effort was not successful but had alerted the colonial government which was facing national movements at that time. With a fear that radio broadcasting might be used in national movements by the freedom fighters the government bought this company and renamed it as Indian State Broadcasting Service (ISBS) in 1930 (Chatterji, 2015). Later it was renamed All India Radio (AIR) in June 1936, this name was suggested by the first controller of broadcasting Lionel Fielden. A new name Akashvani was given to AIR in 1957. The Vividh Bharati Service was launched in 1957 with popular film music as its main component. Akashvani has 420 radio stations at present. Area-wise reach of AIR is 92 percent and population-wise up to 99.19 percent in the country (AIR website). FM Radio was first

introduced by All India Radio in 1977 in Madras and later in 1992 at Jalandhar. Private radio show owners entered the radio industry in 1993 when the government sold airtime blocks on its FM channels in Madras, Mumbai, Delhi, Kolkata, and Goa to private operators, who developed their program content (Kumar, 2010, p. 257).

Private FM in India: A Shift from State-Controlled to Corporate-Owned Radio

Till 1995 Radio broadcasting in India was under the monopoly of a public broadcaster. Doors for Private FM stations were opened up after the verdict of the Supreme Court in 1995 that airwaves are the public property by rejecting the government's monopoly on broadcasting ("By rejecting state monopoly...," 1995). FM Phase-I policy was approved by the Government in July 1999 but due to stiff policy, only 21 FM channels were launched in 12 cities. Improved FM Phase-II policy was notified in July 2005 after the recommendations of the Amit Mitra Committee and TRAI. II Phase has been well received by all stakeholders. There were 245 private FM radio stations till the II phase of the FM auction and their footprint spread across 85 cities. (MIB website, n. d.). In 2001 India's first private FM radio station Radio City owned by Music broadcast private limited (MBPL), Bangalore came on air (David, 2001). As per the ministry of information and broadcasting of India, there were 369 private FM stations in various cities of India till December 2018 ("Operational private FM radio channels...", n.d.).

Network of 94.3 MY FM and 93.5 RED FM Radio Stations Across the Nation

94.3 MY FM radio station was launched by the Dainik Bhaskar Group in 2006. It has 30 stations in II and III tier cities of seven states. 93.5 RED FM radio station which was launched in 2002 is owned by Sun TV Network and serves 57 cities across the country.

Aim of the Study

This study aims to find out the effectiveness of social awareness campaigns promoted on private FM channels.

Objectives

- To analyze social awareness campaigns of two private FM stations.
- To examine the recall value of social awareness campaigns through Private FM stations among listeners.
- To analyze the effect of social awareness campaigns on listenership of Private FM Radio stations.
- To examine the role of social networking sites in promoting social awareness campaigns.

Statement of the Research Problem

How effectively do private FM channels raise social issues through social awareness campaigns on the radio? As radio is a passive medium and mostly turned on to listen to music only so whether people listen to awareness campaigns on-aired on FM channels actively or they change channels. How effective social awareness campaigns of private FM stations are in changing the mindset of an individual and society. Are social awareness campaigns an effective tool for development communication and whether private FM stations a major player which promotes awareness campaigns effectively?

Significance of the Study

Social awareness campaigns may prove an effective promotional tool for development communication. Media not only inform, educate and

entertain us but also motivate, promote, and persuade simultaneously. Developing nations like India need to be motivated to bring social change through a change in the mindset of people on social issues for the development of the nation. Researchers want to study the effectiveness of social awareness campaigns on FM radio stations and want to know whether listeners like listening to awareness campaigns on radio. Do they feel that more and more awareness campaigns are needed to sensitize people on social issues? Results of this study will also motivate FM channels to do CSR (Corporate Social Responsibilities) activities more intensively and would lead to suggest public broadcasting to follow the pattern of FM channels to make awareness campaigns interactive and participative.

Scope of the Study

The study encompasses the effectiveness of social awareness campaigns on FM radio stations from listeners' perspectives through a sample survey. Comparative analysis of social awareness campaigns of two private FM stations of Bhopal City was also done through structured interviews of Programming heads of Red FM and MY FM stations selected for the study. The central question to be examined in this study is the effectiveness of public awareness campaigns of FM radio stations with special reference to Red FM and My FM radio stations of Bhopal to know whether awareness campaigns are effective tools of development communication.

Literature Review

The research article 'Social messages on FM radio channels' stipulated that social awareness campaigns on private FM radio stations play a major role in changing the mindset of the audience and motivating them to come forward to bring change in society. Social awareness campaigns broadcasted on the radio also motivate listeners to be the change. Social campaigns like Ambulance First on Fever 104 FM, Palna on RED 93.5

FM, and Dil Deke Dekho on Radio City 91.1 FM became very popular among listeners of Delhi. Celebrities like Ranbeer Kapoor, John Abraham, Share Khan, Annu Kapoor, Varun Dhawan, Gautam Gambhir, and Mikka Singh also promoted and appreciated these activities. Ambulance first was an initiative taken up by Fever 104 FM along with Delhi traffic police to urge the Delhi commuters to move towards the left side whenever they hear or see an ambulance coming. After this campaign Supreme Court came up with a new rule- people who will not give aside to an ambulance to pass through will be heavily fined by traffic police. Palna campaign was initiated by RED 93.5 FM in association with Delhi Council for Children Welfare to raise funds for abandoned and disowned children. Out of a total of 93.5 lakh, 70 lakh were raised from RED FM itself. Being in the driver's seat of social awareness campaigns, private FM promotes itself as the Station of the Nation. According to researchers of this study, RJs who weaved social messages in their programs became more credible and popular among listeners. The brand value of FM stations also increased and they bagged several awards like Golden MicS Award, IRF award, New York film festivals, and Asia Pacific Award as well for creating social awareness through FM radio campaigns (Tomar & Kaur 2017).

In 'A study on social initiative activities given by FM radio stations' authors stipulated that Private FM radio channels in India have given radio a new lease of life and expanded the listener base. Celebrity hosts, jazzy jingles, phone-in programs, and big prizes as gratification for the listeners are changing the face of FM radio in India. Private FM became popular among listeners because of its presentation style. Listeners could hear the vibrant and bright voices of young RJs, their favorite celebrities being interviewed on radio shows, get the latest traffic updates of their cities, talk shows, song requests, etc. This new avatar of radio was no less than a mini-revolution. Social initiatives by FM radios are done in collaboration with some organizations, institutions,

government departments, non-government organizations, and private partners (Venkatalakshmi & Chandralekha 2013).

According to the A-Z research report from the recall perspective, FM radio exhibited a better quality recollection. Radio had a significantly higher quality recall (43 percent) as compared to television, which was only at 22 percent. Regular listeners could remember elements like the name of the program, the name of the RJ, the main sponsors of the program, and even the contests that are run on the FM channel. This clearly shows that FM Radio is a very high involvement category much more so in comparison to television and print (exchange 4 media 2016).

In a study on 'The impact of a Mass Media Campaign on HIV/AIDS knowledge and behavior change in North India: Results from a longitudinal study' authors revealed that individuals who were exposed to HIV/AIDS campaigns were more likely to be aware of sexually transmitted infection (STI), HIV/AIDS and condoms, to know about the sexual routes of HIV transmission, to have fever misconception about HIV transmission and to talk to others about STIs, HIV/AIDS, and condoms than those who were not exposed to media campaign messages. This shows that media exposure to social awareness information campaigns may change the perception, mindset, and attitude of people towards social issues (Sood et al., 2007).

A powerful story is that which informs, entertains, inspires, persuades, motivates, and connects with people. Radio is a multi-task-friendly medium (Geller, 2011).

Research study 'Role of FM radio as an information source among youth in urban Thiruvananthpuram' concludes that FM radio is a medium of infotainment. As an infotainment medium FM radio has also worked to improve awareness and knowledge among youth, ranging from social issues, development, women empowerment, health, and hygiene to local governance to some extent (Arya & Jacob, n. d.).

Research Methodology

Mixed methods research approaches have been used to obtain the data required for this study. The researcher implemented the strands of quantitative and qualitative data collection methods in two distinct phases. Sequential Explanatory Mixed Method has been selected as quantitative data collection and analysis occurred first followed by qualitative data collection and analysis. Both approaches were employed for enhancing the integrity of the findings.

Sample Size and Sampling Techniques

A sample from 200 respondents was collected from Govindpura, Mrinal Residency, Ashoka Garden, and Manisha Market of Bhopal City. These areas were selected on the convenience basis of the researcher. 50-50 questionnaires were distributed among respondents in these four areas. Close-ended questionnaires were distributed among 200 respondents and the response rate was 196. The purposive sampling technique under the non-probability sampling method has been selected by the researcher for data collection for this research study. Eight open-ended questions were included in the structured interview of Programming Heads of two private FM stations Red FM 93.5 and MY FM 94.3.

Data Analysis and Interpretation

Data has been organized, coded, and analyzed on SPSS (Statistical Package for the social sciences) using the frequency table and percentage method.

Demographic details of Table 1 show that

- The majority of respondents (26 percent) were between the age group of 26-30 years followed by the age group of 31-35 years with 24 percent. 23.5 percent of respondents were between the age group of 21-25 years, 18.4 percent of respondents were between the ages of 36-40 years while the

least of respondents (8.2 percent) falls in the age group of 15-20 years.

- There was a minute gender difference between respondents. Male respondents were 51.5 percent and female respondents were 48.5 percent.
- The majority of respondents (34 percent) were students followed by 25.5 percent from service class, 14.8 percent from a business class, 13.3 percent respondents do other kinds of a job while 12.2 percent of respondents were housewives.

Chart 1 shows that all most half of the respondents (49 percent) listen to the radio daily. Data Chart 2 shows that 43.9 percent of listeners prefer listening to Akashvani (AIR) radio station while data from Chart 3 reveals that 62.3 percent of respondents prefer listening to private FM stations. Data from Chart 4 highlights that the majority of the respondent (48.4 percent) listen to the radio during their travel time. Most of the respondents (53.1 percent) tune into the radio for listening to music only (see Chart 5). The majority of the respondent (41.3 percent) are aware of social awareness campaigns run on private FM stations (see Chart 6) but the majority of them (48 percent) have never participated in any of the awareness campaigns (see Chart 7). Data from Chart 8 shows that the majority of respondents (54.6 percent) have listened to social awareness campaign called "Kabaad see jugaad" on FM radio. 45.9 percent of respondents said they have listened to social awareness campaign called "Chalo Aaj kuchh achchha sunte hain" on FM radio (see Chart 9). Data from chart 10 reveals that almost half of the respondents (47 percent) agreed with the statement that more and more social awareness campaigns will bring change in the mindset of an individual as well as in society. More than half of the respondents (55. 6 percent) think that social media is a perfect platform for promotional activities of social awareness campaigns (see Chart 11).

Analysis of Structured Interviews

Red FM on-aired six social awareness campaigns while MY FM launched seven awareness campaigns last year (2017). Though MY FM launched more campaigns as compared to Red FM campaigns like EK pyala Khushi, Rangrez, Ek koshish are repeatedly done season-wise in the last few years for example Rangrez's fourth and Ek pyala Khushi's third season was launched this year. On the question of on an average how long any social awareness campaign is on-aired, both of the programming heads said that depends on CSR activity i.e. "Kabad se Jugaad" campaign of Red FM was on-aired for three months while the "Halla Bola" campaign of MY FM against polythene use was on-aired for 15 days only and "My dream dress" of MY FM was on-aired only for nine days during Navratri festival. On average any CSR activity is on-aired between 15 days to one month in general by any private FM channel. When both programming heads were asked which activity was the best activity according to them, the Programming Head of Red FM said "Kabad se Jugaad" without any doubt and the researcher too found the highest recall value of this CSR activity among listeners in her listener's survey. On the other hand, the Programming head of MY FM radio station twisted his answer. He answered that all activities are best activities but it depends on listeners which activity appeals to them. On the question of what are various promotional tools for making social awareness campaigns grand success, the Programming head of MY FM said awareness campaigns should be people-oriented only then people will take interest in those activities and will participate in them. The programming head of Red FM said that the social media platform is the best promotional tool for making awareness campaigns a grand success among people as almost everybody is on social media today. We can engage people through interactive videos on social media platforms. He said we have experimented with that and it works. On the question of whether are, FM channel's awareness campaigns are highly interactive

Programming head of MY FM said we have to make our programs highly interactive as radio is a passive medium. Interactivity is the lifeline of FM radios. The programming head of Red FM said we make extra efforts for making our awareness campaigns innovative, creative, and interactive. The reason is people listen to the radio for entertainment purposes only in that case if we want to make them listen to our awareness campaigns then we have to work extra so that people just don't shuffle channels during campaigns. Innovation, creation, and interactivity are those ingredients that make our campaigns popular among listeners. When the researcher asked both Programming heads if social media helped promote awareness campaigns, both agreed. They admitted that usage of social media has become a daily routine for people today. Price of internet data packs and smartphones both are affordable for most people and this made virtual connectivity very strong. People of all ages use social media platforms so promoting awareness campaigns on social media is a wonderful idea and need of the hour as well. On the question of audience analysis, Programming Heads of both of the radio stations told that they evaluate the popularity and effectiveness of awareness campaigns of their radio station through several registrations of listeners, SMS, query calls, likes, and comments on posts.

Disclosure of Findings

- The majority of respondents were students. In comparison with Akashvani, the percentage of private FM listeners was more. The reason might be youth feel more connected to private FM because of their presentation style, songs according to their mood, and various interactive activities.
- Most of the respondents prefer listening to the radio during travel time as listening to music is entertaining and a good time pass. Earlier radio was mostly heard at night by students but at present social media usage and online music are more in trend instead of listening to the radio at night.

- As compared to other time band shows morning show is more popular among listeners, the reason is morning Jock (Radio Jockey) of a private FM station not only plays hot and happing songs for listeners, he/she also provides them with traffic and weather updates, news headlines, Bollywood gossips, etc. One more reason for the popularity of morning shows is people do not have that much time for reading the newspaper or watching television in the morning so for getting updates on the city and nation they tune into the radio during travel time in the morning.
- The majority of respondents tune the radio only for listening to music, not for any particular show or RJ.
- Most of the respondents said that they are aware of social awareness campaigns run on private FM stations.This indicates that though listeners tune to radio only to listen to music and they are hardly interested in listening to any particular radio program or any RJ but when any social awareness campaign is broadcasted on FM radio people do listen to that awareness campaign.
- The majority of respondents said they like listening to social awareness campaigns sometimes on FM radio.
- The social awareness campaign "Kabaad se jugaad" had the highest recall value followed by the "FM par tobacco-free" campaign. "Kabaad se jugaad" and "FM par tobacco-free hai" both campaigns were launched by RED FM, Bhopal.This shows that 93.5 RED FM is more popular among youth than 94.3 MY FM.
- The majority of respondents (48 percent) have never participated in any of the awareness campaigns till now while

37 percent of respondents have participated in the social initiative of FM stations only sometimes. This shows that people's participation in social awareness campaigns is very less. They still need to be motivated for active participation in activities related to social reforms.

- When respondents were asked whether the social awareness campaigns of FM radios are creative, innovative, and participative most of the respondents answered 'cannot say because they have not heard any of the awareness campaigns seriously. The majority of youth said they listen to the radio only for music, not for other things. When anything besides music is on-aired by FM channels, they change the channel. It was also found that the craze for FM radio is decreasing among youth in cities as they are shifting towards online music. Many of the respondents said that too much of ads and gossip about RJs are many times intolerable. You can listen to your favorite song on the internet with just a single click on your phone without any interruption. Private FM channels have also observed this change which is why now FM channels highlight in sweepers (promos of songs) "gaane lagataar" "chaar gaane back to back" "suniye sabse zyada gaane…FM par" without any break etc.
- Media not only inform, educate and entertain people, it also persuades, motivates, and promotes them to do something better. First of all, it changes our perception of anything. Perceptions slowly and steadily change our attitude, way of thinking, and living. This way media also bring transformation and social changes in society. When the researcher asked respondents whether awareness campaigns run on private FM channels changed their mindset, half of the respondents said that yes 'to some extent' FM campaigns have changed

their mindset while the mindset of 34 percent of respondents was changed 'to the larger extent' only 16 percent respondents disagreed with the statement. Change in mindset is a way to change in attitude and lifestyle. This shows that the social campaigns of FM radios have a positive impact on people and the number of such awareness campaigns should be increased to bring change in society.

- Almost half of the respondents said that more and more social awareness campaigns on FM radio channels will bring change in the mindset of people in society.

- The majority of respondents (57 percent) accepted that social media is a perfect platform for promoting social awareness campaigns on FM radio channels. Awareness campaigns on social media will not only get the attention of local people but can get momentum on a national and international level too. We are moving towards digitization and social media is getting popular among all generations especially youth so social media platforms can be used as an effective promotional tool for sensitizing people towards social issues.

- Though the majority of respondents appreciate social awareness campaigns initiated by private FM radio channels when they were asked whether they also share those campaigns publicly on their social media accounts, the majority of respondents (53 percent) replied that they have never shared any of the awareness campaigns of FM radio on their social media account. It has been observed by researchers that clicking on the like button has become a habit. Most of the time people do not even read whole content posted on social media like Facebook and without understanding the context they click on the like button. Most of the time

appreciation on social media is merely clicking on the like button. People do not read content seriously on social media, especially on Facebook, they use it mostly for sharing pictures and videos. Generally, people are not habitual of sharing others' posts frequently, they share only those posts which is very unusual and rare that is why social awareness campaigns of FM radio channels are appreciated by listeners but not shared frequently on their social media accounts.

- The majority of respondents (53 percent) had no RJs in their friend list of social media accounts. The reason behind this is RJs interact with selective people on social media platforms. They do not add everyone to their friend list. They only interact with those people whom they know to some extent. Mostly they interact with their regular listeners besides their family and friend circle on social media platforms. Though they ask their listeners to like their pages and communicate with them on their page but do not add them to their friend list.

- The researcher has analyzed that out of four private FM channels in Bhopal only two FM channels (MY FM and Red FM) actively run awareness campaigns on radio, the rest two (Radio Mirchi and Big FM) only play songs and show no public awareness campaigns (PACs) the way MY FM and Red FM do.

- Both the programming heads of Red FM and MY FM have accepted that social awareness campaigns help in connecting with people. As awareness campaigns always have emotional appeal associated with them people get connected easily with FM. Social awareness campaigns also enhance the brand value of the channel. Promoting social awareness campaigns on various social issues is also the corporate social responsibility of FM channels.

- Not only respondents but Programming heads of both radio channels accepted that social media is an effective platform for promoting social awareness campaigns.

Conclusion

This study highlights that majority of respondents were students and they tune in FM radio for music only this shows that despite other entertainment genres music still rules in the hearts of youth. Male and female respondents equally love listing to the radio as there was a minute gender difference among them. Listening to any particular show or RJ is not the listener's priority. In fact, because of too many ads and gossip about RJs on private FM channels listeners prefer listening to online music. Though people have the choice of listening to online music today still almost half of the respondents listen to the radio daily. As compared to Akashvani listenership of Private FM channels is higher. The majority of listeners enjoy listening to private FM stations as private FMs are more youth-oriented. Though awareness regarding social awareness campaigns among respondents was forty-one percent when they were asked how frequently they like listening to awareness campaigns on FM radio only thirty-nine percent of respondents said they like listening to awareness campaigns on FM radios sometimes only. Reasons might be; first radio is a passive medium, secondly, listeners tune in to the radio to gratify themselves with music. They have already so many tensions in their life that is why they are not interested in listening to heavy media content like social issues thirdly majority of respondents were youth and youth is not that concerned about social issues which is why a majority of respondents were not interested in listening to the awareness campaign on FM radio. Half of the respondents accepted that the social awareness campaigns of FM channels have changed their mindset to some extent. An appeal can change our thought process at any time and that change in thought process is a way to change our attitude and behavior so such kind of public appeals

in innovative ways should be carried out regularly. Almost half of the respondents agreed that more and more social awareness campaigns on FM radios will bring change in the mindset of people in society. As we are living in the age of the digital era social media has become part and partial of life today. More than half of the respondents along with programming heads of MY FM and Red FM accepted that social media is a perfect platform for promoting awareness campaigns of FM radio stations. The programming head of Red FM said that we can engage the audience on social media through interactive and eye-catching videos and content. Social media platforms can also be used for healthy and fruitful online discussions with so many people at a time. On one hand, more than half of the respondents appreciate awareness campaigns promoted on social media platforms but on another hand, fifty-three percent of respondents do not share those awareness campaigns on their profile to make them popular among their circle, the reason is they are not being sensitized in that manner to promote that activity. More than half of the respondents have no RJs on their social media friend list. Usually, RJs promote their pages on social media but they do not do friends with unknown faces in general. Two-two awareness campaigns of both stations (Red FM and MY FM) were randomly selected by the researcher, among those four campaigns "Kabad se Jugaad" of Red FM had the highest recall value. This activity has made Red FM popular not only on the local and national levels but on international platforms as well. A radio made of 3 tons of metal segregated from 10 tons of waste material collected from people of Bhopal is placed on Roshanpura Square of Bhopal City. With the permission of the Municipal Corporation of Bhopal that square is now called Red FM square. Red FM won several awards for this social awareness initiative like the Golden mikes award, Asia-Pacific sustainability award Radio/ Audio, and New York Festivals Radio Awards, and is nominated for the Limca book of records too. Audience analysis is a must for the media industry to know what people want, which kind of media content they

are interested in, which are they satisfied with present content, their media content is popular among which class of people, and it was found that only MY FM take help of Harvey Research Company for audience analysis while Red FM neither conduct in-house surveys nor hire any research company for audience analysis. As compared to the radio station, the recall value of RJs is more among listeners. People still do not remember the frequencies of any FM channels. During data collection, researchers found that radio properties like Bauaa, Mirchi murga, Kamla ka hamla, and Chingam boy had more recall value than regular RJs and their shows. In fact properties like Bauaa and Mirchi murga have made Raunak and Naved popular among listeners. Though MY FM launched more campaigns as compared to Red FM and campaigns like EK pyala khushi, Rangrez, and Ek koshish are repeatedly done season-wise in the last few years still recall the value of RED FM is more than MY FM radio station. The researcher has analyzed that awareness campaigns on the Red FM channel are more creative as compared to the MY FM radio station. Red FM also plans ground activities more regressively. The language used by both of the stations is quite different. Red FM is more youth-centric so their treatment of language is like the language used by school and college students while MY FM uses sober language targeting 30 to 30 plus listeners. They approach listeners emotionally through awareness campaigns while the approach of Red FM is "Bajao for a cause" a kind of jolt to awake them.

Limitations of the Study

This study has been conducted in the Bhopal City of Madhya Pradesh on 200 respondents. Purposive sampling has been used under the non-probability sampling technique. Comparative analysis of social awareness campaigns of two private FM stations has also been done through structured interviews of Programming Heads of Red FM and My FM of Bhopal. Though the Researcher opted for mixed methods research to provide a better understanding of the research problem

and to enhance the integrity of the findings still feels that if this study would be conducted on a larger scale through a stratified sampling technique the attitude of various strata towards social awareness campaigns on private FM channels could be analyzed more accurately and then results could be generalized that social awareness campaigns are effective tools of development communication and private FM channels are playing a major role in promoting awareness campaigns under CSR (Corporate Social Responsibility) activity. A comparative study on 'Effectiveness of social awareness campaigns on private FM radio stations' of tier one, two, and three cities may also be conducted to know which cities' awareness campaigns are listened to more attentively by listeners and whether they lead toward the change of mindset of an individual on any social issues.

Recommendations

Integrated public awareness campaigns on social issues need to be promoted on radio, television, newspaper, and social media platforms simultaneously. Multimedia campaigning would create an impact on the audience's mind. Radio can play a major role in the promotion of awareness campaigns as it is a highly interactive medium.FM should promote local people and should share their stories in their voice to motivate others instead of broadcasting celebrities' bites on radio regarding awareness campaigns. A social awareness campaign is an effective tool of development communication for bringing social change in society provided it is launched and executed step-wise. Fifteen days to one month is not enough duration to sensitize people on any social issue. Time duration of awareness campaigns should be extended. It has been analyzed by the researcher that none of the private FM channels has highlighted issues like gender discrimination, equality, right to education, unemployment, equal distribution of resources, red-tapism, cyber-crime, corruption, health and hygiene, climate change, and other issues which need to be highlighted. As audience analysis is a must before starting any new program or extending any old show same is required for making awareness campaigns acceptable among the audience. Until and unless the audience will not connect themselves with social campaigns, the motto of awareness-raising campaigns may

not be fulfilled. The researcher has traced private FM stations and Akashvani both for a month and found that social issues in the public broadcasting system are aired in a very dull and dry manner in form of PSAs (Public Service Announcements) where people's participation is lacking. Akashvani should design creative, innovative, and participative awareness campaigns like private FM channels. Plus point with Akashvani is its reach. Effective awareness campaigns can bring desired changes in society. Although technology has revolutionized the world today social customs and traditions continue to hamper development in rural areas of India. The popularity of private FM stations among listeners has motivated the government to provide them licenses for small cities in C and D categories. Social awareness campaigns of private FM channels can do wonders in those areas. RJs are called "live wires" of FM radio channels, until and unless they will not take interest in the promotion of social awareness campaigns, awareness campaigns can never become popular among listeners. As RJs nurture their shows like a baby, the social awareness campaign has to be taken care of in that very manner. First of all, RJs need to be sensitized toward social issues so that they can effectively promote them. Social awareness campaigns should be promoted on-air and on the ground simultaneously so that they could become the talk of the town. For the effectiveness of social awareness campaigns on FM radio channels, people should also be involved in designing awareness campaigns. Those who will become part of social awareness campaign designing will share their experience with others and will promote that campaign in their circle, mouth publicity will help a lot. Incentivize mechanism can work very well to motivate listeners and RJs both to be an active part of awareness campaigns. Incentives should be given to those RJs who have promoted awareness campaigns in a better way. Incentives will motivate RJs to do promotions with their hundred percent efforts that will also increase the effectiveness of awareness campaigns. Until and unless the audience will be part of social awareness campaigns right from its ideation and designing to execution, awareness campaigns will never be wholeheartedly accepted by the audience. Social media platforms should be used to promote awareness campaigns as digital media is an effective medium to reach and engage people for healthy and fruitful discussions on social issues.

Appendices:

Demographic representation of respondents					
Age (in years)	15-20 (8.2%)	21-25 (23.5%)	26-30 (26.0%)	31-35 (24.0%)	36-40 (18.4%)
Gender	Male (51.5%)		Female (48.5%)		
Occupation	Student (34.2%)	Housewife (12.2%)	Service class (25.5%)	Business class (14.8%)	Others (13.3%)

Table 1

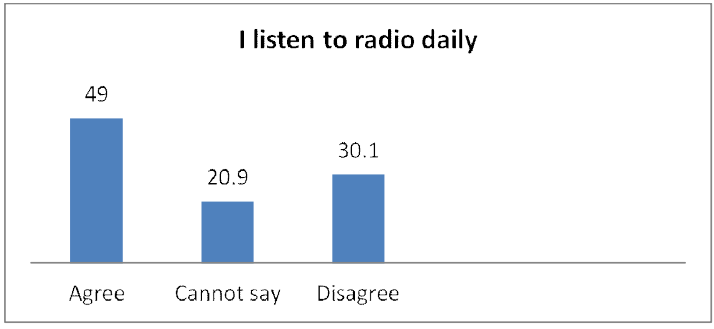
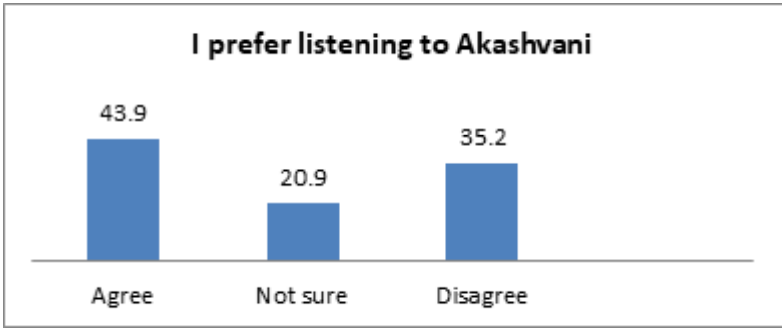


Chart 1



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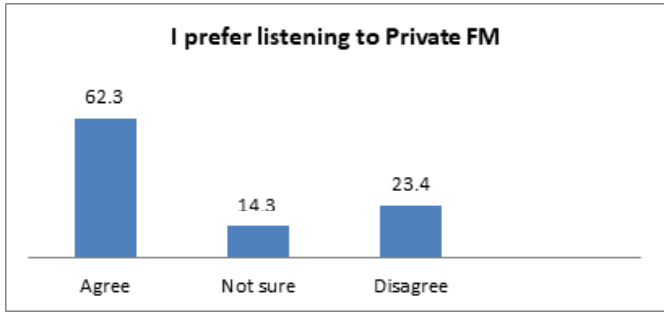

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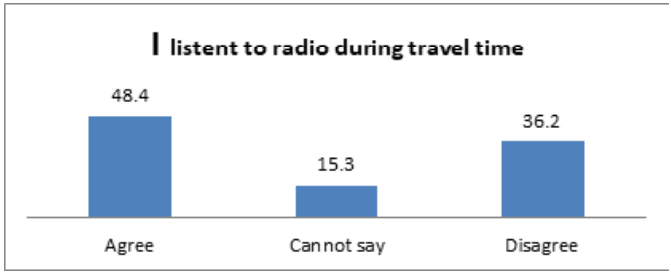

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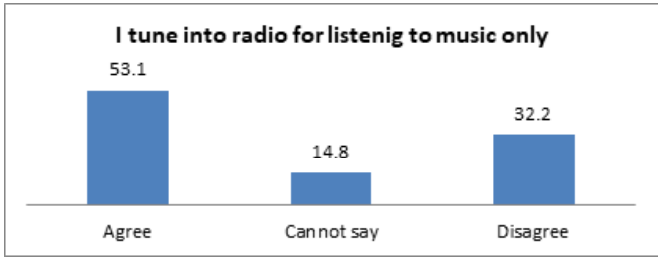

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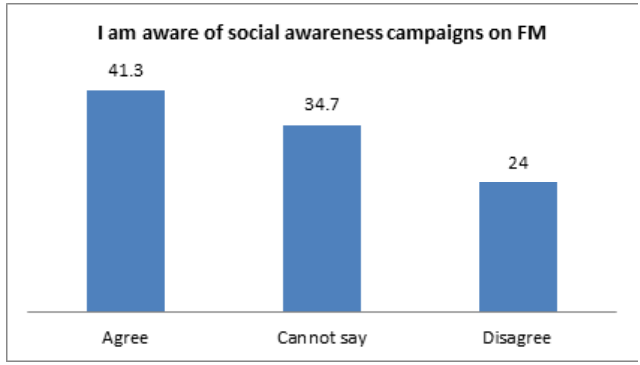

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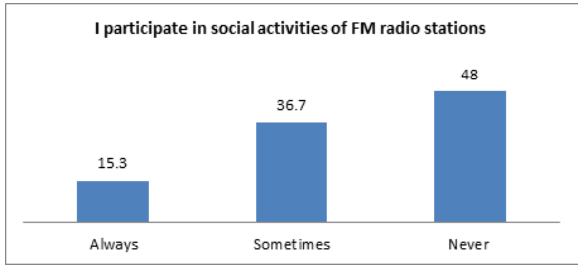

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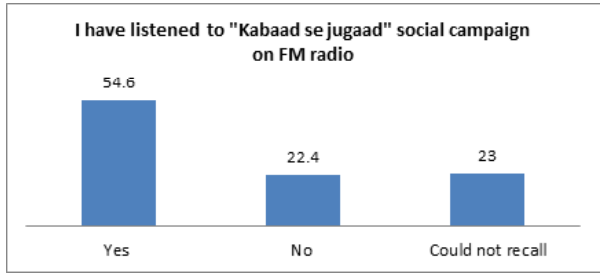

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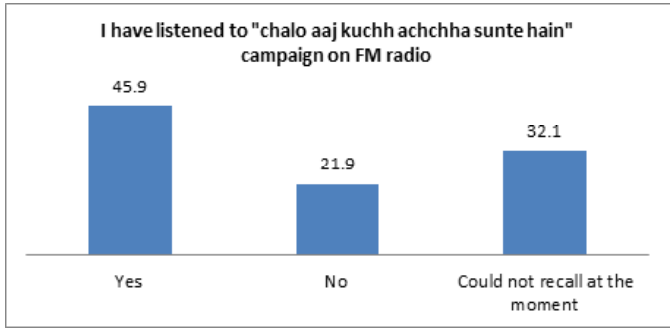

Chart 9

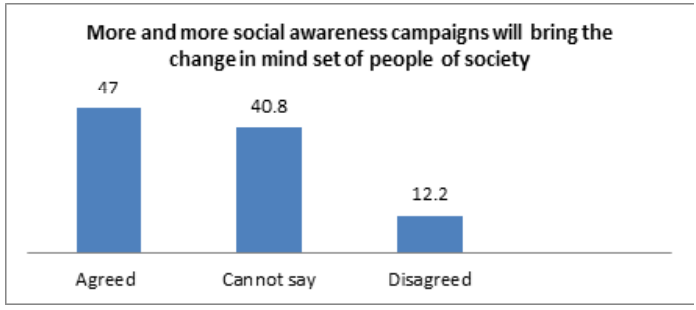

Chart 10

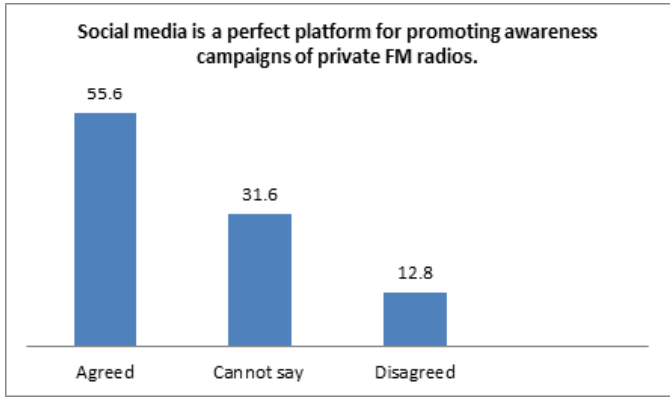

Table - II

Structured Interview with Programming Heads (PH) of 93.5 Red FM and 94.3 MY FM, Bhopal			
S. No.	**Questions**	**Mr. Vikas Awasthi Programming Head 94.3 My FM**	**Mr. Robin Jagtap Programming Head 93.5 Red FM**
1.	**How many radio activities related to social awareness campaigns were launched by your radio channel last year?**	**Rangrez:** it is a drawing competition between school children, theme of last year's Rangrez was 'Swachchh Bharat, swasth Bharat'. Our station reaches around ten thousand students through this CSR (corporate social responsibility) activity. **Ek Diya:** During the Diwali festival poor children who were good at painting were asked to paint Diya and those diya were sold. Money collected through the sale of diyas was used for the upbringing of those poor kids. **Ek pyaala Khushi:** This campaign is based on sponsoring a cup of tea for those who cannot afford it. Listeners were asked to sponsor a cup of tea for those who cannot pay for it. This activity was based on the joy of giving. Tea sponsored boards were placed on various tea stalls in Bhopal. Tea sellers were supposed to mention on that board the numbers of sponsored tea left daily. The people of Bhopal appreciated this activity a lot which is why we are planning to launch the 3rd season of this activity. **Ek koshish:** In this campaign, listeners were asked to donate their old warm clothes to those who cannot afford warm clothes.	**Kabaad se Jugaad:** The campaign was based on waste management in association with Municipal Corporation Bhopal. 10 Tons of waste material were collected from listeners. Out of 10 tons of waste material, metal was segregated and with that waste metal, a radio of 3 tons was made on Raushanpura Square of Bhopal. Red FM won several awards for this social awareness campaign like the Golden mikes award, Asia-Pacific sustainability award Radio/Audio, and Newyork Festivals Radio Awards, and is selected for Limca's book of records too. This radio campaign was on-aired for three months by Red FM from December 2017 to February 2018. Municipal Corporation of Bhopal has given Red FM permission in writing to rename it Red FM square instead of Raushanpura Square. This activity was a grand success and people still remember that activity. This campaign was on-aired for 3 months. **Light for Laxmi:** This awareness campaign was on-aired during the Diwali festival in association with Parvarish NGO. Six to seven lakh funds were raised for lighting the lives of laxmies (girl children) for their education. This campaign was on-aired for 20 days. **Upasna ka number:** We have observed that when any female's

		We got a good response from listeners. **My dream dress:** This campaign was launched during Navratri (Durga Pooja). Nine girls from slum areas were selected. These nine girls went to market with MY FM RJs and selected their dream dress for themselves. This way MY FM gifted them their dream dress of their choice which they could not afford. **Halla Bol:** This social awareness campaign was against the use of polythene. Polythene was banned last year but still was used by everyone. The campaign was started on 15th August with the tagline…hamein chahiye hazards polithino se. **Chalo aaj kuchh achchha sunte hain:** When we switch on news channels, read newspapers or go through news portals most of the time we find negative news like crime, murder, forgery, rape, and many more. Exposure to negative news many times makes us insecure inside and we start feeling negative inside because of negative media content floated to us. To make the environment positive MY FM started a campaign called 'Chalo aaj kuchh achchha sunte hai'. In this campaign, RJs start their show with a positive story and keep motivating listeners. They request listeners to always see the bright side of the life and ignore the dark side	number leaks mental trauma she faces cannot be expressed in words. You too have seen several numbers written in public toilets, in toilets of trains. This idea came from there only. We have leaked the phone number of one of our RJ called Upasana intentionally. 500 posters with names and numbers were placed in spots like public toilets, public places, toilets on trains, and RJs to keep talking about this number and name on-air. Within two days we received several vulgar messages and pictures on this number. We noticed that those who send vulgar messages were from 15 years to 65 years old. IG Bhopal was also with us in this activity. Those who have sent dirty pictures and messages were inquired by police and were given a warning not to do such kind of behavior in future. **Tedhe ko seedha karenge:** In this awareness campaign we asked people to inform us about tilted poles which can fall at any time. It was a 15 days activity and during this period 40 tilted poles were straightened by the Bhopal administration. **Red FM par Tobacco-free hai:** It was an anti-tobacco campaign. Those who were listening to our campaign were saying "have you people gone mad" you are promoting tobacco on your FM. While reality was those who had tobacco addiction we gifted them tobacco-free hampers and requested them to take a pledge not to use tobacco. It is not injurious only to them but to their family as well. **Seetibaaz…help ka naya sound:** In this activity 20 schools of Bhopal were selected where we distribute

			girls a whistle that had a unique voice. We asked them if somebody is teasing them on the way, misbehaving with them in a public place, on public transport, or anywhere else then should blow this whistle. We are also blowing this whistle on our FM and requesting people if they listen to this whistle please stop for a while and try to find out who needs their help. We took 15 days to identify a piculiar kind of sound of the whistle. Marshal art trainers also go with our RJs in schools for teaching the basics of self-defense to girls.
2.	**On average how long any awareness campaign is on-aired for?**	It differs from campaign to campaign. "Ek pyala Khushi" was on-aired for one month, "Rangrez" was a one-month activity, "My dream dress' was on-aired for 9 days during Navratri, "Halla Bol" was aired for 15 days.	It depends on the activity. On average any radio campaign is designed for 15 days to 1 month. Some campaigns may be exceptions like our "Kabaad se Jugaad" campaign was run for three months. It depends on listeners' responses also. If we get good responses from people we extend our campaign.
3.	**According to you which awareness campaign was very popular among listeners?**	All campaigns were best only people can answer this question with which campaign they felt connected more.	"Kabaad se Jugaad" without a doubt.
4.	**What are various promotional tools for making social awareness campaigns popular and grand success among people?**	Awareness campaigns should be people-oriented. People's participation is a must for making it a grand success. Ask people to initiate, and motivate them to take responsibility. We are not social workers, we are here only to make people aware of their rights and responsibilities and can provide the platform from which their voices can be heard. Rest of the things they have to manage and deal with themselves.	Social media can play a major role in the promotion of social awareness campaigns. We should engage people on social media platforms too. Unique engaging ideas work positively. We make creative videos and upload them on social media and ask people to have healthy and fruitful discussions on them. Trust me it works.

5.	**Are FM's social awareness campaigns highly interactive?**	We have no choice. We have to engage people at any cost as radio is a passive medium and for that, we have to design creative and interactive campaigns. Interactivity is the lifeline of FM stations. Public interaction is a must for any program on-aired.	Of course, our campaigns are highly interactive and innovative. The popularity of any activity depends on people's participation. For engaging listeners, we work hard and design highly interactive campaigns.
6.	**How helpful are social network sites for popularizing social awareness campaigns on the radio?**	Social media is very popular among all ages, especially young Indians. Youth are highly active on social media. For creating a buzz about any activity among youth we have to take the help of social media.	Today most people are on social media. They criticize, appreciate, share, comment, and like things floated on social media. Social media is the best platform for popularizing social campaigns too.
7.	**How the effectiveness of social awareness campaigns is evaluated by FM channels?**	Registrations, SMS, WhatsApp messages, phone calls, likes, and comments on social media posts are ways to evaluate whether an awareness campaign is working or not.	We get various calls, SMS, WhatsApp messages, and e-mails from listeners who appreciate our activities.
8.	**How do FM channels do audience analysis? Do social awareness campaigns enhance the brand value of the FM channel?**	Karvy Research Company does audience analysis in two and three-tier cities for us on various parameters we also take the listener's feedback. Yes, social awareness campaigns enhance the brand value of the channel. People have recalled the value of awareness campaigns along with radio channels for example listeners know that "Paiso ka ped" is MY FM activity.	We believe in true and immediate responses from listeners. We get their response and feedback through calls, SMS, WhatsApp messages, and e-mails and feedback them when we go for on-ground activities. Trustworthiness enhances brand value. Social awareness campaigns connect us with listeners, they share their experiences, participate in our awareness campaigns, and promote our campaigns on their social media accounts, this way a strong bonding develops between the channel and listeners. So I can say yes social awareness campaigns enhance the brand value of FM channels.

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Internet Technologies and Aspirations: A Study of films "Fan" and "Gully Boy"

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Abstract

This paper seeks to understand the internet and its use in contemporary Hindi films. There is a plethora of Hindi films apart from other regional language films which have tenets of the internet, whether in the form of social media, new technologies, or the language of the new era in their narratives. There are films like Secret Superstar (Advait Chandan), Gully Boy (Zoya Akhtar), Fan (Maneesh Sharma), and War (Siddharth Anand) which have a tinge of the internet and its different manifestations in them. For this, I would take inference from the concept of *convergence culture by* Henry Jenkins, who has dealt with this term since the arrival of new technologies. Through this paper, I would analyze how two films, Gully Boy and Fan, used the internet and weaved it around their narratives, which in turn created an impact, especially amongst the young audiences who are the avid users of this new phenomenon.

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Keywords: Internet, Challenges, Social Media, Technology, Narrative.

Introduction

Hindi films since their inception have utilized technology, be it the sound in films, the black and white color transition to the use of other technologies in the films. New media is not new to Hindi films but it has been there since the inception of films in India but in different forms. In recent times, there have been several films that have had the use of new media in it be it the pre-production to production to post-production, it is part and parcel of Hindi films nowadays.

There are so many films that have used the forms of new media or the internet in the narrative of films like *Secret Superstar* (Advait Chandan, 2017), *Masaan* (Neeraj Ghaywan, 2015), *Queen* (Vikas Bahl, 2013), etc. As we can see, in the film *Secret Superstar*, the protagonist of the film, Inshiya (Zaira Wasim), uses the Internet and YouTube in particular as one of the tools to become a singer and becomes one after her songs become a hit on the internet. She is referred to as the "YouTube sensation" in the film. This is a platform through which so many films base their narratives on and around new media. Similar things can be seen in films like Ae Dil Hai Mushkil (Karan Johar, 2016), Gully Boy (Zoya Akhtar, 2019), etc. It is pertinent to mention here that a majority of films that have contemporary times in the narrative use technology as a motif, as it represents the changes in society, and films are a mirror to them in a broader sense.

To understand it in a broader context, there will be an emphasis on two films: *Gully Boy* (Zoya Akhtar, 2019) and *Fan* (Maneesh Sharma, 2016). These films are very important in dealing with films and new media technology. There is a profound interest in these films because of the scale on which they have been made and the kind of technology that has been used to create characters for them.

Gully Boy (Zoya Akhtar, 2019)

This film is quite interesting in dealing with the anxieties and trauma a rapper undergoes in making it big in the music industry. It is a film which resonated with all kinds of people throughout the world as it

was about rappers, but it also dealt with human stories which talked about the class divide and related to ordinary people who had a normal upbringing, which appealed to the audiences.

This is the story of Murad (played by Ranveer Singh) and Safeena (played by Alia Bhatt), who live in the city of Mumbai. Murad is in the final year of college with his classmate Safeena. One day at the college, they witness the performance of a rapper called MC Sher (played by the brilliant Siddhant Chaturvedi), and Murad plans to become a rapper. Murad, due to his abusive father and poverty-stricken family, can't think about the rapping profession. So, after his father's accident, he lands the job as a driver at his father's workplace. But, he can't get the rapping scene out of his head and keeps writing the lyrics for his rapping shows and is eventually assisted by his mentor, MC Sher, when he tries to connect with him on the social media platform, *Facebook*. Despite facing so many hurdles, he makes an impact in the rapping scene with his music partner Sky (played by Kalki Koechlin) and MC Sher. This makes him go further in the rapping world, and he records his videos for his YouTube channel and makes it big in the music world. In the end, he participates in the rapping competition and wins it to move further in his life.

Gully Boy is itself a case study in its own right as the use of technology and how it was shown in the film is imperative in today's times as the world is grappling with a lot of intervention regarding this. The use of video-sharing websites like YouTube has surged, especially in contemporary times due to the recent pandemic. People have taken resort in this world, and it has been shown in the appropriate manner in this film.

***Fan* (Maneesh Sharma, 2016)**

This Shah Rukh Khan starrer not only delves deeper into the intricacies involved in any star's life but also looks at it from a fan's viewpoint. There are so many technologies that have been used to make Shah Rukh Khan enact the role of both a star and a fan. This film had an interesting premise that dealt with the star and his fan, which became quite significant as the very notion of stardom is under question

nowadays, but people rejected the film, yet the character stayed with the audiences. It was a very ambitious film that did not click at the box office, but people from all over the world appreciated the attempt by the people associated with the film, especially Maneesh Sharma, who helmed the film and tried to project Shah Rukh Khan in a different light altogether, and the role was attempted well by the actor. This showed a different side of Shah Rukh Khan but also made him connect to the audiences for which he is known all over the world.

This is the story of a fan named Gaurav Chandana, who resides in the city of Delhi and is a big fan of a star named Aryan Khanna. Both the roles of a fan and a star, Aryan Khanna, have been played by Shah Rukh Khan. Gaurav performs to the songs of Aryan Khanna in his colony of Delhi and wins the trophies each year in the contests. One day, he decides to go to Mumbai as Aryan Khanna went to Mumbai, the city of dreams, to make it big in the film industry. Like Aryan Khanna, he also travels on a train to Mumbai without a ticket but is caught by the ticket collector. He reaches Mumbai and lives in the same hotel where Aryan Khanna resided when he came to Mumbai for the first time. On reaching Mumbai, he tries to meet Aryan Khanna many times but fails to do so. He even goes to his house but does not succeed in meeting his superstar dream. So, one day, he threatens the co-star of Aryan Khanna, who criticized him and uploaded a video on the internet, which in turn made him meet Aryan Khanna. But, he is arrested by the police and lands in jail for his wrongdoing. Aryan Khanna visits him in jail and warns him to not trouble him. Thereafter, Gaurav takes a pledge to teach Aryan Khanna a lesson and follows him on his visits to Europe, where he tarnishes the image of Aryan Khanna by molesting a girl at the billionaire's daughter's wedding, because of which his image takes a beating. Ultimately, Gaurav even visits Aryan Khanna's house in Mumbai as both of them resemble each other. He takes hostage his wife and tries to destroy his property by venting his anger in front of his superstar. Finally, Aryan Khanna brings him to Delhi, and during one of his follow-ups, Gaurav falls from the rooftop and dies. This is the crux of the story of the film.

This is the story of an obsessive fan and his love for the star, which has been played by Shah Rukh Khan, and the story is also based on his

stardom and how he is larger than life for his fans throughout the world. In one of the reviews of the film, Shubhra Gupta from the Indian Express states that "SRK is played to all his strengths in the film and further mentions that *Fan* is an out and out SRK show in which the star proves again that he can greenlight roles completely out of his comfort zone and deliver" (retrieved on March 24th, 2022). This review, like many others, reveals the power of stars as well as the fans who have a symbiotic relationship with each other.

Aspirations and Technology: The Common Factor

Gully Boy, which is a film about fandom and the extent to which a fan can go for a star, is about a common boy from the slums of Mumbai who wants to make it big in his life. Both of these films have a tonal quality that leads us to the dream, aspirations, and technology acting as a catalyst in their path. In the film, *Gully Boy* Murad aims to become a rapper, and technological tools like the internet and the presence of YouTube make his dream more approachable through these means. In Fan, Gaurav is all about making it as big as Aryan Khanna, modeled on Shah Rukh Khan, and uses technological means in the narrative to approach and meet him.

Gully Boy as a film appealed to the audiences as well as the critics, but it had a premise to which a majority of the younger audiences were hooked, i.e., to the internet and rapping, which are two major things in their lives now. In one of the popular scenes of the film, the lead character of Murad, played by Ranveer Singh, along with his friends, goes on a night symphony in the streets of Mumbai and paints with the graffiti on the walls and mentions Roti, Kapda Aur Makaan (Food, Clothes, and House) and the Internet as the necessities of human lives. In simpler words, it can be said that to live a decent livelihood, one needs access to food, clothes, and a house, and in today's scenario, it is imperative to have access to the internet, on which the majority of things depend. There was something that had caught the attention of the masses and was quite real for the younger lot as well. Academics like Anustup Basu and Amit S. Rai have dealt with the relationship of technology with cinema, whereas Lev Manovich and Manuel Castells have dealt with

the concept of new media and convergent technologies in their respective books on the same.

In their book, *Cell-Phone Nation: How Mobile Phones have Revolutionised Business, Politics, and Ordinary Life in India*, Robin Jaffrey and Assa Doron observe that "Cheap mobile phones gave poor people a device that improved their chances in a hard world, and in India, because of long-standing discrimination and structures of authority, the mobile has proved even more disruptive than elsewhere." Here, I argue that since mobile phones in India have reached almost every nook and corner of the country, it has empowered people of diverse backgrounds, and the protagonists in these films are testimony to that.

Conclusion

A film and its journey towards its making are significant for a director. Similarly, a film like *Fan*, about fandom, and *Gully Boy*, about a rapper, shares a common goal: to explore people's aspirations in conjunction with technology. Thus, these films transport us to a world where every ordinary person can relate to its narrative, and its glimpses can be seen in several forthcoming films and web series as well.

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An Overview on Some Important Medicinal Plants

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Abstract

The worldwide rise in chronic diseases and health care costs is making interest among researchers to use medicinal plants and their components for the treatment of various diseases. Several medicinal plants have anti-oxidant, antimicrobial, anti-cancerous, and many other activities which are being used for the treatment of various diseases. Plant-derived essential oils are harmless to normal cells and possess a unique property that can help in maintaining the immune system. These oils have many biological activities and therefore gain attention in the discovery of the modern drug. It is highly necessary to investigate these oils as they are associated with allergic reactions, hypersensitivity, etc. Therefore it is considered scientifically to develop alternative drugs which can be used as medicines for the treatment of infectious diseases.

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Keywords: Antimicrobial, Essential oil, Diseases, Health care, Treatment

Introduction

There are more than 500,000 species of plants on Earth. Among them, only a small proportion (1-10%) is used for medicinal purposes. These plants were used by humans since ancient times for healing purposes. India comes under extensive forest cover which is enriched with plant diversity. In India, there are several medicinal plants found which are being used for the prevention and treatment of various diseases. Medicinal plants are plants rich in ingredients and resources that are used in drug development against infection by maintaining and conditioning the body tissues to promote positive health (Agarwal N et al., 2012). Pharmacopoeial or synthetic drugs can be derived from medicinal plants for resistance to various diseases (Behera, K etal., 2021). These plants contain alkaloids, flavonoids, phenolics, carotenoids, etc as their secondary metabolites (Roy Arpita et al., 2017). which are considered a good source for the development of anticancerous drugs (Greenwell M, and Rahman P.K.S.M 2015). Medicinal plant Phyto-compounds can prevent cancer progress by the integration of AP-1, and NF-Kb signaling pathways (Ali Ghasemzadeh and Hawa Z. E. Jaafar 2011). Various essential oil-yielding plants have anti-oxidative, anti-microbial, anti-cancerous, and anti-inflammatory properties (Gordon M. Cragg et al., 1997).

Medicinal plants can be of two different types i.e., aromatic and non-aromatic. Aromatic plants belong to those plants producing fragrance or aroma which is used for perfumery and flavor. Aromatherapy and the medical system use various aromatic plants and their essential oils for medicinal purposes (Thatte Urmila and Dahanukar Sharadini 1986). There are many aromatic medicinal plants which include garlic, ginger, onion, turmeric, tulsi, mint, sandalwood, clove, cinnamon, green tea, thalkudi, lemongrass, etc that help cure several common diseases (Azhari H. Nour et al., 2017). Essential oils are the mixtures of fragrant and odorless substances which contain esters of fatty acids, phenylpropanoids, aldehyde alcohols, and volatile aromatic compounds as their components (Greenwell M and Rahman P.K.S.M 2015). These oils are considered concentrated volatile liquids which are present in

between 0.01 to 10 percent of the plant. There are about 3000 essential oils known to date but only 300 are commercially used in various industries like pharmaceutical, food, sanitary, perfume, and agronomic. Essential oils can be extracted from the leaves, seeds, flowers, roots, and bark of the plants.

Lists of various parts of plants from which essential oils are derived

Leaves	Flowers	Peel	Seeds	Wood
Basil	Chamomile	Bergamot	Almond	Camphor
Bay leaf	Clary Sage	Grapefruit	Anise	Cedar
Cinnamon	Clove	Lemon	Celery	Rosewood
Eucalyptus	Geranium	Lime	Cumin	Sandalwood
Lemongrass	Hyssop	Orange	Nutmeg oil	
Gotukola/ thalkudi	Jasmine	Tangerine		
Oregano	Lavender			
Peppermint	Manuka			
Pine	Marjoram			
Rosemary	Orange			
Spearmint	Rose			
Tea tree				
Brahmi				
Thyme				
Turmeric				
Berries	**Bark**	**Resins**	**Rhizome**	**Root**
Allspices	Cassia	Frankincense	Ginger	Valerian
Juniper	Cinnamon	Myrrh	Turmeric	

Aromatic Medicinal Plants

Turmeric- Scientific name-Curcuma longa

It belongs to the ginger family Zingiberaceae. It is native to southern Asia. It contains many active compounds such as Curcumin (active ingredient), curcuminoids, turmerone, monoterpenes, sterols, alkaloids, diterpenes, etc. Curcumin derived from the plant rhizome is used for the prevention and treatment of cancer by inhibiting the growth of tumor-associated genes and interfering with the signaling phases (G Singh., et al 2005). Turmeric is useful for many common diseases such as arthritis, heartburn, joint pain, stomach pain, bypass surgery, hemorrhage, diarrhea, intestinal gas, stomach bloating, jaundice, liver problems, irritable bowel syndrome (IBS), gall bladder disorder, headache, bronchitis, colds, lung infections, hay fever, leprosy, fever, menstrual problems, tuberculosis, urinary bladder inflammation, kidney problems.

Tulsi- Scientific name- Ocimum sanctum

It belongs to the family of Lamiaceae. It is native to the Indian subcontinent. It is also cultivated widely in the Southeast Asian tropics. Vitamin C, Vitamin A, and phytonutrients Eugenol in holy basil are useful in protecting the skin from free radical damage and helpful in reducing cholesterol levels in the blood as they are great anti-oxidants (Sridevi M et al., 2016). Tulsi is useful in treating skin infections and acts as a detoxifying agent in lowering the body's uric acid levels (Lam, S.N et al., 2017). It has anti-inflammatory properties due to the presence of eugenol, camphene, and cineole which help prevent viral, bacterial, and fungal infections (Mahapatra S.C 2011). This helps in maintaining eye health, soothes eye inflammation, and reduces stress. It cures bronchitis, tuberculosis, bone health, heart health, mouth ulcers, etc.

Ginger- Scientific name- Zingiber officinale

This is a flowering plant that belongs to the family Zingiberaceae. It originated in the tropical rain forest leading from the Indian subcontinent to southern Asia . It contains a phenolic compound that helps in gastrointestinal irritation, saliva stimulation, and bile production. It is useful in treating nausea, cold, flu, diarrhea, infections, dysentery,

cholesterol reduction, maintaining healthy blood sugar levels, colon cancer, constipation, etc. (Ali Ghasemzadeh and Hawa Z. E. Jaafar 2011).

Ginger contains many active components such as [6]-gingerol, [6]-shogaol which help treat GI cancer. It helps in inducing apoptosis which suppress the growth of a variety of cancer such as skin, ovarian, colon, breast, cervical, oral, renal, prostate, gastric, pancreatic, liver, and brain cancer (PrasadSahdeo and TyagiAmit K 2015).

Garlic- Scientific name- Allium sativum

This belongs to the family Amaryllidaceae and is native to the central Asia region. A.sativum contains methanolic extract which is effective against MCF 7, A549 & DU145 and helpful in preventing colon cancer, rectal cancer, stomach cancer, prostate cancer, and bladder cancer (Rahman Shafiur Mohammad 2007). It is useful in treating an enlarged prostate, cystic fibrosis, diabetes, osteoarthritis, hayfever, high blood pressure late in pregnancy, yeast infection, flue & swine flu, chronic fatigue syndrome, caraches, menstrual disorders, abnormal cholesterol level caused by HIV drugs, hepatitis, shortness of breath, stomach ulcers, bronchitis, asthma, joint pain, stomach ache, gout, low blood sugar, stomach inflammation, sinus congestion.

Mint- Scientific name- Mentha spicata

It belongs to the family Lamiaceae (Raymond et al., 2004). It is widespread across Europe, Africa, Asia, Australia, and North America. It helps relieve seasonal allergies as it contains rosmarinic acid which has antioxidant and anti-inflammatory activity. Mint contains methanol which helps break phlegm and mucus. It also helps in pain relief and Irritable Bowel Syndrome (IBS), stomach lining protection, and gastric ulcer prevention.

Onion- Scientific name- Allium cepa

This belongs to the family Amaryllidaceae. It is distributed all around the world. It is used in treating arthritis, used as a disinfectant, as an appetizer, for earache, for stomach pain, for teeth and gum disorders, relives amoebic dysentery, reducing depression, regaining consciousness in the diseases like giddiness, epileptic fits, hysteria, and severe headache

(Jain D et al., 2011). Onions are high in vitamin C which helps in preventing cancer by destroying free radicals. The study shows that intake of allium in high amounts can lower the risk of prostate cancer while frequent intake of allium can reduce the risk of oesophageal and stomach cancer (Upadhyay, R. K. 2016).

Conclusion

Today, only a few plant products are being used in Western medicine to treat various diseases. The Indian traditional system of medicine known as Ayurveda focuses on the promotion of health and strengthening host defenses against different diseases. In India, various medicinal plants and their constituents are used for the therapy and prevention of various human diseases, including cardiovascular, gastrointestinal, nervous, and skin diseases and even malignancies. These are necessary to improve the immune system against diseased conditions

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Influence of Integrated Nutrient Management on Productivity of Finger Millet (*Eleusine coracana L. Gaertn.*)

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Abstract

Finger millet (Eleusine coracana l. Gaertn.) is one of the important minor millets that is considered 'nutritional'. In the south Odisha region, once it was considered a major food crop. Based on the above facts, a field experiment was conducted to study the effects of integrated nutrient management in finger millet on growth and productivity during the kharif season of 2020–21 at Bagusala Farm (23°39' N latitude, 87°42' E longitude) of Centurion University of Technology and Management, Odisha. The experiment was laid out in a factorial randomised block design (FRBD) with two factors. The first factor was the 2 levels of biofertilizer seed inoculation, namely, Azospirillum inoculated (I1) and un-inoculated (I2). Another factor was the 5 levels of chemical fertilizers, viz., F1: 0% recommended dose of fertiliser (RDF), F2: 25% RDF, F3: 50%

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RDF, F4: 75% RDF, and F5: 100% RDF. The treatments were replicated thrice. The recommended dose of fertiliser (RDF) was 40:20:20 kg N, P2O5 and K2O ha-1 and was supplied through urea, single super phosphate and muriate of potash, respectively. The results clearly indicated that growth parameters, yield attributes, and yield were influenced significantly by nutrient management. There was no significant difference between Azospirillum inoculated and non-inoculated treatments. However, 100% RDF registered its superiority over other nutrient levels. The present study clearly revealed that the treatment combination of Azospirillum inoculation with 100% RDF performed the best in registering growth parameters, yield attributes, and yield of finger millet. Hence, the study concludes that in the cultivation of kharif finger millet, integrated nutrient management can be adopted to obtain optimum growth and yield in the sandy loam soils of south Odisha.

Keywords: Finger millet, integrated nutrient management, *Azospirillum*, chemical fertilizers, yield attributes, yield

Introduction

The small millets have gained popularity due to their nutritional qualities during recent years (Maitra, 2020; Maitra et al., 2020). Finger millet (*Eleusine coracanan* L. Gaertn) is the most important small millet in terms of area and production (Maitra et al., 1998). The crop ranked fourth globally among all the millets, after sorghum, pearl millet, and foxtail millet (Gupta et al., 2012). In India, it is cultivated in Karnataka, Tamil Naidu, Andhra Pradesh, Orissa, Jharkhand, Uttaranchal, Maharashtra, and Gujarat. Locally, the crop is called ragi/marua in India (Brahmachari et al., 2018). The area under finger millet cultivation in India is about 1.27 million ha, with a production of 1.98 million t and an average productivity of 1661 kg ha^{-1} (Sakamma et al., 2018; Panda et al., 2021). The improved varieties under good management can produce up to 4 t of grain per hectare. In Odisha, it covers an area of 1.66 lakh ha with a production of 1.6 lakh t (Agriculture Statistics, 2017).

Among other millets, finger millet is considered a 'nutri-cereal' because it has a high amount of Ca (0.38%), fibre (18%), phenolic compounds

(0.3–3%) and sulphur-containing amino acids (Banerjee and Maitra 2020, Maharajan et al., 2021). It contains a fairly good amount of tryptophan, cysteine, methionine, and total amino acids compared to other cereals, and thus to irradicate malnutrition, it is an important crop in the developing countries of the world. The most important amino acid, methionine, is present in finger millet, which is lacking in hundreds of millions of the poor who feed on starchy staples and, due to its slow digestion, indicates low blood sugar level. It is highly recommended for diabetic patients, and it is gluten free. Straw makes valuable fodder for both working and milking animals. Grains can also be malted and the flour of the malted grain used as cakes, porridge, and a nourishing food for infants.

Finger millet requires less water and it can withstand aberrations of weather. Through the adoption of improved varieties, the growth and productivity of finger millets can be increased (Harika et al., 2019; Maitra et al., 2020). Under rainfed conditions, due to uncertainty in rainfall, the occurrence of moisture stress at various crop growth stages leads to a decline in yield and crop loss to some extent. As it is well adapted and cultivated in the adverse environments of arid and semi-arid regions, it is known to be the "crop of the future". In semi-arid regions, most of the soils where finger millet is grown are deficient in major and minor nutrients. It is mainly due to continuous cropping, low use of mineral fertilisers, poor recycling of crop residues and low rates of organic matter application that can increase yield potential to some extent (Prasanna Kumar et al., 2019; Rao et al., 2012). Therefore, it is important to balance nutrient management practises and other factors relating to finger millet cultivation to attain better yields under the comparatively marginal growing conditions.

Presently, different high yielding varieties have been developed which are fertiliser responsive, and these can be adopted with proper nutrient management practises to get a higher yield of quality finger millet. In the practise of supplying nutrients to crops, it is wise to adopt integrated nutrient management (INM) by integrating the possible sources of nutrients, namely, organic manures, biofertilizers, and chemical nutrients, for managing the soil health and sustaining the agricultural productivity.

Poor management of fertilizers is a major concern for low productivity and in order to achieve optimum crop productivity management of nutrients through judicious application of organic sources, bio-fertilizers and chemicals is required (Ghaffari et al., 2011; Kumar et al., 2019; Das et al., 2021;). Earlier research revealed that inoculation of biofertilizers, namely, *Azospirillum*, phosphate solubilizing bacteria and arbuscular mycorrhizal fungi, has a potential role in the improvement of productivity of finger millet (Bama et al., 2010; Singh et al., 2016; Ramya et al., 2020). A balanced dose of chemical fertilisers was also noted to enhance the growth and productivity of finger millet (Panda et al., 2021). Considering the above, the study was conducted on integrated nutrient management with biofertilizer Azospirillum and chemical fertilizers for enhancement of yield in south Odisha.

Materials and Methods

The field experiment was conducted at Bagusala Farm, of M.S. Swaminathan School of Agriculture, Centurion University of Technology Management, Paralakhemundi, Gajapati, Odisha, which is geographically located at 23^{0}39' N latitude and 87^{0}42' E longitude under typical tropical climatic conditions. The experimental design was laid out in a factorial randomised block design (FRBD) with two factors. The first factor was of two levels, namely, *Azospirillum* biofertilizer inoculated (I_1) and un-inoculated (I2). The other factor was five levels of chemical fertilizers. The seeds of finger millet were sown periodically on a well-prepared seed bed with a seed rate of 5 kg ha^{-1}. Seed treatment was done with carbendazim at 1.0 g kg^{-1} of seeds. The beds were covered with paddy straw and irrigated with a rose can twice daily. Paddy straw was removed carefully after the emergence of the seedlings. Beds were watered prior to uprooting and healthy seedlings of 21 days of age were used for planting in the main field**.** The recommended dose of nutrients i.e., 40:20:20 kg N, P2O5 and K2O ha-1 were supplied through urea, single super phosphate and muriate of potash respectively in 100 percent RDF (T4),75 percent RDF (T6, T10), and 50 percent RDF (T5, T9) treatments. The entire quantity of phosphorus and potassium and half of the nitrogen were applied as basal at the time of transplanting. The remaining quantity of nitrogen was applied as top dressing 21 days

after transplanting. The *Azospirillium* was prepared and the seedlings for the respective treatments were treated by root dipping for 30 minutes prior to transplanting. Water was let into the plots and seedlings were transplanted at one seedling per hill with a spacing of 25 cm x 25 cm. Two hand weedings were done at 10 and 46 days after transplanting. The crop remained almost free from pests and diseases. However, there was an incidence of blast disease. To manage the disease, tricyclazole at 0.6 g litre^{-1} of water was applied at 35 DAT and the spread of the disease was checked. Finger millet was harvested at full maturity of grain. The ear heads from the net plots were harvested, sun dried, threshed separately, and the weight of grain was recorded for each plot at 14 per cent moisture content. The straw of the crop was also harvested from the net plots at ground level and sun dried separately, and the weight was recorded**.** The meteorological data on weather conditions like temperature, relative humidity, rainfall, and sunshine hours during the crop growth period from July to November, 2019 is furnished in Figure 1. The data recorded on various parameters of the crop was subjected to statistical scrutiny by the method of analysis of variance as outlined by **Panse and Sukhatme (1985)** and statistical significance was tested by the F value at a 5 percent level of probability. Wherever the F value was found significant, the critical difference (CD) was worked out at a 5 percent level of probability and the values are furnished.

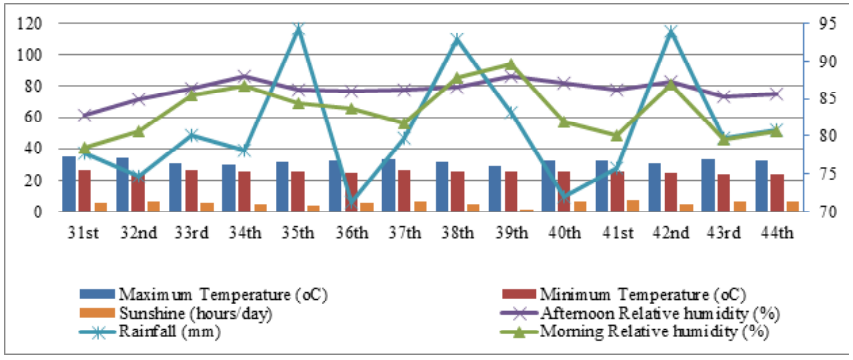

Figure 1: Meteorological data of MSSSoA, CUTM, Meteorological Observatory, Odisha (July-November, 2019)

Results and Discussion

Yield attributes of finger millet

The yield attributes such as effective tillers per m^2, number of fingers per ear head and test weight of finger millet were influenced by the treatments (Table 1). There was no significant difference in effective tillers per m^2 of finger millet between inoculation and un-inoculation among *Aospirillum*. However, seed inoculated with *Azospirillum* produced a marginally higher number of effective tillers per m^2 than un-inoculated treatments. The results showed a significant difference among the different nutrient levels and 100% RDF showed the most effective tiller followed by 75%, 50%, and 25% RDF, and the least was observed with control. The chemical fertiliser with 100% RDF showed the maximum number of fingers per ear head. Similarly, *Azospirillum* inoculation did not influence the number of grains per ear head of finger millet, but levels of chemical fertilisers significantly impacted the same yield attribute. The treatment consisting of 100% RDF produced the most grains per ear head. There was a statistical difference between 100% and 75 % RDF; 50% and 25%; and 25% and control. The control produced the fewest grains per ear head because no fertilisers were used and it remained inferior to other treatments. The grain weight per ear head and length of finger also showed almost a similar trend where seedling inoculation with *Azospirillum* did not show any significant impact of these two yield attributes. Among different chemical fertiliser doses, 100% RDF produced the most grains per ear head, which was significantly superior to others. In the case of length of fingers, the treatments consisting of 100% and 75% RDF being statistically at par with each other, resulted in greater significant values than the remaining treatments. Test weight remained statistically at par among inoculation and fertiliser treatments.

Table 1: Yield attributes of finger millet as influenced by integrated nutrient management

Treatment	Yield attributes					
	Effective tillers m^{-2}	Number of fingers per ear head	Number of grains per ear head	Weight of grains per ear head (g)	Length of finger (cm)	Test weight (g)
Biofertilizer inoculation						
Inoculated	26.4	6.9	1402.5	3.5	11.0	2.4
Un-inoculated	25.8	6.8	1386.8	3.4	10.8	2.4
SEm (±)	0.5	0.3	37.8	0.1	0.3	0.04
CD (P=0.05)	NS	NS	NS	NS	NS	NS
Chemical fertilizer level						
Control	20.8	6.3	1286.0	3.2	9.9	2.4
25% RDF	22.9	6.5	1342.8	3.2	10.4	2.4
50% RDF	26.1	6.7	1392.2	3.4	10.8	2.4
75% RDF	28.6	7.2	1465.5	3.6	11.5	2.5
100% RDF	32.1	7.8	1486.8	3.8	11.9	2.5
SEm (±)	0.3	0.2	23.9	0.1	0.2	0.05
CD (P=0.05)	1.1	0.5	71.0	0.2	0.6	NS
Interaction						
SEm (±)	0.7	0.4	53.5	0.1	0.4	0.09
CD (P=0.05)	NS	NS	NS	NS	NS	NS
CV	5.6	9.9	6.6	6.0	6.9	5.4

Yield of Finger Millet

There was no significant difference found between the two biofertilizer treatments (Figure 2). However, both the inoculated and un-inoculated remained statistically on par with each other (Figure 3). In the study, it was found that there was a significant difference among different fertiliser levels. Application of 100% RDF resulted in the highest grain yield, followed by 75% RDF, 50% RDF, 25% RDF and control. whereas, in control, less grain yield was obtained. A similar trend was noted in straw yields also. Inoculation with *Azospirillum* resulted in a marginally higher straw yield compared to un-inoculated. There was a significant difference among different chemical fertiliser levels. Application of 100% RDF gave a significantly higher straw yield compared to other fertiliser doses. Further, application of 75% RDF also registered a significantly higher straw yield than lower fertiliser doses and control. There was a non-

significant difference among bio fertiliser inoculation treatments in the expression of biological yield. But 100% RDF showed its significant superiority over other chemical fertiliser doses in the production of biological yield. Such results were noted because of the nutrient needs of the crop to produce a satisfactory yield, and when the recommended dose of fertiliser was applied, the crop yielded more. Biofertilizer application did not show significant impact as the crop was grown for a single season and it is expected that continuous application may influence growth and yield of finger millet, which offers the scope for future research. The results are in conformity with the findings of Harika *et al.* (2019); Ramya *et al.* (2020).

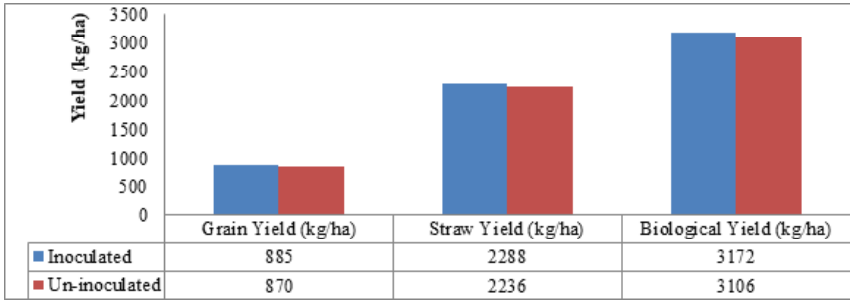

Figure 2. Yield of finger millet as influenced by biofertilizer

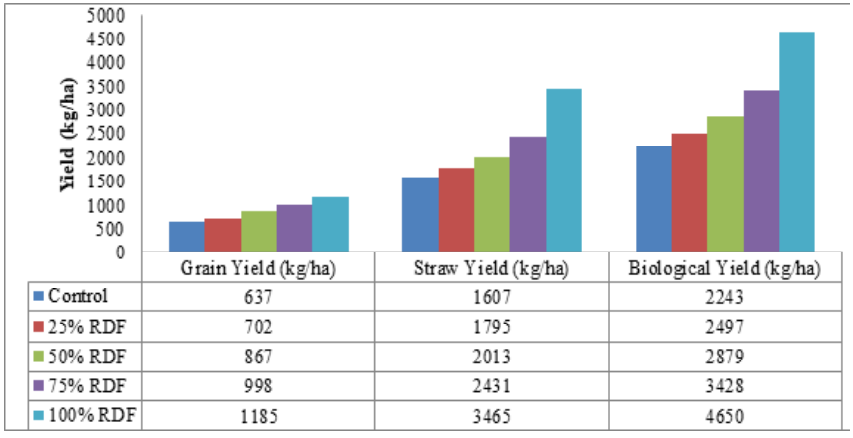

Figure 3. Yield of finger millet as influenced by chemical fertilizers

Conclusion

The present study clearly revealed that the biofertilizer inoculation of *Azospirillum* resulted in marginal and nonsignificant enhancement of yield attributes and yields. However, the 100% recommended dose of fertilisers performed the best in registering significantly superior yield attributes and yields. It was followed by the 75% recommended dose of fertilizers. Hence, the study concludes that for cultivation of *kharif* finger millet, 100% of the recommended dose of fertilisers can be applied to obtain a higher yield in the sandy loam soils of south Odisha. Considering the biological health of the soil, *Azospirillum* biofertilizer inoculation may be carried out, which may perform better in the long run and it offers the future scope of study on integrated nutrient management.

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Role of the Dainik Asha in the Odia Nationalistic Movement

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Abstract

Like various other language media across India, the Dainik Asha has contributed to propagating nationalistic ideas and strengthening the freedom movement in Odisha. The present study attempts to present an overview of the key role played by the Dainik Asha and its Editor, Sashibhusan Rath, in the freedom struggle, efforts for unification of Odia-speaking regions and the development of journalism in the State. Through secondary research methods, the study finds that being the first daily in Odisha, the newspaper and its editor have influenced Odia journalism, Odia agitation, and Odisha's freedom fight to a great extent. The newspaper and Sashibhusan were instrumental in mobilising public

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support in favour of the amalgamation of the southern part of Odisha with the Odisha state, established on 1 April 1936. The newspaper pioneered professional journalism in the state by introducing training for young journalists. It acted as a platform to spread arousal nationalism and motivate people to fight the British Raj. The History of the Dainik Asha is one of the golden chapters of Odisha's media history.

Key Words: *Odia Journalism, Dainik Asha, Freedom Movement, Sashibhusan Rath, Regional Media*

Introduction

The contribution of Indian media towards the promotion and strengthening of the cause of the freedom struggle in the country is one of the illustrious chapters in the history of the Indian press and India's fight for independence (Aggarwal & Gupta, 2001). The crucial role played by Indian media, especially the language press is unrivalled anywhere else in the world in terms of involvement and commitment. The language press added momentum to the freedom struggle by spreading the messages of independence and patriotism, criticising the Government and promoting social reforms (Aggarwal & Gupta, 2001). "The regular reading of newspapers or listening to others reading the newspaper became the most important factor in politicising the Indian people against the British domination" (Narayanan & Pradhan, 2016, p. 112). Several leaders of the independence movement and social reformers like Aurobindo Ghosh, Lokmanya Tilak, Lala Lajpat Rai and Mahatma Gandhi used media for advancing their philosophy and the causes they promoted (Aggarwal & Gupta, 2001).

While most of the Indian press was instrumental in propagating nationalistic ideas and philosophy and promoting propagating social reforms, the newspapers in Odisha did additional roles in spearheading the movement of uniting Odia speaking region under one administration and developing of Odia language and culture (Chatterjee, 2013b; Prasad, 2014). During the early twentieth century, several newspapers emerged in Odisha with the active involvement of various nationalistic leaders

and social reformers. Among them, '*the Asha*' made a significant impact on Odisha's media history and fight for independence. The newspaper is one of the few language dailies in India which completed 100 years of their publications. Its founder Sashibhusan Rath was one of the prominent leaders of Odisha during the freedom struggle and movement for the unification of Odisha.

The present study aims to explore the role played by *the Asha* and Sashibhusan Rath during the pre-independence period of Odisha.

Research Objectives and Questions

Considering the vital role played by the Odia press in the freedom movement in Odisha and *the Asha*, founded by Sashibhusan Rath, being one of the pioneering Odia newspapers, this paper aims to

1) Understand the critical role played by Sashibhusan Rath in Odisha during the freedom struggle

2) Have an overview of the contribution of *the Dainik Asha* newspaper to the independence movement in Odisha

Based on the above research objectives, the present study attempts to answer the following questions

a) What are the critical contributions of *the Dainik Asha* towards the freedom struggle and unification of Odisha?

b) What is the crucial role played by Sashibhusan Rath, especially as a journalist, during pre-independence times?

Research Methodology

The secondary Research method, which involves analysing existing published work by various scholars, has been used to answer the above research questions. Data for the study has been collected from different secondary sources such as published articles in peer-reviewed journals, books, reputed magazines and newspapers. The gathered information is analysed and discussed with a thematic presentation.

Key Findings and Discussion

Several works of literature studied for this research agree that the history of Odia journalism and Freedom Struggle in Odisha would be incomplete without mentioning Sashibhusan Rath and the *Dainik Asha*, the newspaper he founded in Berhampur (Chatterjee, 2013b; Das, 2016; Mohanty, 2019). He was a devoted freedom fighter, an able legislator, a social reformer, a pioneering journalist, and a competent organiser (Mohanty, 2019). He started Asha in 1913, and the newspaper made a significant impact in the fight for the unification of Odisha based on language and furthered the freedom movement (Das, 2016; Prasad, 2014).

About Sashibhusan Rath and the beginning of Asha

Sashibhusan was born at Sorada in Ganjam District of Odisha on 1 January 1885. He completed his primary education in 1890 and high school in Russelkonda (now known as Bhanjanagar) in 1895. After completing his matriculation in 1904, he went to Parlakhemundi to study at Maharaja's college under Madras University. He had expertise in eleven languages. After a brief stint as a businessman and later as an employee, he joined public service and social work, spearheading the fight to form a separate Odisha state, promoting social reforms and freedom movement in Odisha, especially in the south Odisha (Mohanty, 2019). He had served as Vice-chairman of the then Berhampur Municipality and represented Ganjam District in Madras Legislative Council twice from 1920 to 1930. For his valiant, brave and sincere fight for the cause of the Odia people and the freedom movement, he is also known as Ganjam Byaghra (Tiger of Ganjam).

Sashibhusan launched *The Asha* newspaper, a weekly, in Berhampur on 13 April 1913, on Odia New Year's Day (Chatterjee, 2013a; Das, 2016; Tripathy, 2018). He took Rupees Five hundred from the king of Badakhemundi to start the publication (Mahapatra, 2011). It was named after his daughter Ashalata. As a nationalist news publication, *the Asha* made a significant impact on the socio-political life of Odisha and Ganjam and influenced Odia journalism (Chatterjee, 2013a; Prasad, 2014). "Journalism in Odisha entered a new phase in 1913 with the publication of the weekly "Asha" by Sashibhusan Rath (Das, 2016, p. 64). It became

the most influential newspaper of its time after Utkal Deepika, the first news publication of Odisha. It connected southern Odisha, then with Madras Province, with the rest of Odisha (Chatterjee, 2013a; Mohanty, 2019).

The Asha was converted to a daily in 1928 and was known as *the Dainik Asha*, the first Odia daily."It was a turning point in the history of Odia journalism. It demonstrated the power of the press in uniting people for a cause - in this case, first unification of the outlying Odia areas under one administration and then freedom movement" (Tambat, 2012, p. 37).

Odia Agitation and Formation of Odisha Province

Within a very short span, *the Asha* become one of the prominent Odia newspapers in Odisha, speaking for the interest of Odisha in general and Ganjam in particular. Sashibhusan as an Odia nationalist consistently fought for the formation of a separate Odisha state based on language. In 1927, he organised several meetings of social activists, political leaders and freedom fighters to unify Odia speaking regions and fought against the colonial power. As a member of the Madras legislative council, he "moved a resolution in the Madras Legislative Council for constituting a committee to advise the Government of India about the areas which might be amalgamated with Odisha from Madras presidency" (Government of Odisha, 2016, p. 69). Though it was withdrawn for not having adequate support, this gave popularity to Odia agitation in Ganjam (Government of Odisha, 2016). Later with the help of Sir A. Parshuram Patra and Harihara Mardaraj, he could pass the proposal Madras legislative council for a separate Odisha state (Das, 2016). He worked shoulder to shoulder with nationalist leaders of the Odisha Utkal Union Conference such as Madhusudan Das, Gopabandhu Das, and others to spearhead Odia agitation across Odia speaking regions.

As a nationalist newspaper, *the Asha* played a dominant role in the fight for the unification of Odisha. With its influential writings, the newspaper consistently argued for the cause of Odisha and Odia. The newspaper played a crucial role in a more effective and robust campaign for the unification of the Odia speaking region under a single government. It

vehemently opposed Telugu supremacy in Ganjam and argued in favour of Odia demand. Similarly, it opposed the dominancy of Bengalis in northern and other parts of Odisha.

In one of its editorials on 5 January 1914, it wrote, "In every British District, there is always a non-indigenous element of about ten per cent, but that has never influenced the consideration of the language question by the government which recognised the prevailing language of each District as the official vernacular form the very commencement of the British Administration, but the hapless Odias of Ganjam has been treated as poor Cinderella in the Madras Presidency" (Chatterjee, 2013a, p. 14)

"In March 1924, *the Asha* brought out an "amalgamation special" with numerous poems and essays on the Ganjam issue, to emphasise the point that the Orissa Movement was far stronger than it was imagined to be" (Acharya, 2008, p. 116). Renowned freedom fighter Krupasindhu Hota published an article on 3rd November 1924 in support of the amalgamation of Ganjam, Jeypore, Medinipur, Singhbhum, and Phuljhar with Odisha. When the people of Berhampur taluk submitted a memorandum favouring the amalgamation of Ganjam with Odisha, the newspaper gave it huge publicity. *The Asha* regularly published poems and articles by several prominent writers to support the Odia movement. It also published reports on the number of Odia people and Telugu people of Ganjam and Jeypur, justifying the demand for unification (Prasad, 2014). "These reports had brought a clear picture for the administration, leaders and common people. Everyone understood that the demand for the merger of these areas was reasonable and justified. Through all these reports and articles, *The Asha* was successful in creating awareness for the unification of Odisha" (Prasad, 2014, p. 91).

Role in Freedom Movement

Shasibhusan was an ardent nationalist who fiercely and bravely fought against the colonial power. He was a supporter of Mahatma Gandhi and was a key leader in Civil disobedience and non-cooperation movements. He was a prominent leader of Congress in Ganjam and led various

agitations and campaigns against the British Government. He participated in Salt Satyagraha and the Civil disobedience movement and earned the ire of the Government. In May 1930, he organised a rally of women volunteers and delivered a fiery speech against the British Raj. He was arrested on the spot and sent to Vellore Central Jail. While at the jail, he translated Bhagwat Gita, written by Gandhi, into the Odia language (Mohanty, 2019). The district magistrate records the incident as follows:

"As there was some rowdy element causing trouble, Shashi Bhushan, popularly known as S.B. Rath, Editor, Asha and Biswanath Das, M.L.C. was arrested and convicted. They had undoubtedly been stirring up trouble behind the scenes and they had great influence among the Odias" (Mohanty, 2019, p. 22).

Like its support for Odia agitation and unification of Odia speaking regions, *the Asha* was engaged in intensifying the freedom movement by spreading the messages of nationalism and criticising the colonial power through its editorials, articles and news (Chatterjee, 2013b; Shastry, 2005). It developed as a strong, stable, and reliable mouthpiece for people, advocating for the freedom movement and establishing a new Odisha province. Shasibhusan's editorship and the newspaper became a British government eyesore. The newspaper publicised news items about unlawful irregularities in British administration with priority (Mohanty, 2019). On 23 January 1928, the newspaper in its Editorial, opposing the Simon Commission, wrote:

The British rule has fastened our ankles by shackles. We have been made dependent and defenceless on every small matter. In such a situation, who would believe that the commission desires to emancipate us? Can it give us what we want? We want curtailment in defence expenditure. We want the organisation of a national defence force. We want the right to prepare our budget… We say no need to have all these over-paid officials in the administration. Our poverty-stricken country cannot afford them. We demand an end to all discriminations between "you" and "us" ... which one of these demands could the Simon Commission concede? Simon saheb may be very intelligent and capable. So what? ...We need faithful people. How can we have faith in somebody sent by a government, which has no faith in us… The Commission is

coming to enslave us further. Any cooperation with it will only bring loss and no gain to us. (Acharya, 2008, p. 2015)

The Asha regularly covered Mahatma Gandhi and was instrumental in spreading messages of the Father of the Nation across nooks and corners of Odisha. It regularly translated Gandhi's writings to the Odia language and published them. Though there was limited development of printing technology and printing photographs was too costly, *the Asha* published photographs of Gandhi's programme in Odisha. In one of its cartoons, the newspaper portrayed Gandhi as an Elephant of Reform.

Contribution to Odia Journalism

The launching of *the Dainik Asha* has been hailed as a landmark event in the history of journalism in Odisha (Chatterjee, 2013b; Das, 2016; Tambat, 2012). Since its inception, it enjoyed support from stalwarts of Odisha like Pandit Gopabandhu Das, Pandit Nilakantha Das and Pandit Godavaarish Mishra, popularly known as the Satyavadi group (Chatterjee, 2013a; Mohanty, 2019). In addition to the Satyavadi group, prominent personalities of Odisha like Gopal Chandra Prahraj (author of Odia language dictionary), social reformer Anant Mishra, Gadadhar Vidyabhushan, Sadasib Vidyabhushan of South Ganjam, great Odia novelist and writer Fakir Mohan Senapati, poet and author Ramchandra Acharya were some of the regular writers to this newspaper. Pandit Gopbandhu Das, the founder of the Samaja, published his first monthly magazine, Satyavadi, from *Asha Press* in Berhampur (Samantaray, 2012).

Shasibhusan Rath and *the Dainik Asha* are also credited for strengthening journalism in the State. The newspaper created opportunities for many talents. The newspaper started the process of professionalisation in Odia journalism by commencing training in newspaper production and publication. "With the publication of *the Dainik Asha*, many public-spirited young men got the opportunity to receive practical training in journalism in general and in the publication of a daily newspaper in particular" (Chatterjee, 2013b). Moreover, several people trained at *the Dainik Asha* were instrumental in developing various other newspapers in Odisha. In other words, *the Dainik Asha* is the forerunner of journalism in Odisha.

The Asha Press also helped in the publication of other two English newspapers in Odisha. After converting *the Asha* to a daily, Sashibhusan launched *the East Coast*, an English Weekly with Pandit Godavarish Misra as its Editor. He is also credited for launching the first English Daily of Odisha. 'The New Orissa', the first English Daily of Odisha, was launched on 5 May 1933 by Sashibhusan. It was published in *the Asha* Press at Berhampur under his Editorship (Chatterjee, 2013b; Das, 2016; Shastry, 2005). Realising the need for the Odia type-writer to develop journalism and language in Odisha, Sashibhusan's brother Ranganath Mahapatra designed the first Odia type-writer and manufactured it from Germany (Shastry, 2005).

Under the leadership of Sashibhusan, *the Asha,* after becoming *Dainik Asha* become very popular in Odia speaking regions of Andhra Pradesh, Madhya Pradesh, Bihar, Chhattisgarh, and West Bengal (Mohanty, 2019). After the formation of the separate Odisha State on 1 April 1936, Sashibhusan relinquished editorship of *the Dainik Asha* on 18 April 1936. *The Dainik Asha,* along with the first English Daily of Odisha, the New Orissa, was taken over by a Calcutta based businessman M.L. Jajodia, who shifted to Cuttack in 1942. The newspaper's new owner continued its publication till 1951, ending one of the great chapters of Odisha's pre-independence journalism (Chatterjee, 2013b; Shastry, 2005).

The newspaper resumed its publication on 10 February 1982 from Berhampur with the efforts of a Trust set up by late Brundaban Nayak, a political leader and social activist. Veteran journalist Sriharsha Mishra was the Editor. The newspaper is still in circulation among few committed readers, especially in south Odisha.

Conclusion

This study suggests that Sashibhusan Rath has been one of the prominent figures in Odisha journalism. *The Dainik Asha*, under the editorship of Sashibhusan, had a pioneering role in the amalgamation of Odia speaking areas and driving freedom movements in the State. The newspaper acted as a vehicle for mobilising public support favouring the Odia agitation and freedom movement. Besides, the newspaper and

its Editor were also instrumental in bringing various social reforms in Odisha. Because of his sincere efforts to develop journalism and professional media in Odisha, he can be called the Father of Professional Journalism in Odisha.

Limitations and Scope for Future Research

The study is limited by its dependence on secondary information only. However, an in-depth analysis of primary data like older issues of *the Dainik Asha*, Government records of that time and other historical documents may throw a broader picture of the role played by the newspaper in the freedom movement and social reform during the pre-independence time. Further studies can be conducted on:

- The Role of *the Dainik Asha* in ushering various social reforms
- Contribution of various journalists, trained by *the Dainik Asha*, to Odisha media
- Content Analysis of the coverage of news by *the Dainik Asha* during pre-independence times
- Oppression faced by *the Dainik Asha* for its nationalistic role

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Effect of Ultrasonic Studies on Different Electrolytes in Dimethyl formamide Aqueous Solution at Different Temperatures and Concentrations

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Abstract

The Ultrasonic waves generated for a particular frequency(1MHz) affect the molecular interactions of different electrolytes in aqueous dimethylformamide. Viscosity (η), density (d) and Ultrasonic Velocity (U) have been measured for some electrolytes like Potassium Chromate, Potassium Dichromate, and Potassium Ferrocyanide in different concentrations of solute in 5, 10, 15, 20 and 25 wt.% in aqueous Dimethylformamide solvents at different temperature ranges from 293 K to 313K at 5 K interval. At different temperature and different composition ranges other thermodynamic and acoustic parameters like, adiabatic compressibility (â), acoustic impedance (Z), relaxation time (?), free length (L_r), internal pressure (π_i) and Gibbs free energy (?G) can be computed. A certain degree of variation was found in the above

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parameters non-linearly with the change in temperature, concentration and composition. This provides useful information regarding the presence of intermolecular interactions of the components inside the system. The increase in acoustic impedance explains the molecular interaction of the solute in the mixture.

Keywords: *Ultrasonic Velocity, internal pressure, relaxation time, molecular interaction, free length.*

1. Introduction

The measurement of ultrasonic velocity is very useful in the research field to predict the solute-solvent, ion-solvent and solvent-solvent interaction in aqueous solutions containing electrolytes (Palani et al., 2009; Thirumaran and Sabu 2009). If ionic solutes are present in solutions, then the interaction is purely ion-dipole interaction which depends on the ion size and polarity of the solvent. After adding the solute to the solvent, the interaction of ions and solvent molecule takes place which causes volume contraction (Palani et al.,). The ultrasonic velocity and related parameters determination have been made by several researchers (Ali and Nain 2001; Sonar et al., 2011; Thirumaran and Sabu 2009; Das et al., 2013) From the review of literature, it is found that study has been made for various univalent, bivalent electrolytes, biomolecules, heterocyclic compounds, drugs and different solvent systems are used like CH_3OH, ethylene glycol propanol, and different proteins. This present work is very useful for providing information for the prediction of solute-solvent interaction. Here, ultrasonic investigation along with density and viscosity has been reported for electrolytes like Potassium Chromate, Potassium dichromate, and Potassium Ferrocyanide with aqueous dimethyl formamide with different concentrations and different wt % (5, 10, 15, 20, 25) at different temperatures (293 to 313 K) at an interval of 5 K. The above data obtained during the study is used for the determination of other acoustic parameters like acoustic impedance (z), adiabatic compressibility ($\hat{a}$), free length (L_r), internal pressure (π_i), Gibb's free energy (ΔG) and relaxation time(τ). The above parameters are useful to predict different molecular interactions like solute-solute, solute-solvent, ion-ion and ion-solvent interactions (Patil et al., 2016).

2. Materials and Methods

For this present research work all the require electrolytes like Potassium chromate, potassium dichromate, potassium Ferrocyanide were analytical reagent (AR) grade. For the preparation of different wt % of the solvent deionized (conductivity) water was used. The accuracy of dimethylformamide is ±0.01% in the mixed solvents system and was prepared on the same day. The solutions of different concentration of the electrolytes were prepared on the molality basis.

2.1. Density measurement

The density was determined by using a specific gravity bottle about 25 mL capacity by relative measurement method with an accuracy of $\pm$ 0.01 gm^{-3}. The density of solvent of different wt% and different concentrations are freshly prepared solutions at different temperatures were also measured. The same reading was taken for at least five times and the difference between two readings did not exceed $\pm$ 0.02%.

2.2. Velocity measurement

The ultrasonic velocity was measured by using multifrequency ultrasonic interferometer operating with a frequency 1 MHz (Mittal Enterprises, Model No.F-81, New Delhi, India). Water from thermostat water bath circulated through the brass jacket was well insulated and the temperatures of the solutions for this experiment ranging 293 K to 313 K at an interval of 5 K were maintained with an accuracy of 0.01K in an electrically controlled thermostatic water bath.

2.3. Viscosity measurement

Viscosity measurement was carried out by Ostwald's Viscometer of 10 mL capacity. The viscometer is calibrated with fresh conductivity water kept in water bath which is kept at the experimental temperature. The flow of time was measured by using digital clock. By knowing the time of flow of reference liquid the viscosity of the mixture can be calculated.

3. Theory

In this present work, different acoustic parameters can be determined from density(d), velocity (η) and ultrasonic velocity(U) by the following methods (Palani and Balakrishan 2010; Das and Dash 2013):

1) Acoustic impedance (z)

z = u x d

2) Adiabatic compressibility

$$\beta = \frac{1}{U^2 d}$$

Where U = Ultrasonic velocity

d = Density of solution

3) Free length (L_r)

$L_r = K_r$ â½

$K_r = 2.0965 \times 10^{-6}$

â = Adiabatic Compressibility

4) Internal Pressure:

$$\pi_i = bRT \left(\frac{K\eta}{U}\right)^{1/2} \left(\frac{d^{2/3}}{M^{7/6}}\right)$$

Where b = Cubic packing factor ≃ 2 for all liquids and solutions

K = Cont. 4.281×10^9

η = Viscosity of solution

M = Mol. Mass

R = Universal Gas Cont.

5) Relaxation Time (τ)

$\tau = 4/3\ (\hat{a}.\eta)$

6) Gibb's Free Energy :

$\Delta G = KT \ln \left(\frac{KT\tau}{h} \right)$

Where K = Boltzmann's Cont

$= 1.23 \times 10^{-23}\ JK^{-1}$

h = Plank's Cont.

$= 6.62 \times 10^{-34}$ J.S.

4. Results and Discussions

This experiment gives information that density, viscosity and ultrasonic velocity increases with increase in concentration (0.0015, 0.0027, 0.0035, 0.0042, 0.0054, 0.0065, 0.0075) mol/g of the electrolytes (Potassium chromate, potassium dichromate, potassium Ferrocyanide). Similarly with an increase in temperature (293K, 298, 303K, 308K, 313K) density and viscosity decreases because of thermal energy which decreases the intermolecular forces (Roy et al., 2009) whereas velocity increases due to association. As concentration increases the number of solute particles in solution also increases that's results an increase in density. The increase in concentration density and viscosity increases due to the association of solute and solvent interactions which indicates the presence of molecular interaction exists in the mixtures*. [Due to the presence of extra solute causes shrinking in volume so results in the increase in density] (Sumathi and Anandhi 2015; Sethu Raman and Amirthagansan 2004). Similarly with an increase in concentration ultrasonic velocity increases due to the association between solute and solvent molecules due to intermolecular H-bonding as ultrasonic velocity depends on the making and breaking of H-bonds (Sethu Raman and Amirthagansan 2004). Due to an increase in temperature viscosity of the solution decreases because kinetic energy increases which result in the decrease in solute-solvent interaction (Kaur and Kumar 2013; Patil et al., 2016). With the increase in temperature ultrasonic velocity increases which indicates that molecular association takes place in the solution. When dimethylformamide (DMF) content in water increases it increases the ultrasonic velocity due to a decrease in the

compressibility of the solvent molecules with the addition of an electrolyte as well as an increase in molecular mass. The viscosity of all the electrolytes increases with an increase the wt% of DMF due to ion-solvent interaction (Sumathi and Anandhi 2015; Singh et al., 2012).

The plots of ultrasonic velocity (U) verses concentration and wt% are shown in Figure 1(a),(b)

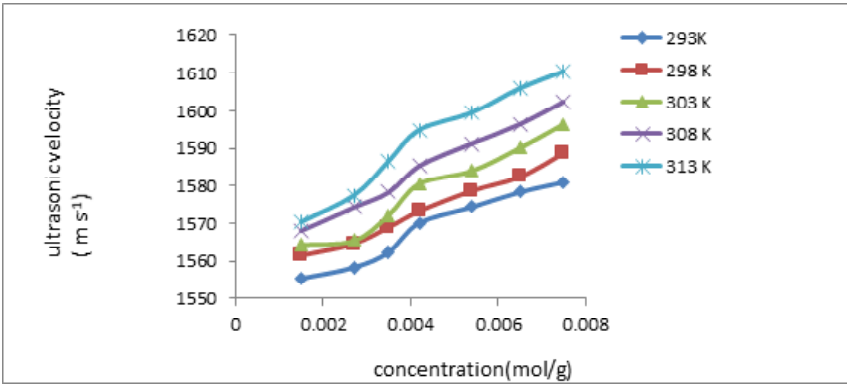

Figure 1: (a) plot of ultrasonic velocity versus concentration for $K_4[Fe(CN)_6]$ in 5wt% of aqueous dimethylformamide at different temperatures.

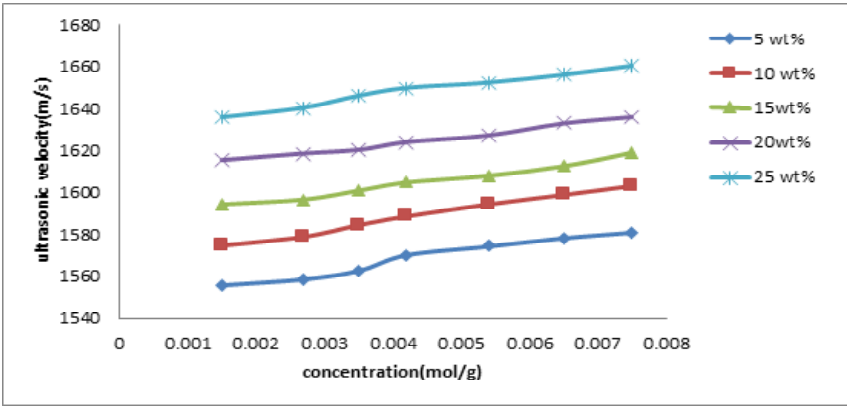

Figure 1: (b) plot of ultrasonic velocity verses concentration for $K_4[Fe(CN)_6]$ in different wt% in aqueous dimethylformamide solution at 293 K.

It is observed from fig2(a) that with an increase in concentration Acoustic Impedance increases for all the three electrolytes which indicate the interaction becomes strong among the components in the solution (Patil et al., 2016; Nithiyanantham and Palanippan 2012). This parameter is the measure of resistance given by the liquid medium to the sound wave and the bulk modulus of electricity that depends on the structural changes in the solution. The z value is more in all the electrolytes with an increase in concentration indicating each starts elastic property in solution. Among the given electrolytes Z value is low in potassium chromate due to low molecular mass and the Z values for all the three electrolytes are in the sequence $K_4[Fe(CN)_6]$> $K_2Cr_2O_7$> K_2CrO_4 (Dehury et al., 2014). Similarly with an increase in temperature acoustic impedance increases due to the associative nature of the electrolytes in the solution. The acoustic impedance values increase with increase in dimethyl formamide content in the system determining the mediums elastic property given in figure 2(b) (Mohartha et al., 2011).

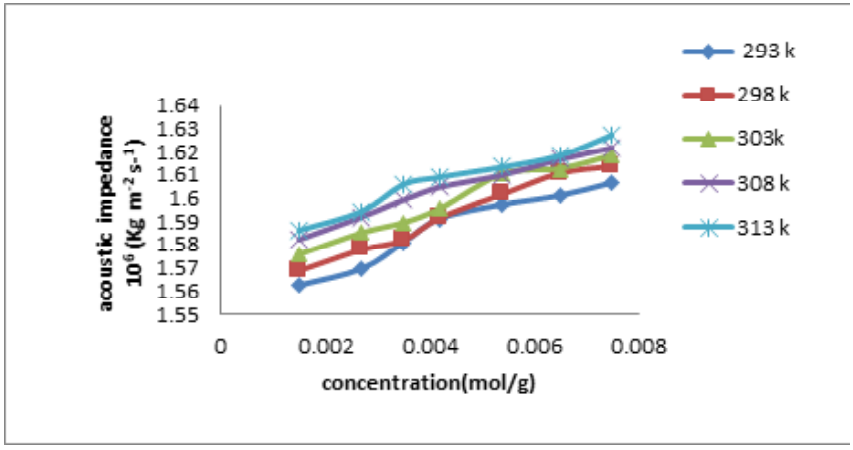

Figure 2: (a) plot of acoustic impedance verses concentration for $K_2Cr_2O_7$ in 10wt% aqueous dimethylformamide at different temperatures.

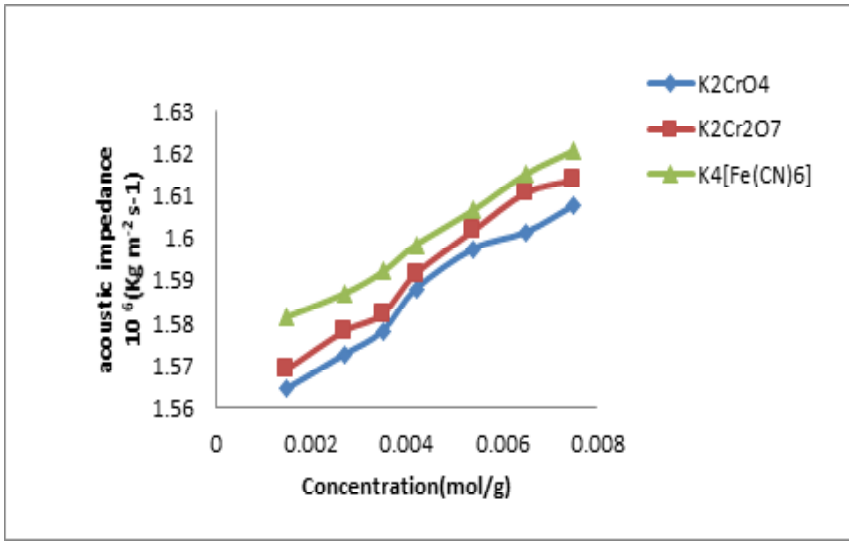

Figure 2: (b) plot of acoustic impedance verses concentration for K_2CrO_4 , $K_2Cr_2O_7$, $K_4[Fe(CN)_6]$ in 10wt% aqueous dimethylformamide at 298 K.

From Figure 3(a) it is confirmed that with an increase in concentration adiabatic compressibility decreases due to an increase in strong interaction between solvent-solute molecules which is because of molecular association of solute particles in solution (Das et al., 2013). When an electrolyte is added to the solvent then some of the solvent particles make bond with the ion and they are now more closely packed in the primary salvation shell. With increase in temperature adiabatic compressibility value decreases because the medium becomes loosely packed (Nithiyanantham and Palaniappan 2010). With increases in dimethylformamide content in water acoustic impedance decreases given in figure 3(b).

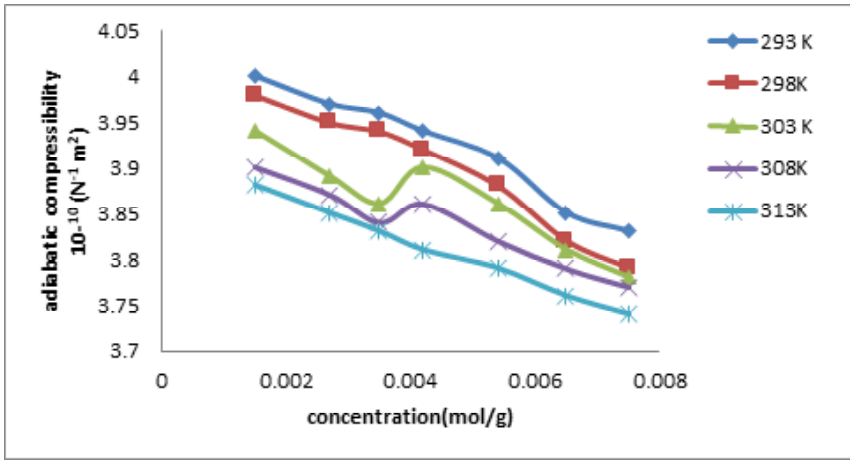

Figure 3: (a) plot adiabatic compressibility verses concentration for K_2CrO_4 in 15wt% aqueous dimethylformamide at different temperatures.

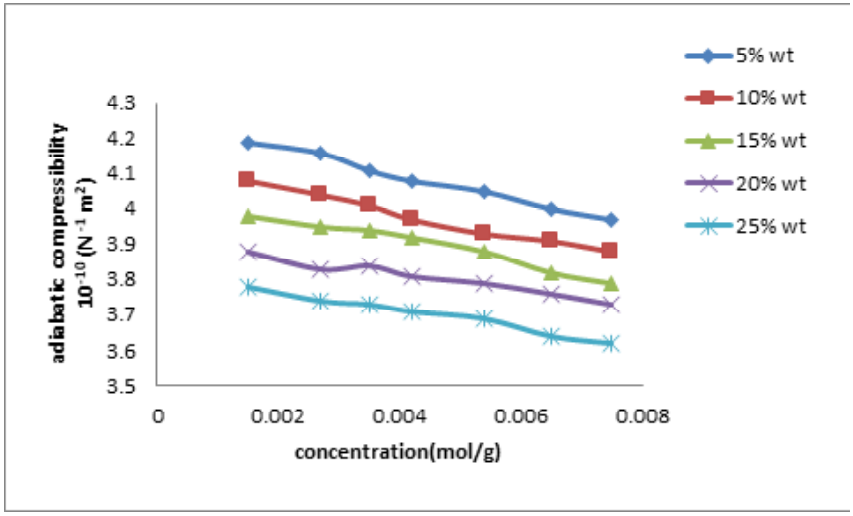

Figure 3: (b) plot of adiabatic compressibility verses concentration for K_2CrO_4 of different wt% in dimethylformamide solution at 298 K

with increase in concentration free length decreases is observed in Figure 4(a) due to increase in the interaction of solute and solvent particles i.e dipole-dipole interaction. With increase in wt% i.e dimethylformamide content in the system free length decreases in all the three electrolytes due to solvent-solvent interaction given in figure 4(b).With increase in temperature free length increases due to increase in intermolecular distance between the surfaces of the molecules as thermal energy increases and less orderly arranged structure so volume expansion takes place (Praharaj et al., 2012).

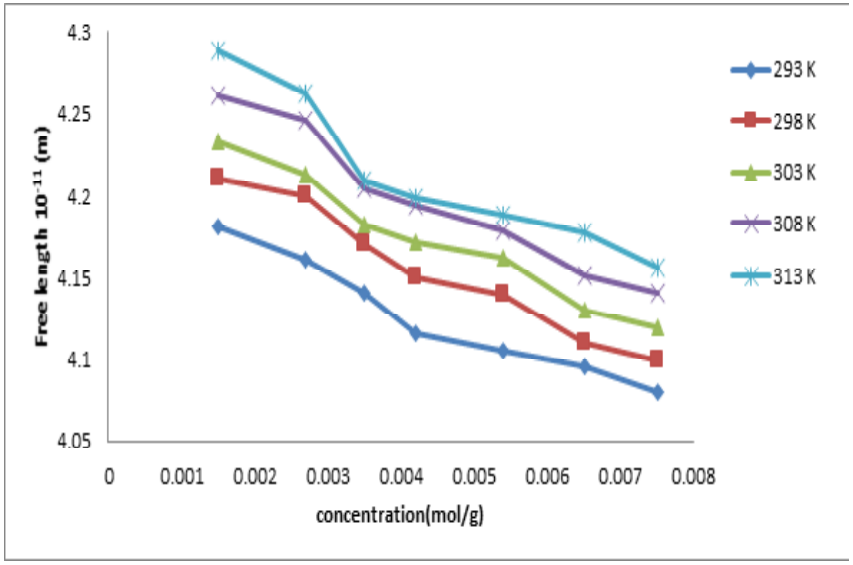

Figure 4: (a) plot of free length verses concentration for K_2CrO_4 in 5wt% aqueous dimethylformamide at different temperatures.

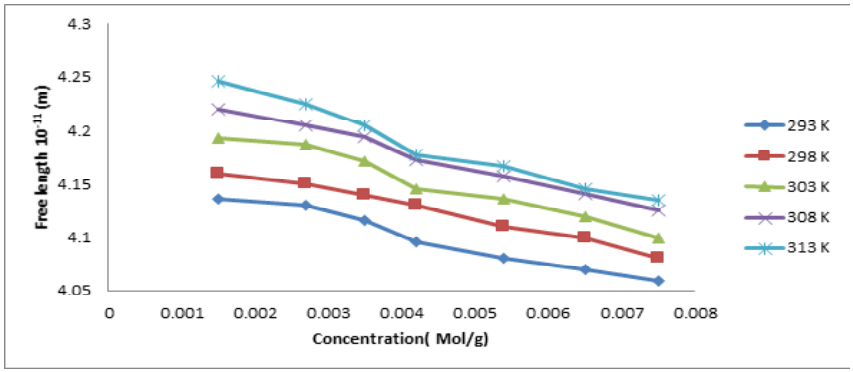

Figure 4: (b) plot of free length verses concentration for $K_4[Fe(CN)_6]$ in different temperature in aqueous dimethylformamide solution.

It is seen from Fig.5(a) that internal pressure increases with increase in concentration because with the addition of more solute ion-solvent interaction increases. With increase in temperature internal pressure decreases due to increase in thermal energy because of thermal agitation of ions with each other (Rajendran 1994). internal pressure is also increases with increase in wt % due to electrostatic field of ions shown in figure 5(b).

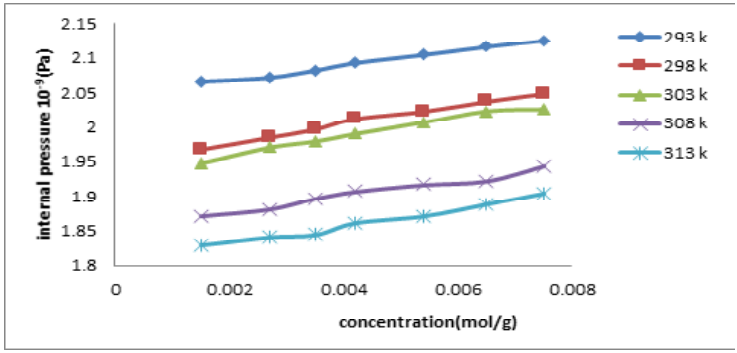

Figure 5: (a) plot of internal pressure verses concentration for $K_4[Fe(CN)_6]$ in 15wt% aqueous dimethylformamide at different temperatures.

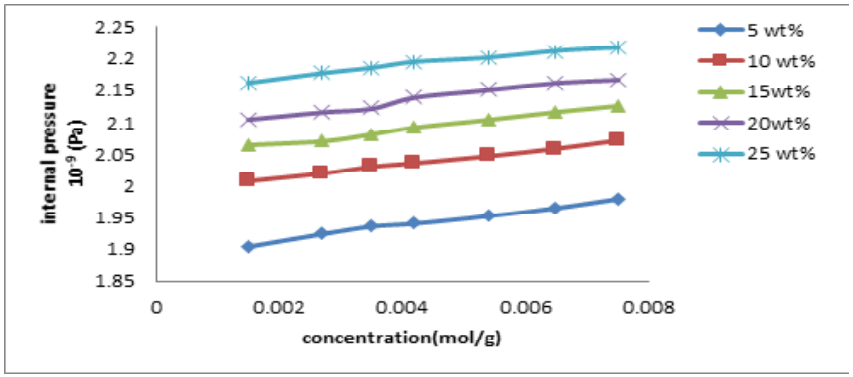

Figure 5: (b) plot of free length verses concentration for $K_4[Fe(CN)_6]$ in different wt% in aqueous dimethylformamides solution at 293 K.

Relaxation time increases with increase in concentration for all the three electrolytes is observed in fig. 6(b) due to its structure making effect. It is more in potassium ferrocyanide due to its more molecular mass. With increase in dimethylformamide content in water relaxation time increases. Similarly with increase in temperature relaxation time decreases due to structure breaking effect and increase in excitation energy given in figure 6(a) (Ali et al., 2000). Due to increase in temperature intermolecular force becomes weak due to thermal vibration results decrease in relaxation time.

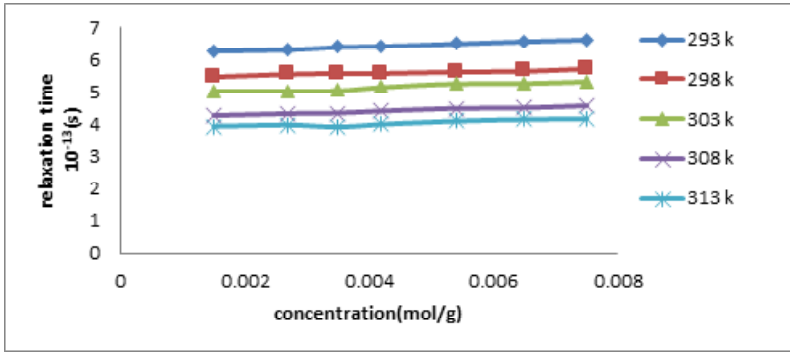

Figure 6: (a) plot relaxation time verses concentration for K_2CrO_4 in 5wt% aqueous dimethylformamides at different temperatures.

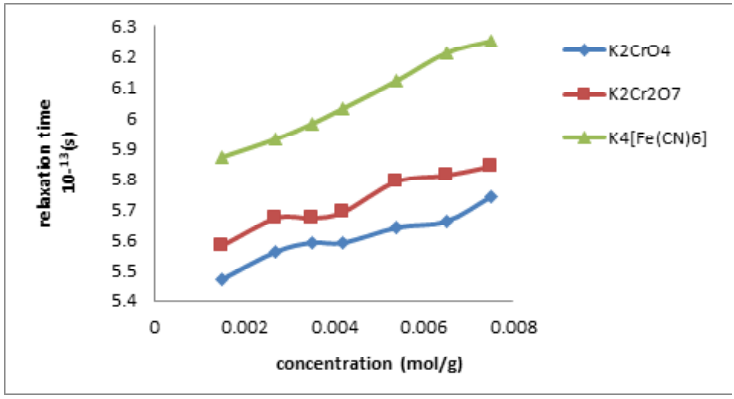

Figure 6: (b) plot of relaxation time verses concentration for K_2CrO_4, $K_2Cr_2O_7$, $K_4[Fe(CN)_6]$ in 5wt% aqueous dimethylformamides at 298 K.

Gibb's free energy increases with increase in concentration of all the three electrolytes due to the formation of product after the reaction is given if fig 7(a) (Praharaj et al., 2012).With increase in concentration. Due to the rise in temperature Gibb's free energy increases because dissociation takes place due to rearrangement of molecules in solution. Gibb's free energy increases with increase in dimethylformamide content in system for all the three electrolytes given in figure 7(b).

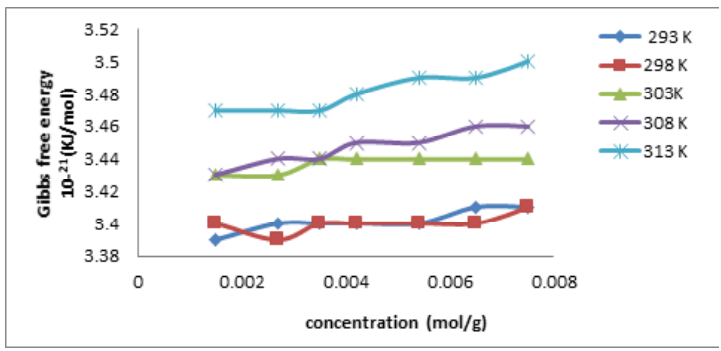

Figure 7: (a) plot Gibbs free energy verses concentration for $K_2Cr_2O_7$ in 10 wt% aqueous dimethylformamide at different temperatures.

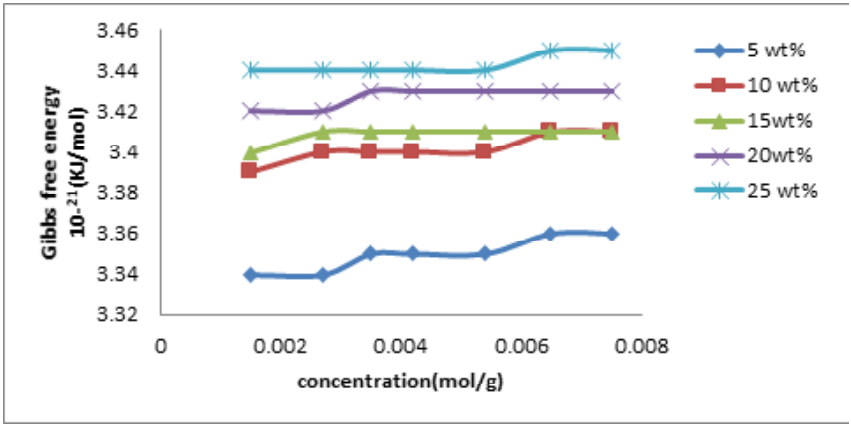

Figure 7: (b) plot of Gibbs free energy verses concentration for $K_2Cr_2O_7$ in different wt% in aqueous dimethylformamide solution at 293K.

5. Conclusion

The acoustic parameters variation takes place which can be derived from density, ultrasonic velocity and viscosity with change in temperature, concentration and dimethylformamide content in the system for the electrolytes potassium chromate, potassium dichromate and potassium ferrocyanide in aqueous dimethylformamide system. From this present investigation it is observed that molecular interaction is present between the components of the system. So due to attractive forces it promotes the tendency of structure formation. The non-linear variation of the thermos acoustic parameters like adiabatic compressibility, relaxation time, acoustic impedance free length, internal pressure and Gibbs free energy takes place obeys the presence of solute-solvent, ion-solvent, solute-solute interactions. As solute added causes electrostriction in solution so compressibility decreases. Due to increase in temperature intermolecular force decreases reveals that there is weak thermal energy present in the system. Adiabatic compressibility is more in potassium ferrocyanide indicates strong interaction is present, so the magnitude is in the order of potassium ferrocyanide > potassium dichromate > potassium chromate.

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