CHAPTER 1

INTRODUCTION

1.1 GENERAL

Communication in the scientific community usually consists of exchanges between scientific peers through specialized journals, science conferences, peer review etc. However, communicating with the public is equally important because it brings scientists and the public closer together and increases popular support for scientific research (Thomas and Durant 1987). Dissemination of the development in science domain and the use are the intriguing components of the development process; mass communication tools have ample potentiality to disseminate the information to all the sections of society. Hence, mass communication tools are compatible to provide the needed information to the people. Communicating science to people through the mass media is a significant challenge in the new millennium. There are four basic objectives of mass communication which are described as to inform, to interpret, to educate and to entertain.

Radio is considered as an important medium to disseminate the information in more convenient and feasible way since it has got the capability to operate with minimum technology. In the modern era, radio has been attached with mobile phones and I-pods which increase the usage to a larger extent. Mushrooming of radio stations and accomplishment, carry huge amount of entertainment and information to the people. At this juncture, the
present study has assessed the perceptions of the radio listeners about the potentiality of the radio to provide the science programmes in an effective way in urban areas. The study has also examined the prospective use of radio in communicating the science programmes and the extent to which radio had made to the effective contribution to the public understanding of science in the study area.

In the modern political discourse, particularly in explaining democratic process, the media is considered to be the Fourth Pillar. Political thinker Laski (1936) opined that freedom of press is the hallmark of modern democracy. Backed by neo-liberal thinkers, the World Bank report suggested for a free flow of information, transparency and a responsible government as the stepping stones for good governance. Science communication has a vital part to play in modern society. Communication of information about science and technology is essential for good governance. Radio has come to play an important and inextricable part in science communication. Tony Schwartz, U.S. Advertising Executive (2001) says that

When you ask some people if they listen to the radio, they say, ‘No’. Then you ask them if they drive to work and they say, ‘Yes’. Then you ask them if they drive to work with the radio on and they say, ‘Yes’. They don’t listen to it (pp. 1).

That is the effect of radio on people who literally live in it. Radio is also a medium that uses a few intermediaries between the scientists and the public. People come out directly: the opportunity for personal and direct contact makes the radio the best place to show who you really are and disprove the stereotypes of the scientist that gets on a high horse and starts
explaining the ‘arcane worlds’ to the ignorant, and of the crazy scientist, a genius but basically a bit pathetic. According to Dharurkar (2009), the essential ingredients of communications of science are:

- Science and Technology
- Languages
- Mass Communication.

These all must join their head, heart and hands together for bringing positive change in society through science programmes.

1.2 SIGNIFICANCE OF SCIENCE – TECHNOLOGY -- SOCIETY (STS)

Science and technology will be indispensable to the development of any nation in the future. Science and technology are central to knowledge-based economies and societies. As a consequence, the dissemination of science and technology and broad public engagement with its development are also central. It is thus vital to recognize the multiplicity of publics created in the processes of communication and interaction as well as the diverse communicators involved and the contexts from which they speak.

The increasing trend of inter-dependency among science, technology and society (STS) has created new problems and complexities and led to questions like, what would be the world of tomorrow? And how will the common people of today face the future? Being a product of society, science programmes can and should play a role to make the inter-linkages among the three – sciences, technology and society (STS) smooth as shown ‘Aejaz’ by Masih (1998) in Figure 1.1
Science Communication (SciCom) may be able to help to establish a transparent and open form of communication in both directions that contribute to define the role of science in society and for enabling society to make the best use of scientific knowledge.

1.2.1 Public Understanding of Science

The expression ‘public understanding of science’ (PUS) has a dual meaning. First, it covers a wide field of activities that aim at bringing science closer to the people and promoting PUS in the tradition of a public rhetoric of science (Fuller 2001; Miller et al 2002). Second, it refers to social research that is investigated, using empirical methods, what the public’s understanding of science might be and how this might vary across time and context.

Other, commonly used terms include: ‘public awareness of science (PAS)’, ‘scientific literacy (SL)’ and ‘scientific culture (SC)’. Burns et al (2003) provide an extremely useful review of the ways in which these various terms are used. He states that “they have broadly compatible aims but
different philosophies, approaches and emphases. In essence, public awareness of science aims to stimulate awareness of, and positive attitudes (or opinions) towards science.”

Thomas and Durant (1987) outline some of the proposed benefits of improving public understanding of science, which include:

- Benefits to science
- Benefits to individuals
- Benefits to national economy
- Intellectual benefits
- Benefits to democratic government.

1.2.2 Science Communication

Science communication is a process of generating new, mutually acceptable knowledge, attitudes, and practices. The process of negotiation involves trust that leads to mutual understanding, rather than through statements of facts. Science Communication is a malleable tool and serves various ends for both communicators and audience (Gregory and Miller 1998).

Science communication has been defined as “the use of appropriate skills, media, activities, and dialogue to produce one or more of the following personal responses to science (the AEIOU vowel analogy): Awareness, Enjoyment, Interest, Opinion-forming, and Understanding” (Burns et al 2003). For example, science can be appreciated as entertainment or an artistic creation.
Aram (2007) stated that science communicating news and views on science related topics which are of interest to a significant number of people. It is an interface between science and communication. It builds bridges and dialogues in societies on the issues of science. It plays a vital role in throwing light on the inventions of scientists to the common people.

Science communication is the newly developed horizon of knowledge, which is emerging in the new millennium. Science communication is an effective source of moulding public opinion for positive change. In the Indian context, science communication must be in the process of simplification which is described by Bharatmuni as ‘Sadharanikaran’ – process of simplification (Dharurkar 2009).

According to Cheyon (2011), the art of transformation of scientific information, scientific attitude, scientific awareness, scientific temper, scientific research, scientific inventions, scientific innovations, etc., from one person to another through some means is called science communication.

At the outset, communicating information related to events, developments, inventions, and innovation of different areas of science for both elite and common masses through various modes and channels of communication is or can be defined as science communication. It is an umbrella term that describes a huge variety of communication activities and the context(s) in which they occur, such as public engagement, policy development, peer-reviewed publication, scientific meetings, conferences, science museum, etc.
1.2.4 **Barriers in Science Communication**

There are different types of barriers in the development of science communication programmes in Indian languages. Prasar Bharati and many more Indian channels are facing these problems which can be classified as:

- Lack of planning
- Lack of creativity
- Lack of proper presentation methods
- Poor feedback.

The purpose of science communication is to focus on developing professional skills to ensure accurate reporting and dialogue between journalists and scientists, and the effective use of the interns by science programme creators. The job can be much easier if there is proper link between scientists and media experts (Dharurkar 2009).

1.4 **RELEVANCE OF SCIENCE COMMUNICATION IN INDIA**

Two types of science communication have been identified in India. One type included institutional (governmental) science communication initiatives and science education programmes, such as those conducted under the auspices of the National Council for Science and Technology Communication (NCSTC), the National Centre for Science Communicators and the National Council of Science Museums. The second type continued the tradition of early initiatives of dissemination of science information among the population. India can benefit precisely in the following ways, by popularizing scientific and technical information among its people:
The agriculture sector on which majority of the people depend is backward. One basic reason is that the technology of cultivation is traditional and is unfit to meet the demands of the ever growing population. If the scientific knowledge (related with agro-biology, agro-botany) needed for better farming is disseminated, it may extend some help and raise the land labour/productivity of the agriculture sector of the country.

Appropriate scientific and technological information and knowledge may help the people to widen their economic horizon, the sphere of economic activities and engage them in activities other than agriculture.

Scientific knowledge may help develop a conducive atmosphere in rural areas and maintain a balanced natural and ecological environment without which the rural lives are exposed to natural calamities such as landslides and floods.

Superstitious beliefs are rampant in rural areas of India. Some of these beliefs are completely detrimental to rapid socio-economic development. The minds of the people are mostly filed with fears and unnecessary suspicions which make them less enterprising and less responsive to new innovative ideas. For example, if one or both the parents die after the birth of a child, he or she is looked down upon by most of the people thinking that the child is the sign of some misfortune. Scientific knowledge and reasoning may effectively combat such beliefs in the rural areas.

Consciousness for achieving higher educational status and aspirations are low in India. Widespread dissemination of scientific and technical knowledge may bring awareness of
their potential capabilities in harnessing available resource and achieving higher educational and technical status for their own development and that of their children.

1.5 RADIO

Grover (2002) defined radio is the transmission and reception of signals by means of electric waves without the use of connecting wires. Radio converts sounds or other signals into electro-magnetic waves, called radio waves. A radio is an electronic device that contains some transistors, diodes, capacitors and other electronic devices. These devices are fixed on a Printed Circuit Board (PCB). It is designed to catch the radio waves that are transmitted by a local station in its vicinity. Radio waves are of four types, as follows:

- Short - Wave I Radio (2.3 - 7.0 MHz)
- Short - Wave II Radio (7.0 - 22.0 MHz)
- Medium Wave Radio (530 - 1,800 kHz)
- Amplitude Modulation (535 - 1,705 kHz)

1.5.1 Historical Perspective – Radio: Early Development

Radio was invented by Guglielmo Marconi, an Italian electrical engineer. In 1895, he patents radio technology, moving electronic forms “wired” (the telegraph) to “wireless”. The early uses of radio were mainly concerned with sending messages from one place to another. During World War I, armies on both sides made great use of radio for relaying commands in
battle. Many of the men involved in such signaling were later employed in radio broadcasting stations throughout the world.

An Indian scientist is also given credit for developing the radio, but the West does not recognize his efforts since India was a British colony during those times. Times changed soon, however. The transistor was invented and used in radio receivers. The advent of modern electronic technologies further reduced the size of the radio. This happened during the mid-seventies of the last century. Invention of solid-state devices like diodes, capacitors, filters, and amplifiers made radio the key beneficiary of the electronic age. It was further compressed during the mid-nineties when the FM technology of radio transmission arrived.

1.5.1.1 Milestones in radio history

Rodman (2001) explained the milestones in radio history:

1895 Guglielmo Marconi patents radio technology, moving electronic forms ‘wired’ (the telegraph) to ‘wireless’

1906 Reginald Fessenden makes the first wireless voice transmission, which frees radio from the Morse code limitations of the telegraph

1907 Lee DE Forest invents the audio on the vacuum tube that picks up and amplifies radio signals

1912 The first Radio Act, which requires the licensing of radio operators, establishes the government’s role in regulating broadcasting communications

1920 What is probably the first commercial radio station, KDKA, goes on the air in Pittsburgh
1927 The Radio Act decrees that broadcasters must operate in the public interest and necessity

1934 The FCC (Federal Corporation Commission) is established in the communication Act which still governs electronic communication today

1936 Edwin Armstrong invests in FM, improving sound quality considerably

1938 The ‘War of the Worlds’ broadcasts create a panic and demonstrate the power of radio

1995 The first digital Audio Broadcasting in the world was launched by BBC, the established in various countries like Sweden, France, Germany and Canada.

1996 The Telecommunications Act of 1996 removes most of the restrictions in stations ownership, and encourages consolidation in the industry.

1.5.2 Broadcasting in India

Radio broadcast was first started in India in 1927 with two privately owned transmitters at Bombay and Calcutta. The government took over the radio broadcasting in 1930, which started operating under the name of ‘India Broadcasting Service’. When India achieved freedom in 1947 there were only six radio stations with 2.5 lakh radio sets and it worked out as one set for every 12,500 people. In 1957 All India Radio’s name was changed to Akashvani which was given by ‘Professor Gopalswamy of Mysore’. Today, radio broadcasting covers 97.5% of the population and 91% of the area. The great potentiality of radio as a mass media can effectively be harnessed for not only informing and educating
the people but also for providing them healthy environment (Malagar 2007).

1.5.2.1 **Milestones in development of radio in India**

The milestones in development of radio in India:

1921 First broadcast from the roof of The Times of India Building, Bombay
1922 First transmitting licence granted
1923 First broadcasting conference
1923 Radio Clubs, Madras and Calcutta, launched in India
1925 Official India Government notification inviting application for setting up broadcast stations
1927 The India Radio Times, the country’s 1st radio programme journal started. The title was later changed to “The Indian Listener” and subsequently to ‘Akashwani’
1927 Bombay Station starts broadcast
1927 Calcutta Station starts broadcast
1930 Indian Broadcasting Company handed over Bombay station to the Government. It is re-named the Indian State Broadcast Service (ISBS)
1938 Short wave transmission begins
1939 External service of All India Radio inaugurated
1957 Vividh Bharati launched
1988 National All India Radio Channel via Satellite launched.
1.5.2.2 Types of radio stations in Chennai

The following are the types of radio stations in Chennai:

- All India Radio (Regional and Local)
- Gyan Vani of IGNOU
- Community Radio
- Private FMs.

1.7 FEASIBILITY OF RADIO FOR SCIENCE COMMUNICATION

Radio is a wonderful media for science communication. Radio, from its beginnings, has proven to be very feasible and apt to science communication. Both from its praisers and detractors, radio has been analyzed with regard to the ability to comment not only news and information or to broadcast music but rather, it has been seen from the start as a tool to reach a big number of people, to diffuse knowledge, to mirror the important changes and social movements that were taking place in the first decades of the 20th century. Therefore, radio had been felt as a very innovative way to connect people and to promote education, cultural development and also political participation.

1.8 NEED FOR THE STUDY

In recent years, the quantum of scientific information has grown rapidly. But the people, in general, take less interest to gain scientific and technical knowledge. As the media is considered to be the mass educator, it has the power and responsibility to take science to the people. The study intends to explore science communication through radio in Chennai namely All India Radio (Chennai ‘A’), Community Radio (Anna CR), Gyan Vani and private
FM (Radio Mirchi). Earlier studies have not adequately addressed the issue in a holistic dimension. Hence, this study intends to elaborate and evaluate the effectiveness of radio in communicating science information.

1.9 STATEMENT OF RESEARCH PROBLEM

Radio is often assumed to be an efficient and effective medium for disseminating information about various fields including science. Science communication through radio reaches a wider audience. But by covering certain science aspects and leaving others, the radio contributes to bias perspectives. People often know about the perceptions of significant other stakeholders through what the media say, though they form their own opinions on an issue. The effectiveness of science communication depends on reach, level of perception, utility and understanding about science. Hence, to ensure that people in Chennai get the full benefits of science information, it becomes important to look at how effective science communication is, in All India Radio (AIR), Anna Community Radio (AIR), Gyan Vani and a private FM (Radio Mirchi).

1.10 RESEARCH QUESTIONS

The research questions are as follows:

1. What is the reach of science programmes / information through radio among the listeners in Chennai?

2. What is the understanding of the radio listeners about science programmes / information?

3. How do science programmes / information help the listeners in their day-to-day life?

4. How can science programmes through radio be improved?
1.11 OBJECTIVES OF THE STUDY

The objectives of this study are:

(1) To find the reach of science communication through radio among the listeners in Chennai

(2) To find the perception of listeners about science communication through radio

(3) To assess the utility of science communication through radio by the listeners

(4) To assess the level of application of science communication through radio.

1.12 HYPOTHESES OF THE STUDY

The hypothetical statements to be tested are as follows:

Ho : There is no significant influence of utility and appropriateness on effectiveness of science communication

Ho : There is no significant influence of formats of the science programmes on the effectiveness of the programme

Ho : There is no relationship between age and the use of radio concerning science information dissemination.

1.13 SCOPE OF THE STUDY

The public get most of the information from the media including science and technology. The present study is to know how much importance do media; radio in particular, give to science and technology information and how people are benefited out of it. It would also help to know the current status and significance of science communication through radio. This study
would help radio people to think upon the importance of science communication and to enhance the quantity and quality of the information on science in their radio stations. This study would also help the researchers who are interested in knowing the role of radio in science communication.

1.14 LIMITATIONS OF THE STUDY

The limitations of the study are:

(1) The research findings of this study are limited to the framework of the categories and definitions used in the survey research

(2) Survey research was limited to relatively accessible areas keeping in a view of the limited time available

(3) The study, though emphasizing the interconnectedness of science and other walks of life, focuses only on science communication in radio

(4) The study does not examine the detailed impact of the science communication. For impact study, more detailed and in-depth study may be needed raising questions like, how far people have changed their lifestyle, and increased their scientific understanding, knowledge, attitude and awareness.

1.15 DEFINITION OF KEYWORDS

The researcher gives working definitions of the following terms.

**Role**, according to Oxford Dictionary, is the function or position that somebody has or is expected to have in an organization, in a relationship or in a society.
Radio, in Okunna introduction to Mass Communication, the term radio is defined as an audio medium of broadcasting in electronics family that has the capacity to cut through the barriers of illiteracy and infrastructure which could limit the ability of the print media to reach large audience.

Science communication has been defined as “the use of appropriate skills, in media, activities and dialogues to produce one or more of the following personal responses to science (the AEIOU vowel analogy): Awareness, Enjoyment, Interest, Opinion-forming and Understanding” (Burns et al 2003).

Genetic engineering, according to Oxford Dictionary, is deliberate modification of the characteristics of an organism by manipulating its genetic material.

Climate change is a long-term shift in the statistics of the weather. For instance, it could show up as a deviation in climate normals (expected average values for temperature and precipitation) for a given place and time of year, from one decade to other.

Controversial science describes ideas and theories and thoughts which are contrary to mainstream science. These ideas have often been advanced by individuals either from outside the field of science, or by scientists outside the mainstream of their own disciplines. ‘Scientific certainty’ as being 95% sure that cause and effect have been correctly identified’. It is exceedingly rare for a large group of scientists to be 95% certain about a thing, especially about anything as complex as an environmental problem.

The deficit model of science understanding concerns itself with how science and scientific ideas are communicated. The deficit model also
assumes that the public has no or very little knowledge to start with. The rise of new information based systems such as the internet and greater access to scientific research through the mass media, the audience’s understanding of scientific discourses can be seen to be growing.

1.16 CHAPTERIZATION

This thesis is arranged into seven chapters including the introduction and the conclusion.

Figure 1.3 Organization of the Thesis

First Chapter

The first chapter contains the basic contextual background of the study. The importance of the radio and science communication and various elements of radio and scientific development such as the significance and the features of radio and its development in India, research problem, and objectives, have been structured and illustrated in the introductory chapter.
Second Chapter

The second chapter provides a detailed review of literature with reference to mass media, studies on socio-economic and personal characteristics of people and their influence on radio listening and audience behaviour. It also focuses on effectiveness of radio as a communication medium and also the preferences of different programmes and modes of presentation towards radio. It also deals with the extent of usefulness of radio programmes and credibility and the perceived problems of radio listeners. The suggestions to improve the existing programmes are also dealt with.

Third Chapter

The third chapter discusses the theoretical framework for the study. It examines science communication models and the relevance of these models in today’s context. It also takes a participatory approach to radio for development. Because of the inadequacies of the various existing models, a need has been felt for a participatory model, within which a multiplicity of models may be appropriate to explain a variety of science communication phenomena.

Fourth Chapter

The fourth chapter has documented various considerations relating to the methodology of the study, to obtain answers to the research questions detailed in the first chapter. It has explained the research method, population and sampling, research instrument, pre-test, data collection methods and analysis scheme. It also detailed how the data for this study were gathered. It further delineated the methods used to analyze the data. The researcher used the statistical software packages such as SPSS to test the three hypotheses. The tools used were Multiple Regression and Chi-square.
Fifth Chapter

In the fifth chapter, after selecting the appropriate research method, the researcher has analyzed the content of the science programmes of All India Radio (AIR), Anna Community Radio (CR), Gyan Vani and a private FM (Radio Mirchi). The cases are studied based on the following attributes which include the percentage of science programmes, the formats, categorization and the subjects covered. Then the key issues are studied separately; these constituted health, energy and environment.

Sixth Chapter

In the sixth chapter, a detailed analysis of the collected data has been attempted in accordance with the objectives stated earlier. Hypotheses had also been tested.

Seventh Chapter

The seventh chapter concluded by saying how science is communicated through radio among the listeners of Chennai and how they perceive and apply the contents with reference to each of the radio stations selected i.e. AIR, Anna CR, Gyan Vani, and private FM (Radio Mirchi). It dealt with the concluding part of the study and provided various recommendations to the science community. It also discussed the scope for further research.