

Indian Journal of Science Communication

Communicating Science of Science Communication

National science communication framework:
An integrated approach

Vigyan Prasar - All India Radio science serials:
An evaluation



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Theme : Women In Science



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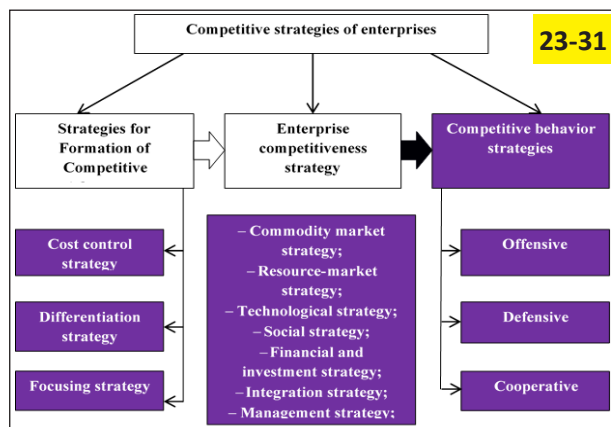
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COVER

National Science Day, 28 February 2020, Vigyan Bhavan, New Delhi; President of India Ram Nath Kovind inaugurates as Chief Guest; Science & Technology, Earthy Sciences, and Health & Family Welfare Minister Harsh Vardhan presides; Principal Scientific Adviser to the Govt. of India K. Vijaya Raghvan, Secretary Dept. of Biotechnology Renu Swarup, Secretary DSIR & DG CSIR Shekhar Mande join as Special Guests; Dept. of Science & Technology Secretary Ashutosh Sharma welcomes.

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National science communication framework: An integrated approach



The Office of the Principal Scientific Adviser to the Govt. of India has organized a Brainstorming Interaction on Science Communication on 27 January 2020 at Prithvi Bhavan, New Delhi. It was felt that “Science communication is a loosely used term bordering on colloquialism, its power and ability to influence people and policymakers vastly overlooked and underutilized. Indian science communication system is in its infancy and mostly fragmented and confined to independent groups who have been partially successful in raising support from government and philanthropy. All these efforts and the support for the efforts are sub-optimal and it is important for increased and sustained support for science communication from the government, media houses and other private organisations”.

The one-day interaction was able to attract different stakeholders. Some 50 participants belonging to scientific, academic, and media organizations as well as freelance amateur science communicators from different parts of the country participated. The interaction was chaired by Prof. K. Vijay Raghavan, Principal Scientific Adviser to the Government of India, and moderated by Dr. Shailja Gupta, Sr. Adviser, Office of PSA. One of the major recommendations was to evolve a policy document on science communication which can form part of upcoming Science Technology & Innovation Policy.

The National Council for Science & Technology Communication (NCSTC) also organized a “Special Brainstorming Session on Science Communication: The Way Forward” in conjunction with the 13th Science Communicators’ Meet held in Bengaluru on 06 January 2020 on the occasion of 107th Indian Science Congress. Some 100 participants from different parts of the country took active part and offered workable suggestions. The session was chaired by Dr A.K. Shrivastava, Director CSIR-AMPRI and moderated by the Editor, IJSC. A lively interaction with the delegates and participants of Science Communicators’ Meet was held and they gave inputs and suggestions for the future of science communication. It was strongly recommended that the recruitments in science communication organizations must be carefully done so that the candidates having the qualification, experience and aptitude both in mass-communication (science communication preferred) and science (natural and applied, including technology, medicine, agriculture).

As a matter of fact, we have got a very robust organizational structure on science communication in the country. At least five national organizations are working for decades for the development and growth of science communication in the country, i.e. National Institute of Science Communication and Information Resources (1951), Homi Bhabha Centre for Science Education (1974), National Council of Science Museums (1978), National Council for Science & Technology Communication (1982), and Vigyan Prasar (1989). In addition, different scientific organizations have their own science communication wings, i.e. Unit for Science Dissemination (CSIR), Directorate of Knowledge Management in Agriculture (ICAR), Publication & Information Division (ICMR), Directorate of Public Interface (DRDO), Public Awareness Division (DAE), Office of Media & Public Relations (ISRO), in place. Almost all national laboratories and scientific institutions have some institutional mechanism for science communication. Media Cell is comparatively yet another emerging concept and various organizations are now equipping themselves with media cell that also takes care of social media communications.

These organizations are contributing in the field of science communication using various ways and means and reaching out to the masses. However, there is hardly any interaction amongst them. There seems an ample scope of interaction and integration between them for evolving and adopting common policies and following best practices at much wider scale. Concerted and collective countrywide programmes at macro and micro levels are needed to be worked-out and implemented jointly by integrating them, besides routine and mundane activities.

It is hoped that these brainstorming sessions would help draw-up a strategic policy documents for India’s science communication programme outlining methods and processes to share the findings and excitement of science, enhancing public appreciation of scientific knowledge of specific issues, influencing opinions or motivating behaviours, considering public perspectives and addressing common concerns. The delivery and implementation of above require better understanding of science, communication, awareness, coordination between scientists and communicators.

At the same time, there exists a number of emerging professionals bubbling with a lot of enthusiasm and energy to join in the science communication programmes offered by different organizations, but are largely unaware and unconnected. The need for connecting science to masses is well understood. Now, there is a need of connecting these young science enthusiasts to scientific organizations, who can eventually help organizations connect science to society by way of harnessing the potential of these young and budding science communicators. Some of them may be good at writing, some may be in audio-visual production, some in sketching, cartooning, computers, designing, oration, or even performing arts, like street plays or theatre! An orientation and hands-on training for them could be an advantage. An integrated and coordinated approach is the need of the hour for a national science communication framework!

Prof. Dr. Manoj Kumar Patairiya

Oor Goundars communicate agriculture practices in Tamil Nadu: Understanding their influence on traditions and culture

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Traditional knowledge, based on centuries of experience, communicated from one generation to other, is visible in various forms. With growing concerns over malnutrition and dietary diversity, traditional food and cultivation practices are gaining attention of scientific and development communities. Efforts to extract this knowledge apart, there is also a need to understand how this has been transmitted. A shift from focus on knowledge to focus on practice may provide pathways to understand how communities adopt and sustain certain practices over generations. This study is on the role of community influencers – known as ‘Oor Goundars’ (village leaders) among tribal communities of Kolli hills in Tamil Nadu, in conserving millet land races. Using the social practice theory, the existing role and importance of these community leaders is analyzed. The study finds that conservation of rich knowledge of social, cultural and agricultural practices reposed with traditional community influencers such as Oor Goundars, is diminishing. It probes whether it may be possible to preserve or enhance traditional knowledge within its setting by increasing focus and attention on these influencers and cultural practices that they impact.

Keywords: Traditional knowledge, Kolli hills, millets, communication, village leaders, social practices.

Introduction

Communities around the world possess knowledge, based on centuries of experience, adapted

to their environment and communicated from one generation to another. This knowledge manifested in various forms is acquiring greater significance in the present day context. In agriculture, several

ancient grains were used in ritual practice or even held as something to be worshiped (Dalton, 2017). In addition, amidst growing concerns over malnutrition, especially in India, there is a movement to re-visit dietary habits and diversity. Traditional food and farming is gaining attention from scientific and development communities. There are efforts to document or share the knowledge with varied stakeholders for greater understanding. However, human intervention has been important in conserving traditional knowledge over centuries and the methods by which this has been preserved is central to its existence. This study explores social and cultural practices within the 'Malayali' tribal community in southern India, to preserve millets – cereals that are seen as climate-resilient and with positive nutritional properties.

According to the UN Food and Agricultural Organization, there is an estimated one in nine people or about 800 million people who go to bed hungry every day (FAO, 2015). The Convention on Biological Diversity, 1992 at the Rio Earth Summit recognized the importance of traditional knowledge recommending initiatives to preserve and promote it, making explicit the link between traditional lifestyles of indigenous peoples, local communities and biodiversity (Bavikatte, 2015).

The biodiversity wealth of a region has been linked to the cultural diversity where it is found, located in various forms and traditions. Each of these forms is in relation to the context of the cultural and natural heritage of that ethnic group. People, their environment and their traditions link closely in mutual respect and in a manner to provide for greater physical and social wellbeing. Over years, work on indigenous knowledge and people, under common property literature helped take away perceptions that rural communities are inefficient users of resources (Agrawal, 2001). The evidence now is that community participation in forest management can substantially improve quality and condition of the forest more than the governments can do (Ming'ate, 2016) while traditional practices can provide solutions to current challenges (Singh et al 2010).

The International Union for Conservation of Nature (IUCN) emphasized 'bio-cultural' diversity as relevant for conservation and sustainability. Most traditional knowledge is documented through informal and oral traditions, besides cultures, social cus-

toms and community practices and beliefs.

Kolli hills: An overview

Most people in Kolli hills of Tamil Nadu, are 'Malayalis', a tribal community. Agriculture practiced here is mainly by small and marginal farmers and only about 15% of them own over 2 ha of land (King et al, 2009). Lack of communication between hill-dwellers and people on the plains increased dependence on millets for food security. Over the years, this led to substantial genetic variability and millet diversity (King et al, 2014). A large part of the region is classified as 'reserve forest' and some forest regions are also considered 'sacred groves', spaces undisturbed by human interference. These sacred groves are natural biodiversity reserves.

Traditionally, not only the Malayali community but also other groups along the western belt of the state and in other Indian states were used to consuming millets as part of their traditional diet. However, easy availability of rice for consumption in the subsidized the public distribution system, combined with increasing demand for cash crops reduced need for millets. The traditional crops and foods consumed have a nutritious and climate-friendly quality. Millets are climate friendly in the sense they can be grown in water scarce conditions. The tribal communities' knowledge of the environment, the importance of conservation and the availability of a wealth of knowledge is evident in cultivation and in other practices. Millet conservation strategies included seed collection, multiplication, distribution, farmer to farmer exchange through seed storage banks, and establishment of such banks were built upon traditional practice (Kumar et al 2015).

The Malayali tribes, said to be from a proto-Australoid group that lived before the Harappan civilization, had abundant knowledge of medicinal plants. With adoption of modern ways of life, there are concerns that this heritage will be lost forever (Rajendran & Manian, 2011). One of the important influencers within this community, the 'Oor Goundars' or local community leaders, command respect and lead the way in social and cultural events. They also have a role in the community's decision making on farming practices and seeds used, as they initiated the selection of seeds and the cropping season.

Aim of the study

The study aims at understanding social practices that conserve traditional wisdom on millets, the indigenous cultural biodiversity within the tribal Malayali community and the role of village leaders as influencers in this process. The research questions considered for the study are:

- What role do cultural practices have in conservation of millets?
- What role do the local and community leaders 'Oor Goundars' play in the conservation process?
- What is the present day relevance of the traditional community influencers within these tribes?

Review of literature

Indigenous knowledge has been referred to as indigenous science, ethno-science and study of knowledge systems to classify objects, activities and events of its universe and about indigenous science interpreting how the local world works through a particular cultural perspective (Torri, 2013). Amidst growing concerns over food and nutrition security, the context of climate change has increased the pressure for most-at-need people in arid and sub-arid regions (Saleh et al, 2013). Primary areas of exploration of indigenous knowledge include the realm of traditional foods, medicinal plants besides methods of cultivation. The flow of information in indigenous communities could be complex and related to maintenance of group or sub-group identities, distinct to the tribe, or indigenous nation (Laird, 2002). Sabar's study of the Chuktia Bhunjia tribes (2012) in eastern India finds traditional methods, technologies and indigenous agricultural system helped people to survive within an ecosystem, manage biodiversity and prevent soil degradation.

Removal or transfer of information from the group can threaten stability and may lead to inappropriate use. Balasubramanian (2003) and Torri (2011) raise concerns over the unsustainable use of medicinal plants for commercial purposes. Traditional crops due to commercial marketing have also moved away from the population where they were consumed, to become elite and expensive food

fads. On the other hand, many communities have a long tradition of being custodians of genetic wealth, particularly landraces, with rare and valuable genes for traits such as resistance to biotic and abiotic stresses, adaptability and nutritional qualities (Kumar, 2015). (A land race is a domesticated, locally adapted, traditional variety of a species of plant that has developed over time, through adaptation to its natural and cultural environment of agriculture and pastoralism). This community knowledge is gaining significance today and can be adopted to challenge vulnerability of food production (Sabar, 2012). Therefore, while there is growing interest in the knowledge of indigenous people and in their use of plants, indiscriminate and commercial use of this knowledge can lead to drastic consequences, destroying the very ecosystem that these communities had strived to preserve. Koochkan and Altieri (2017) while examining the Globally Important Agricultural Heritage Site concept of conserving 'agricultural heritage' found that it is different from conventional heritage conservation. This is because this approach takes into account food sovereignty, nutrition, livelihoods, aspirations and culture of the communities who are nurturing the system (pp 50). The need for a dynamic conservation approach and location-specific management and rethinking conservation of natural resources and the environment, they find, is fundamental in agricultural heritage.

Knowledge in traditional farming systems, is produced and reproduced by small-scale farmers through an iterative process of observation and experiential learning (Hudson, 2016). In Himachal Pradesh, India, culture and traditional knowledge on agriculture, ecological conservation and folk medicine connected people for centuries (Minocha, 2015). Rituals worshiping agro-ecological and livestock-agriculture linkages through social settings, convey to the community the importance of each aspect in their lives and the need to perpetuate them. Also Cocks (2006) quotes Laird to say how natural features and habitats, protected by religious taboos, survived due to strong cultural forces and act as reservoirs of local biodiversity. Like social festivals or occasions, customary laws and cultural norms with rituals showed an intimate relationship with nature where the self and nature are not separate but intertwined (Bavikatte, Robinson & Oliva, 2015) with an 'un-selfing' method of engaging with nature on

its own terms. Pfeiffer (2008) lists expressions of bio-cultural diversity in folk taxonomies, ethno-biological practices, ancestral stories and songs based on local natural resources. Future focus for indigenous knowledge research needs to focus on the process, not just content, where communities become increasingly empowered through self confidence, from their knowledge, to inform interventions which affect them in their everyday lives (Ferguson, 2010). This study aims to look at the process of the transfer of traditional knowledge in Kolli hills.

Theoretical framework and methodology

Through ‘Social Practice Theory’, the authors studied the significance of the community leaders ‘Oor Goundars’ in the context of local festivals, traditional habits and folklore, art or music by which conservation of millets is facilitated. In Social Practice Theory, people are carriers of practice for a particular behaviour to be established within the community and ritualistic action becomes normalized (Schatzki, 2001). Shove et al (2012) suggest three elements to consider in a social practice:

1. Competences (the things people know how to do – embodied skills),
2. Materials (the technology – the actual things that we use when we are doing stuff, e.g. objects, infrastructures),

3. Meanings (the significance of the practice, and how it relates to wider ideas in society, whether seen as empowering, healthy, environmentally friendly, problematic, etc.).

Nash et al (2017) while referring to the practices comprising these three distinct types of elements emphasize that practices are made up of all of these elements interconnected together and cannot be reduced to any single element.

In the current context each of the three components is analysed for strength or weak links in reinforcing traditional knowledge within the community. The elements are abstract but made visible when they come together in a particular setting.

The methodology used is in-depth interviews through a semi-structured questionnaire, focus group discussions and observation. These were preferred since several researchers including Qu & Dumay (2011) indicate the potential of semi-structured interviews to address the major concerns of the localist perspective to produce situated accounts. The communication processes in the past and present are explored in conservation of land races, millet diversity, cropping and food and culinary practices. Also, this was chosen based on the suggested research methodology techniques of McCracken (1988) of how the long qualitative interview is useful, because it can help us situate these numbers in their fuller social and cultural context. The community structure

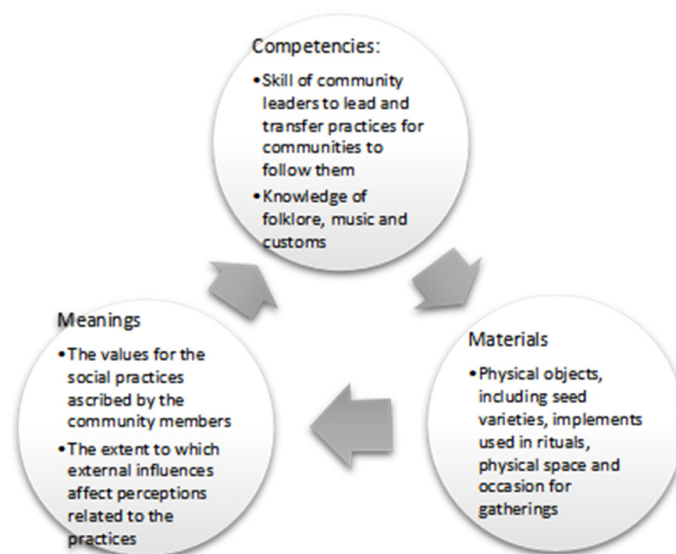


Figure 1: Social Practice Theory - components under study (adapted from Shove et al. 2012)

and leader here is the social leader of the community who plays the role of the ‘*Oor Goundar*’ and not the political or elected representative. Like the opinion leader who mediates mass media messages to their followers, the *Oor Goundars* mediate to the people the traditional knowledge imbibed from their ancestors as well as the modern knowledge they have learnt from the mass media and elsewhere.

Competencies in millets refer to the latent knowledge and skill in identifying millet species and knowledge of conservation, selection as well as cultivation practices, besides the relevant social and cultural traditions. Chosen traditional grains are also part of family tradition. Also latent knowledge within the community is probed. With regard to the *materials* in terms of conservation, there are local custodians of traditional seeds, who have been handing down material from one generation to another. Materials include seeds, the various land races of millets, as well as the means to preserve them with specific methods. The presence or availability of these is explored. The *meanings* of various practices include the presence of social and cultural festivals, traditional habits and folklore, art or music forms. Each of these holds a specific relevance in the local context. The interlinking of this to agriculture, millet production and acknowledgement of their relevance within the local community are examined. The skill and the influence of the community leaders, the availability of required material, time and space, the perception of relevance that these traditional practices have, and influence of external sources in sustaining or weakening the practices is studied.

The semi-structured questionnaire, probing the three components, was used in Kolli Hills in the villages of Thuvrapallam and Naduvalaivu. A total of 31 persons were interviewed in groups of different categories. These included: i) *Oor Goundars* (community leaders) and their family members (5), ii) members of farming families (7), iii) women’s self-help groups (8, 9). Two representatives from the non-governmental organization (NGOs) were also interviewed for an understanding of the social and cultural context. For qualitative interviews, Baker et al (2012) peg the reasonable sample at 30, after a study of various social scientists and students. Hence this size may be adequate for the purpose of this study.

Results

Nadu Valaivu: The name of the village Nadu Valaivu means the centre bent. The village is picturesque, and the houses have a front area that is shaded usually with seating spaces. The agricultural activity here includes coffee, sago and mainly cash crops. They used to engage in substantial millet cultivation earlier, though this has given way to market-driven crops. In a sense, their present cultivation practices reflect the on-going change in the village and in the neighbourhood.

Thuvrapallam: The name of this village also means a basin or crater or a low lying area of legumes (pigeon-pea). Along with millets, these legumes are popularly grown in this region and are part of the regular diet. The shift to cash crops is also happening here but the women are also active in taking decisions on agriculture either along with their husband or independently through information from their peer women farmers and children.

Conservation practices gleaned from literature, from discussions with the community members, and observation during field visits are listed below. These were discussed with the community members. The practices that were probed were *Oor Mugatham*, custodian farmers, *Ponneru*, *Oor Goundar*, folk songs, culinary and food habits and external influences. Of these, the role of the *Oor Goundar* alone is taken up for more detailed discussion.

OorMugatham: The symbolic start of the agricultural season is with the ritual of ‘*Oor Mugatham*’ which from Tamil roughly translates to ‘start of auspicious time’ for our village. It is led by the village community leader who indicates the oncoming agricultural season. As part of the rituals during the *Oor Mugatham*, the community leader chooses and includes a set of varieties to be cultivated by the community in the oncoming season. These are the particular varieties that are deemed more productive for the oncoming season. Following the choice, the community sets out to procure and farm these varieties on their land. This ritual also contributes to agricultural diversity. The community decisions are to be guided by choice of seeds of the community leader. This ritual was recalled by almost all those who were interviewed.

Custodian farmers: The tribal community here has a practice handed down over generations which involves preserving traditional seed varieties within their families. These seeds are stored in conventional methods, usually in the form of a clay pot. The seed varieties that are stored in this manner with ancient roots would be sustained simply because for the family it is a custom, a habit, pride and a means of preserving their family agricultural heritage. In recent years, several families maintain these seeds more as a matter of ritual, rather than actually using them in their fields. Lower productivity and lack of economic incentive in a market-economy are also reasons why these have diminishing popularity. However, since there is a tradition to keep aside some seeds, this is being followed more as a ritual. While some community members holding onto traditional seeds continued to cultivate it, others moved onto cash crops or dispensed with this traditional system.

Ponneru: Translating to ‘the golden plough’ *Ponneru*, is a ritual, during which the community leader pulls a plough into a designated spot in the village. This ritual is accompanied by multiple festivities and a feast. However, here too, community members have decreased their independence in order that they may catch up with what has been laid down in the traditional practice. The festival *per se* has its own significance and place of importance within the community as they recall and speak about it among one another. The belief is that this gives a good harvest and is important to start the cultivation season. In practical terms, the village as a whole begins the cropping season together, after this ritual, leading to more discussion and cooperation and sharing of resources through this traditional practice.

The Oor Goundar

The *Oor Goundar* is the community leader of the village, and has to be a married male looked up to for resolving various issues. He is usually given a place of honour at important festivals. With expertise in identifying seed varieties and selecting for the cropping season, these leaders play a role in conservation of traditional agricultural practices. When there was an issue in the village and the violation of a social rule by a villager, a ‘verdict’ given by

the ‘*Oor Goundar*’ – e.g. in the form of a fine, etc., would be accompanied by a meal to all villagers. The feast would consist of a series of grains including millets and legumes to be eaten by all in the village. Sometimes, the neighbouring villagers would also join in. The date for the feast would be fixed by the local priest along with the *Oor Goundars* and the cost would be borne by the violator as penalty for their actions. The *Oor Goundar* loses place of prominence when he is single. Some marry more than once to retain their status. Finding an heir is difficult with the younger generation moving on to modern lives.

Role of folk songs

The community has a treasure of songs for different occasions. Several of them are even made up on the spot – depending on the situation e.g. on seeing a beautiful woman, or during the month-long festival of Aadi collecting cash and contributions. These songs evoked spontaneously and directed to another person brought in an imbibed culture of folk songs. In fact, the community used to sometimes even sing loudly to scare away wild animals when there were tigers and bears in the region. These have been recorded in a book ‘*Kolli Malai Songs*’ (Vedavalli, 2002). These songs reduced the drudgery of farming but also provided insights and knowledge into how people performed these actions. At the time of a death also, music and millets played a prominent role. When someone passes away, there are separate lament songs and in which millets are used in the customs. Five types of grains are offered and mourners beat their chest and do the ‘*kummi*’ (a type of group dance, usually performed by women, moving around in a circle) during the ritual. This practice is, however, slowly diminishing now.

Culinary and food habits

Women here are not seen as being the primary custodians of agricultural tradition or traditional knowledge. However, when it comes to nutrition or cooking healthy food and traditional ways of cooking millets, these are recounted with nostalgia by and in relation to women. The cooking of millets is recalled with nostalgia and relevance and an important point of reference in the presence of these cereals within

the community. The food is believed to give strength for the hard labour that agriculture demanded, when millet was staple diet. However, this is not the primary diet now and the more urbanized idli (steamed rice cakes) or dosa (rice-based pancakes), or rice-based meals are indicated by all the respondents as being part of the regular diet, while millets for man additional or optional food. Since the public distribution system provides rice, rice is now consumed more than millets or legumes that were traditionally eaten. In the Tamil month of *Aadi*, however, there is a feast for the village, through contributions from people, and new clothes are distributed with a meal of millets.

External influences

In recent years, the work being carried out by the government and the value additions to millets that communities here have been trained in have made a difference to the economic value for millets. Earlier, each of the families used to store their traditional seeds. Now that practice had slowly waned but NGOs are making efforts to reinforce this practice. These institutions have had a role in reinforcing and recognizing, documenting these practices as well as making efforts to revive them. Some of these farmers who have made significant efforts towards conservation have been recognized by international institutions such as the Biodiversity International.

This study looks primarily at the role of the *Oor Goundar* and the existing influence and potential for promoting and conserving traditional knowledge on millets.

Interviews and focus group discussions

Meeting with women's groups: Focus group discussions were held with women in Nadu Valaivu village and in Thuvrapallam village. In the rural setting in this region, women are also farmers and engaged in farm-related activities. However, many of them do not refer to themselves as farmers and only some actively take farming decisions. Women who are engaged in group activities and are members of Self-Help Groups facilitated by the government are more articulate and involved in active decision-making. There are also women's and men's groups set up by the NGO M S Swaminathan Research Foundation

(MSSRF) in this region. Due to the intervention, women are also actively involved in millet processing activities, running their own unit. The two groups of women were probed on traditional practices and influencing factors in conserving millets and how they related to traditional knowledge on this subject.

Community structure and livelihood practices:

The primary source of information is from the Self-Help Groups (groups of women who come together for microfinance and development activities) from which she gets seeds, information on when and what crops to cultivate. Some of the women take these decisions in discussion with their husband. When it comes to agricultural practices, some of them say they do not have the practice of conserving seeds though it was done in earlier generations. For their group activities, they also get support from the government as well as from local non-governmental organizations.

Cultural Practices and agricultural rituals:

The practice of setting up the '*Oor Mugatham*', during which the '*Oor Goundar*' or village leader makes a symbolic start to the farming season, is a ritual that women recall as an important agricultural custom. They refer to the practice '*Ponneru*' as a key ritual. However, these are not necessarily key influencers in farming decisions.

Local leaders: The '*Oor Goundar*' is considered a powerful person, in that, even if he needs to convene a meeting in the middle of the night, the drum beater ('*tandora*') starts to make the announcement and the people assemble. However, when it comes to decision making, major influencers in farming decisions the women make are not so much the political leaders or the *Oor Goundars*, but senior members from within the women's group. The information that they receive from the group is cited as a major influencer in decisions. Also influential women in their village on who the group relies for information are named. In this case, they are named as Rajamma and Bakhyamma.

Media habits: The TV watching routine of women intrudes into the time for traditional social engagements. Every evening after 5 or 6 pm, women say,

they finish their cooking and proceed to watch TV. This influence has intruded and impacted some of the earlier social engagements that women had, resulting in diminishing awareness of traditional music and folklore. Also, the advertisements seen on TV are cited as a reason for their children demanding urban and marketed food products rather than their traditional meals.

NGO intervention: According to this group, information and support comes both from the Government as well as from NGOs like MSSRF. They are satisfied with this information. The people who, however, help take these decisions that guide them are family members. Those who married into this village get knowledge on farming practices from their in-laws. Often, knowledge was transmitted just by listening to and observing their elders.

Cultural practices reinforced millet diversity and nutrition: While music was a major part of earlier generations, modern education is cited as a reason that people have moved away from traditional music knowledge. While songs related to millets have been sung here in the past, this knowledge is declining and only one or two women in the group could recall these; while none of them could actually sing these songs. Women do sing lullabies to their children, but this is different from traditional songs linked to agriculture and farming practices. Millet-related traditional practices recalled by the women include temple festivals with millets in the feasting and festivities. Cropping patterns do include millet along with other crops. However, women find that the next generation children are reflective of the changing lifestyle, where the priority is to study and to move away from agriculture if they want to. Their food habits also are a movement away from the traditional tribal foods though most of them consume millets at least once a week. Millet varieties have been handed down in families across generations. However, this is seen more as a ritual than seed conservation for farming. Women feel more strongly about cooking methods and practices besides agriculture. E.g. cooking practices of types of millet learnt from their elders and that has helped imbibe those traditional more nutritive cooking forms, and kept them healthy in the past. Now, modern foods are replacing these on their daily menu, especially those of children.

Farm family perspective

Farm families are essentially those where most of the family members are engaged in agricultural activities on their farm which may be on their own or leased land. Farming workload in these families is shared collectively, but decisions related to farming and agriculture are taken by the head of the household, usually a man. This is also changing now as there is a shift to more women farmers, and women-led farms and more collective decision-making by both men and women. The decisions are also guided by influence of the market forces and of the education or migration of children. In the groups we met, a mixture of farming for food as well as for cash crops is carried on. Women and men equally answered questions pitching in, one for the other.

Community structure and the government: The structure of the family is a major determinant of influencing decisions related to agriculture and farming. Most decisions are taken after discussions with the elders. A lot of the decision-making is guided by the government's Agriculture Department. The reliance on the panchayat that they used to contact earlier for information has somewhat reduced. However, whenever required they do contact them. Adequate information is obtained from the Agriculture Department besides those on saplings or seeds. However, more support for loans or for information related to machinery is desired. Among cultural practices, the 'Oor Mugatham' is considered important, but not much in the context of influencing farming decisions. Other influences specifically with regard to market information and better livelihood opportunities play a part. Here too, women's groups influence decisions made by farm families.

Local leaders, media habits and NGO intervention: Besides the government, they get primary information from the NGO MSSRF that is working actively in the region. They also get information from their women's groups and Self-Help Groups. They also get regular training in millet value-addition and processing, both of which are important for sustaining farming practices. About the role of the leader of the village – the *Oor Goundar* – they say that his importance is more in being a figurehead of the community, and less in actual agricultural deci-

sions. However, they acknowledge that this person is an important information source and shares his wisdom on a number of issues including on various disputes related to the people in his village. On the use of technology, while they have mobile phones, it took a while to get used to them. However, they still do not get much marketing information in spite of the availability of mobile phones.

Millet diversity conservation and nutrition: Millets are being grown in recent years due to a boost received from s. However, traditional seed conservation mechanisms are very limited and are slowly eroding. Most people who are custodians of traditional seeds have a small quantity preserved in traditional pots. Their families have stopped farming with their seeds, but keep a small quantity, for the sake of tradition. Community seed banks are considered a better means to preserve seed varieties. Farm families also find that millets do not grow as well as they used to and there is reduced seed diversity. The shift to cash crops such as cassava (tapioca) for starch-producing factories in the neighbouring districts has brought them a better income. However, this has also meant that they have moved away from the nutritious crops that they were used to cultivating. Now, from the profit from the sale of cash crops, they buy rice from the market and consume it. In consumption, they say, life has come a full circle since people in the cities are buying millets and eating them now. They also buy millets from outside sometimes than actually growing them on their own lands. However, traditional cooking methods still need to be learnt, such as the *kali* (a form of cooked millet) which information is transferred from mothers to daughters and daughters-in-law. This knowledge is still prevalent in the community as are practices such as cooking foxtail millet for pregnant and lactating mothers.

Cultural practices reinforced: Some cultural practices that were engaged in such as singing while doing labourious tasks helped feel reduction in drudgery. However, the present generation is unable to follow or understand the cultural and social context of many of these songs and, therefore, this practice is largely absent. Musical knowledge, acquired by listening, was not transmitted through any formal learning system. The role of songs in various agri-

cultural activities, household chores or taking care of children is recalled. There were also songs during cooking millets (which was time consuming) and while carrying heavy loads, to help ease the burden.

The Oor Goundar – community leader perspective

The community leader of the village is looked up to for resolving various issues and given a place of honour at important festivals. Engaged in agriculture, usually these leaders are affluent or come from families with larger farm holdings. About 10 acres of land, is considered a large holding, in this region where most are small farmers with fragmented farmland. Numerous paddy varieties, types of millets, vegetables and fodder crops are grown. The cropping pattern ensures that the land remains fertile and also, there is fodder and some biomass utilization eg in the form of rope making from fodder crops. The primary source of information for the community leaders have been their father. They would engage in various activities together, even competing to see who does a better job and learning in the process. Knowledge on crops, on maintaining fertile land, about songs during various activities were experienced and learnt.

Community structure, government and cultural practices: Oor Goundars need to stay married and have children to maintain their position of prominence in the village, leading them to remarry for this status or in case their first spouse did not have children. Oor Goundar Malaisamy who we met, has been married four times, just to keep his social status just to retain his place of prominence. The community believes that a married leader is more 'auspicious'. The intervention of the government is limited here, though with elected representatives also being part of the social fabric, the role of *Oor Goundars* in dispute resolution becomes reduced. The knowledge and transmission of cultural practices is decreasing, since the family members and children of the *Oor Goundars* are adopting more modern lifestyles. Also, education and non-farm jobs has meant the time spent with their father has been limited and knowledge of agriculture, seed variety selection experience is limited in the next generation. While this is usually a hereditary position, women

cannot claim the same place that their father holds in this role. It is only the sons of the leader who gain this importance. As *Oor Goundar* Malaisamy who was interviewed, says, “To really learn, you need to get into the field you need to experience the activity that is how you get the exact technique.”

Local leaders, media habits and NGO intervention: Music is seen as a treasured skill here. Songs are used for different occasions and even made up on the spot. The villagers even used to sing loudly to scare away animals, when tigers and bears roamed their villages. Government schemes have involved people of the village including the *Oor Goundars* in various activities such as ticket collection at local sites or being part of the community patrolling the forests. NGOs provide support and technical inputs on new methods and technologies. Interestingly, value-additions to millets facilitated by these organizations have made a difference to the economic value of millets. However, it is still a struggle to compete with cash crops grown in the region. Traditional seed storage is a waning practice. Also, the presence of cattle was important to the whole agricultural landscape, besides alternative cropping patterns to support crop diversity and soil health. *Oor Goundars* were experts in checking the seed varieties and assessing which ones were good.

Cultural practices, millet diversity and nutrition information: The methods of cooking, especially of millets, was carried out in such a way that once eaten, it equipped them for hard labour and they would not feel hungry for hours together on the fields. However, the families, including the old mother of the *Oor Goundar*, says that this millet recipe is not much used now, having given way to rice and more modern foods like rice pancakes. Even on the day of the interview, rice was being cooked in their homes, a stark difference to the traditional meal that they speak to us about from the past. The younger and urbanized children of the *Oor Goundar* admit that they are not too knowledgeable about these things. The concern is how this knowledge could then be transmitted as the youngsters are not too keen to step into their father’s role in the future.

Findings

The interactions with different types of groups, farm family, women’s groups, millet processing groups and *Oor Goundar*’s family have several common and salient features. These are being analysed from the perspective of the Social Practice Theory – the aspects of competencies, materials and meanings with the following findings: (Table 1)

Conclusion and way ahead

The summary of these findings indicates that in this predominantly tribal community of Kolli Hills, there still exists a wealth of traditional knowledge, systems and materials required to sustain their age-old practices in the form of seeds and methods of farming, cultural ambience and rituals to maintain these. These knowledge systems are also reinforced through various social and cultural practices as has been detailed herein. However, while these practices still exist, their reliance as a main source of information or the meaning ascribed to the role of the social and community leader, the *Oor Goundar*, is limited given the increasing impact of urbanization and market forces that are now influencing this remote hilly region. The challenges in terms of the changing lifestyle and the difficulty in reinforcing the role and relevance of the social leader *Oor Goundar* exist. While they continue to be a treasure-house of knowledge and customs, within the given pressure and with the next generation seemingly not as equipped to take on the role, the question remains – how long can their relevance be sustained?

While the interviews and the focus group discussions with community members have given a sense of the importance and prevalence of certain cultural and traditional practices in millet conservation and nutrition, a more detailed behaviour change intervention focusing on these social practices, and understanding their link to reinforcement of knowledge and conservation may provide a pathway for further research.

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Table 1: Social Practice Theory - Findings of influencers and barriers at Kolli hills

Influence	Competencies	Materials	Meanings
Influences positive to traditional knowledge	<p>Local community leaders' role in decision-making on agriculture, on traditional seeds and practices including the cultivation of millets.</p> <p>Belief in competency of the social leader of the village to take these decisions. This is a prestigious as well as a long-standing tradition.</p> <p>The knowledge imbibed from the ancestors, has been learnt through close interaction and personal experience, with a wealth of latent knowledge.</p> <p>Some external influencers reinforce this knowledge and competencies – such as work by non-profit and research organizations to document these skills and competencies</p>	<p>Cultural traditions, Oor Mugatham, community gathering, custodian farmers help reinforce the millets in their lives.</p> <p>Availability and access to traditional grains as well as to the practice of storing and farming with these grains.</p> <p>Families that continue traditional storage methods have used more of the traditional seeds in their agriculture practice.</p> <p>External influences support in preserving seeds, systems and methods of traditional knowledge within the community; MSSRF for instances conserves 21 varieties of millets <i>in situ</i>.</p>	<p>The rituals and customs as well as the belief in the traditional structures ascribed importance by the villagers.</p> <p>Traditions and customs are still being followed and those interviewed believe largely in these social practices.</p> <p>Communities where they still believe in the rituals, the conservation practices exist in a more sustained manner.</p> <p>When external agencies, reinforcing and giving greater prominence to the seed custodians or the traditional structures, the role of these people acquires new respect and meaning.</p>
Influences reducing impact of traditional knowledge	<p>Additional sources of information and knowledge from outside the village impacting the perceived role of the community leader in reinforcing traditional practices and knowledge among the villagers.</p> <p>Change in lifestyle of the families of the social leader – moving to urbanized jobs or lack of knowledge and interest in holding on to the family stature of leader.</p> <p>The struggle in maintaining the skills of the 'Oor Goundar' in that he must be married, knowledgeable, able to provide valuable inputs into agricultural practices and seed systems.</p>	<p>Cash crops and markets dictating cropping practices; migration of family members; giving up traditional storage practices or storing but not using traditional seeds.</p> <p>Increased cash crops or changes towards modern and possibly less nutritious foods, also decrease in production and consumption of millets.</p> <p>Strong marketing strategy & incentives of seed companies in pushing their varieties among the farmers to replace traditional seeds.</p>	<p>Decreasing effect of the importance and reduced participation in traditional rituals, due to migration and urbanization of younger generation.</p> <p>Parallel or additional information from government extension workers, NGOs, self-help groups, and marketing representative, changing cropping pattern and food consumption.</p> <p>Lack of connectivity or belief in the rituals and social practices; closer connect with modern education and urban jobs and influences.</p>

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The effect of physical activity on public health of university's female staff

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The purpose of this research was to study the effect of 12-week physical activity on resiliency and productivity reducing staff absence based on public health of the female staff of Islamic Azad University. In this paper, we used the pre-test - post-test quasi-experimental study designs. The method of this research was semi-experimental and carried out having pre-test and post-test with pre-post design with two control and experimental groups. The statistical population of the research consisted of 94 academic staff members, of which 48 female staff of the university randomly selected and randomly assigned into experimental (n=24) and control groups (n=24). The tools for gathering data were the resiliency inventory of Konor and Davidson (2003) with reliability of $r=0.90$ and validity of $r=0.84$. The other questionnaire used for the productivity of workplace was and productivity inventory of Hang (2008), its reliability using Cronbach's alpha $r=0.71$ and its validity $r=0.60$ were used in order to measure the study variables. To test hypotheses independent t test and Mann Whitney test were used at $\alpha=0.05$ to analyze the data. The results showed that 12-week physical activity had significant effect on resiliency and productivity of the staff subjects. But the 12-week physical activity has not had a significant while the positive effect on reducing staff absence. Therefore, conclusively, it is suggested that planners and managers in the highly recommended to recruiter regular physical exercise for all staff in organizations use practical plans in the way to provide physical activities to the staff especially female staff who suffer from special restrictions, to take advantages of this plan in order to promote more staff productivity and resiliency which consequently lead to improve and increase the productivity of the organizations.

Keywords: Resiliency, Productivity, Physical activity, Reducing staff absence

Introduction

Today, global companies seeking to implement wellness programs aimed at increasing physical

activity within the organization and employees. According to the World Health Organization, if the staff on average spend a significant amount of their work time behind the desk and be inactive are at an

increased risk of developing chronic diseases (Batman, Cartwright, 2011). One of the important goals of World Health Organization about increasing the physical activity level of employees is awaking people from the importance their personal health during work by means of behavioral challenges and personal habits (Gibbs, Cartwright, 2010). Some scholar's have shown simple programs to increase the activity in the workplace and provided recommendations such as walking up the stairs, sometimes get up and stand, walk and relax during short interruptions, etc. (Emmons, Coulson, McKenna, Field 2008; The World Health Organization, 2002). Given that today's workers and companies of the organizations and companies are experiencing many jobs through their work life, the significantly tolerate more stress and mental problems in this way (Coom, 2012). Today the surface increase of stress and reduce the recovery time, to enhance the resiliency of employees, is a very important work. About human behavior, resilience considered often as a feature associated with the character, personality and ability to fight. Resilience is the capacity, flexibility; ability to control or back to normal after dealing with failure or severe challenge (Waller, 2001).

There is a common belief in the development of resilience that physical activity has a positive effect on reducing depression and stress disorders but so far few researches have been done in the field of physical activity and resiliency. The results of Coom (2012) suggests that physical activity had no impact on resiliency of the staff. Also Wing, Louie, Chaw, Wang Aip (2015) investigated relationship between physical activity and mental health and self-efficacy and resilience in the Chinese young students. The results showed that promote physical activities that led to resilience, could be an appropriate way to improve the mental health of adolescents. But it is not clear how the research could identify the issue about staff. Now one of the most valuable findings of researchers is that giving education and necessary skills leads to increasing resiliency in the people and it seems that resiliency can be searched in the components that have essential role in its continuity, meanwhile we can refer to sport and physical exercises such that physical activity can be as a protective mechanism against mental health problems and other psychological vulnerabilities (Coom, 2012).

Given that human resources is one of the

most important force in organizations, and since man can improve the quantity and quality of their work, provide new plans and solve its problem with its creativity and increase its work force and finds the strategy of reducing costs and it seem that it is the only factor that can create changes in itself and its surrounding. Obviously, the growth of employees and their productivity depends on the integrity of the character and his life stream. Productivity is maximizing using the resources, human resources, facilities, etc. with scientific methods, and reducing the production costs, expand markets, increase employment and improve living standards such that be useful for worker, management and all consumers (Japan productivity center (JPC), 1995). The evidence suggests that physical activity can improve health status and increase the productivity. A group of studies has shown a positive correlation between productivity and physical activity for leisure time of employees (Curry, Beaudoin, Mackinnon, Gray, 2012).for example Hutchinson and Wilson (2011) investigated 29 studies and concluded that workplace is a convenient location to create slight changes in the employees physical activity and this has benefits to managers and employers such as it leads to improve and increasing health and as a result increases employee productivity (Koori et al,2012).

Such that Koori et al, 2012 stated that managers and planners that provide physical activities in the form of plans and programs for staff outside and inside organizational environment, can have many benefits. These benefits include increase productivity and job performance, cost-effectiveness, return on investment, increase the presence, and reduce absenteeism, turnover, reduced sick leave, disability, in addition to items such as improving brand of the company. Ben-Ner, Paulson, Koepp, Levine (2012) have found significant relationship between health, physical activity and job performance (staff productivity) by investigating the impact of walking on the productivity and health of employees financial services of a firm in the state of Texas.

Whitney (2016) studied relationship between physical activity and productivity and the absence of University staff of Colorado. The results showed that physical activity leads to increase productivity and reduce absenteeism of employees. Bernard, Proper, Hildebrandt (2007) have not found a relationship between productivity and perceived fitness

of the staff. Gaoshan (2014) by studying relationship between work productivity and physical activity among full-time employees in Singapore showed that a healthy lifestyle is associated with higher productivity but sick leave of employees did not decrease with participate in physical activities. Studies have shown that staff who are correlated with their profession and employer their productivity is more because their motives are beyond individual factors. They are more focused and motivated than their colleagues.

At present time, one of the most important topics in the companies and enterprises is the influential factors in increasing in increasing resiliency of the staff, due to reducing mental stresses and intellectual problems of human resources who are of the most important human resources. Studies have shown that physical and mental health of individuals can be a great major step in improving job performance and productivity, and the quality and quantity of the work. On the other hand, participating of employees in physical activity programs known as a suitable way for primary prevention of many diseases. Therefore, due to the importance of the mentioned topics, the main problem of the research is that. If by participating in the programs of physical activities, it is possible to improve the resiliency of the people? Do participating of staff in the programs of physical activity leads to productivity, reducing absence of the staff in the work?

Given that offering physical activities have not been considered by the managers in Iranian organizations especially among the staff of Universities and on the other hand participating of staff in sport programs is not at the priority of managers planning, thus the purpose of this study this was to investigate 12 weeks physical activity the effect of resiliency and job performance of female employees of Islamic Azad University.

Methodology

The method of the research was semi- experimental field and carried out having pre-test and post-test with two control and experimental group. The statistical population of the research consisted of 94 from whom female staff of Parand University of Tehran were randomly selected. To determine the sample of research after enrolling staff were selected random-

ly for experimental and control groups. Sample size was determined 54 as the sample according to the statistical power 95/0 and the significant level of 5/0 and the number of groups and also using software GE Power .Then among 48 individual 24 people placed in experimental group (12 people for resiliency variable and 12 individuals for productivity and staff absence of staff variable) were substituted randomly in two groups. Then the experimental group participated in a course of 12 weeks' physical activity program, each week 3 days and each day 1 hour while the control group was not given any exercise or other programs. After completing a course of 3 months exercise two experimental and control groups invited to participate in a post-test to investigate experimental factor confirmation and both groups again completed the questionnaires of the research to measure dependent variables (resilience and productivity) as post-test. Connor- Davidson, Resilience Scale (CD-RISC) was used for measuring resiliency variables. This scale has 25 items that are scored in a 5-point Likert scale from 5 (always correct) to 1 (Completely wrong). Cronbach's alpha coefficient in the pre-test and post-test was 0.91 and 0.90, respectively. To determine validate of Kunar and Davidson Inventory (2003), concurrent criterion validity method was used. Vagnild Resiliency Scale (2009) along with Connor- Davidson (2003) inventory was given to experimental and control groups. The reliability of these questionnaires was 0.84. The productivity and public health scale of Huang (2008) was used for the productivity and staff Presence and absence of workplace. This questionnaire had nine values of 7 items. the 7 indicates always, 6 indicate most times, 5 half of time, 4 sometimes, 3 never, 2 .at all, 1 don't know. The scoring is done between 7 (always) to 1 (I don't know). The reliability of productivity variables was obtained using Cronbach's alpha coefficient. The Cronbach's alpha coefficient was in pre-test 0.91....and in post-test was 0.90. The concurrent criterion validity was used to measure validity of general health and productivity of Huang (2008). In this method Attendance at work (Lerner et al., 2003) questionnaire was given to participants of experimental and control groups. The reliability was obtained 0.60. To analyze the data, descriptive and inferential statistics for participation of independent group's t test, Mann-Whitney U test for variables distance and was used for categorical variables.

Table 1: Age distribution of women staff according to experimental and control groups

Feature										
Age	Experimental	Group	30to35	36to40	41to45	Over45	30to35	36to40	41to45	Over45
		2. Relisiency	3	5	2	2	25	41.7	16.7	16.7
		3. Productivity	3	3	3	3	25	25	25	25
	Control	2.2. Relisiency	3	2	3	4	25	16.7	25	33.3
		3. Productivity	3	5	2	2	25	41.7	16.7	16.7

Results

Table 1 shows descriptive results of staff ages.

As it can be seeing the women staff of Azad University unit of Parand has the most frequency percentage of age 30 to 35 that is related to experimental group (%41.7). The highest percentage 36 to 40 years in experimental group is (50%), the highest percentage 41 to 45 years is experimental group 3 (7/16%), The highest percentage of people older than 45 years related to experimental group 3 (25%), the percent aged 30 to 35 years in 3 groups 1, 2 and 3 is (25%), The highest percentage 36 to 40 years is related to the control group 3 (7/41%), The highest percentage 41 to 45 years for the control group 1 and 2 is (25%), The highest percentage of people older than 45 years for the control group 1 and 2 is (3/33%).

The first hypothesis results showed that 12-week physical activity has significant effect on resiliency of female employees of Islamic Azad University. As Table 2 shows.

The significance level obtained less than 0.05 ($t(22) = 3/94, p > 0.05$). Thus there is the assumption of means difference. These results are consistent with %95 confidence interval for difference between two groups of experimental and control (1.36 and 0.42) which not includes difference mean equal to zero.

According to obtained results and by comparing the difference mean of pre-test and post-test in the experimental groups (0.71) and control (-0.81) the score of post-test resiliency in the experiment group (3.02) higher than its pre-test (3.73). While in

the control group of post-test (3.76) is less than pre-test (3.57) which finally led to the mean difference of pre-test and post-test in the experimental group would be more than control group. Thus according to meaningfulness the assumption of research it is clear that the mean of pre-test and post-test in the experimental group is more than control group

The second hypothesis of research showed that 12 weeks' physical activity had a significant effect productivity of female staff of Islamic Azad University.

According to results of table 3, the significance level is less than 0.05, ($t(22) = -5.55, p > 0.05$) thus there is the assumption of means difference. These results are consistent with %95 confidence interval for difference between two groups of experimental and control (0.35 and 0.94) which not includes difference mean equal to zero.

According to obtained results the posttest score in the experimental group (4.20) is more than pre-test (3.71), while post-test score in the control group (3.54) is less than pre-test (3.70) and by comparing mean difference of pre-test and posttest in the experimental groups (0.49) and control (-0.16) it is clear that 12 weeks physical activity had been effective on productivity of female staff in the Islamic Azad University.

Results of the study indicated that 12 weeks, physical activity has been effective on reducing absence (Table 4)

Table 4 indicates the results of the test. Given that in scores of pretest and post-test the meaningful level is obtained higher than 0.05, it can be con-

Table 2: Compare mean of resiliency in experimental and control groups

Variable		The difference between average Pre-test and post test	t	df	sig	Confidence interval of 95% for Mean differences	
Resiliency	Experimental	0.71	-3/94	22	0.001	low	high
	Control	-0.81				0.42	1/36

Table 3: Comparing the mean of productivity in the experimental and control group

Variable		The difference between average Pre-test and post- test	t	df	sig	Confidence interval of 95% for Mean differences	
Job productivity	Experimental	0.49	4.64	22	0.001	0.35	0.94
	Control	-0.16					

cluded that 12 weeks' physical activity has not been effective on the reducing absence of the female staff in the Islamic Azad University.

Table 4: Results of U test of Man Vitney of the variable of reducing absence

U test of Man Vitney		Meaningful level	Result
	Pre-test	0.08	Null hypothesis not rejected
	Post-test	0.22	Null hypothesis not rejected

Discussion

The result of this research showed that 12 weeks' physical activity leads to increase resiliency of women staff in the Islamic Azad University. Results of this study are inconsistent only with results of Coom (2012). Coom (2012) found that by studying the impact of physical activity on the resiliency during 16 weeks on the 200 staff of a commercial company in the New Zealand, Physical activity had no significant positive effect on resiliency staff. The inconsistency of mentioned study with present study maybe due to temporal and spatial conditions and other factors that could potentially be more effective and given that the value of resiliency change at the organizational settings and among their staff can be under another factors rather than physical activities. And on the other hand, probably the lack of good protective factors (good deal, good problem solving skills, positive self-concept, motivation and positive ethnic identity) in some organizations leads to attenuate the impact of physical activity on the subjects. in addition the resilient individuals may be affected by the stress which are strongly enough to put and submit to its psychological and physical disorders. In other words, stress will cause the employees be surrender to psychological and physical disorders and health factors such as physical activity not be effective on the improving the resiliency of the staff,

or it can be said that the resiliency variable is among mental factors that more time is needed to change it.

According to Stewart, Reid, Mangham (1997), the resiliency changes during time and it can be increased by protective factors (good deal, good problem solving skills, positive self-concept, motivation and positive ethnic identity). In addition to the resiliencies people may undergo by stress that are strongly enough and be submit in psychological and physical disorders. In fact, job stress leads that staff be surrounded by psychological and physical disorders and health factors such as physical activity be not effective on improving their resiliency. On the other hand, Wing et al (2015), Kwada et al (2011), Throng (2011), Martin et al (2011), in their study indicated that physical activity has meaningful impact on improving resiliency so that Wing et al (2015), investigated the relationship between physical activity and mental health with mediating variable of efficiency and resiliency in 775 Chinese students.

The results showed that promote physical activity leads to resiliency. Also Cevada, et al (2012) by examining the relationship between exercise, resiliency and quality of life and anxiety in athletes and non-athletes, found that, there was significant difference between resiliency, anxiety, and one of the aspects of quality of life (public health). In fact, athlete's showed higher resiliency and better quality of life than non-athletes, when the individuals using their life experiencing in order to social and psychological growth, they can learn resiliency as an adult (Maddi & Khoshaba, 2005). Research has shown that adolescents and adults can also learn resiliency. Lemay & ghazal (2001) and Losar et al (2002) believe that there is no age limit for positive growth, resilience and adaptability and it is changeable for people according to position in life for people. Stewart, Reid and Mangham (1997) are believed that resiliency would be changed over time and it can be increased in the people through protective factors (luthans, 2002).

In general, most evidence in this regard sug-

gests that the resiliency is acquired and it can be made in people. The characteristics of resilience people, are important beliefs that facilitate the development and occurrence of resiliency in families and can help people in three aspects of give meaning to adverse conditions in the area, having a positive outlook and a transcendental and spiritual beliefs (wallsh, 2006). In a different study some of individual and virtues characteristics have been identified as indicators of resiliency that among them, we can refer to factors such as psychological well-being, individual control and coping skills (Skehill, 2001). A large number of studies have shown that there is a significant relationship between physical activity and well-being and general health (Strohel,2009) Coom 2012 believes that, physical activity, may provide a protective system against mental disorders and other psychological disorders. Therefore, it can be said that, physical activity can be among factors that are effective on some features and individual virtues and leads to resiliency in them.

Results of research showed that 12 weeks' physical activity has had significant impact on the productivity of female staff of Islamic Azad University. Results of the research are consistent with findings of Witney (2016), Ribra et al (2015), Justain (2015), and Prank et al (2004). The result of their study showed that in researches that Health and hygiene conditions as well as physical activity helps to increase employee productivity such that Witney (2016) investigated the relationship between physical activity and productivity and absence of staff university of Colorado. The results showed that physical activity helps increase productivity and reduce absenteeism employees. Justes 2015 in his study investigated the impact of physical activity on the productivity, general health, employee attendance and absence at work in Danish organizations. The results showed that physical activity reduces short-term absenteeism and increased employee productivity. Ribra et al (2015) investigated interactive communication between mental health and productivity based on physical activity and sitting time of 557 people University staff in Spain.

The results showed that there is a significant relationship between physical activity and mental well-being and productivity of employees. There is strong evidence for positive effects of health physical activity. After health benefits, evidence of a positive

effect on performance and results associated with developing work-related physical activity. Promoting physical activity is supported as an important aspect of an organization's business plan that can improve the health and productivity of employees. This is confirmed by Rongen, Robroek, van Lenthe, Burdorf, (2013), Brown, Gilson, Burton, Brown (2011), Pronk, Kottke, (2009), Golaszewski, Allen, Edington, (2008), Proper, Mechelen, (2007), Ackland, et al. (2005). Also these results are inconsistent with findings of Ben Ner et al (2012), Bernardz et al (2007). Ben Ner et al (2012) investigated the effect of walking over the treadmill during working on productivity and health of Staff financial services company in Texas. 12-month long trial study was conducted on employees.

The results showed a positive relationship between physical activity and job performance (staff productivity). This discrepancy may be due to the type of provided physical activity or differences in study method. On the other hand, might be said that the difference to be due to determining factors affecting productivity and each of scientists and experts have identified factors as contributing factors and briefly factors such as continuous professional training for managers and employees, enhance motivation among employees to work better and longer, creation of suitable grounds for innovation and creativity is effective in managers and staff productivity. Results of the study indicates that 12 weeks' physical activity has not had meaningful impact in reducing the rate of absences in a past month.

Results of this research is consistent with study of Goshen (2014), Lahiti et al (2010). Lahti et al (2010) investigated the impact of physical activity on the medical absences (absences due to illness) of 6465 individuals of the staff of Helsinki. Results indicated that physical activities with moderate intensity would not reduce the amount of medical absences. The results of this research is inconsistent with the researches of Whitney (2016), Jastsin (2015), P. et al. (2005), Jakobson and Aldna (2001). Perhaps, the cause of the inconsistency is the rate and intensity of physical activity applied in the study. They conducted physical activity with high intense that could reduce the rate of absenteeism among staff but in the present study, physical activity provided in moderate intensity, that resulted in reduction in staff absence. As the findings of the study of Parvar

et al (2005) revealed that moderate physical activity (physical activity three days a week for 20 minutes) did not significantly associated with sick leave (due to illness) but vigorous physical activity (at least three days a week with high intensity) were significantly associated with less sick leave. Such that Pronk & Kottke, as well as, introduced witnesses that were indicating the positive impacts of vigorous physical activity in reducing sick leave. Results of Witney research (2016) also indicated that physical activity leads to increase productivity and reducing the absence of the staff (2015). Justin indicated that, physical activities reduces short-term absenteeism and increased employee productivity. Hutchinson and Wilson (2011) in this regard argue that managers and planners, improve health outcomes associated with physical activity interventions may lead to a reduction in staff sick leave.

Conclusion

The results showed that physical activity has a significant impact on resiliency and staff productivity. Given that human resources are one of the major forces in organizations, it should all the areas that increase resiliency and productivity of employees to be provided including physical activity, as well as research findings indicate that physical activity is appropriate to improve employee productivity. Since the increase in the level of health that is, healthy workforce and subsequently further production, will improve mental and physical health as employees improve their job performance. As a result, attention to human resources in organizations is of great importance. Therefore, the managers of organizations, such as managers of human resources in the organizations, should provide health conditions and mental and physical health of their staff with designing the programs of physical activity for the staff to give appropriate opportunities to their staff. in order that by doing physical activity in the work time not only be benefited from mental advantages of physical activity, so that they can increase productivity and consequently cause to productivity of the organization. therefore, managers and planners should provide comprehensive and more precise plans about the programs of physical activity and exercise at workplace for the staff, not only in a short-time period, but also in all long-term programs

and as well as, such programs must be taken in the agenda of the organization.

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Outreach and marketing strategies for dairy products in Kazakhstan

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Introduction

An important priority of Kazakhstan is the achievement of the leading positions in the world food market and the increase of agricultural production. The development of the food industry in Kazakhstan is currently particularly relevant in the changed environment conditions - with accession to the Customs Union and the planned entry into the WTO, as well as due to changes in the internal environment - in conditions of population growth, intensive growth in food consumption and changes in consumption patterns towards more quality and diverse products. 120 billion KZT were allocated from the National Fund on realization of investment projects on import substitution and development of new export-oriented sectors in the agro-industrial complex. One of such sectors is the development of a network of dairy farms.

In modern conditions of economic instability, the problem of using a strategic approach in the management of enterprises acquires special significance. For modern entrepreneurial activity there is a high degree of competition in the market, which requires the enterprises to pay special attention to ensuring their competitiveness (Domozhilkina Zh.V., Dzhabbarova N.O., 2016).

Towards the solution of tasks to provide food for the citizens of Kazakhstan, a special role belongs to the food industry. During the years of the republic's independence, the food industry experienced significant structural changes that predetermined the further course and dynamics of its development. In general, the country's potential allows to fully ensuring the stability of the domestic food market and

guaranteed its saturation with affordable food. In turn, the food products produced must be of high quality and competitive in both the domestic and foreign markets.

Only if there is sufficient competitiveness, an enterprise can stably exist and function in a competitive environment and receive income. It is quite objective that the activities to improve and ensure the competitiveness of enterprises in market relations should be the most priority among all others (Asylbekova N.T., 2013).

Today, no one monitors the consumption of dairy products, and after all, such statistics illustrates the standard of living of the average consumer and at the same time helps the manufacturer to navigate in the vagaries of the market. I will cite an old, but characteristic fact. In the first half of the 80s, the republic consumed 600 tons of dairy products daily, in the dashing years of perestroika - only about 125. People simply did not have money at that time. Today, the purchasing power of Kazakhstanis has undoubtedly grown, but even against this background, the prices for dairy products in the country remain very high. Moreover - they are increasing every year. There is a very erroneous opinion that dairy enterprises at such prices have big profits. In fact, the transition from large-scale production to small-scale production negatively affected the price level. It would seem that milk is purchased for 30-40 tenge, and after the normalization it is sold at 90 tenge, that is, more than twice as expensive.

But the bitter truth is that dairy production for small businesses is unprofitable. In addition to raw materials, so-called miscellaneous expenses make up 40-50 percent of unit costs. This is salary, tax-

es, electricity, water, transportation. If earlier trade came for products, now manufacturers themselves go around the outlets and offer their goods. And the smaller the capacity of the plant and the wider range, the greater the proportion of these, other, costs. For example, if the cost price of yogurt is 15 tenge, then in 5 tenge, plus a small entrepreneur packs - a disposable plastic cup. If we ourselves do not produce packaging materials, inventory, packaging, our entrepreneur is simply not profitable to expand the range (Utesheva A., 2017).

Today, due to the difficult situation in the economy and changes in the international situation, new approaches are being considered that can ensure qualitative growth in the agro-industrial sector, including in the dairy sector. Dairy cattle breeding and dairy industry are one of the most important subsystems of the agro-industrial complex of the Republic of Kazakhstan. The dairy industry is a set of enterprises that produce and process complex milk for whole milk, sour milk products, cream and ghee, natural cheeses, processed, brine, cheese, whole milk powder, etc (Nurpeisova M.M., 2016).

Competitiveness and enterprise

An important role in ensuring that the country receives a stable share of world income in the context of globalization is the growing competitiveness of the real sector of the economy by strengthening the positions of domestic enterprises in both domestic and global markets. Numerous studies show that increasing the competitiveness of companies positively affects the economic growth of the country. In the future, domestic and foreign producers will have to compete with the openness of markets, and international relations - expand and deepen due to the interaction of economic entities of different countries. Therefore, it is important to assess the factors that contribute to the formation in the market economy of competitive advantages of national firms and to consider the features of their impact in the new conditions (Asylbekova N.T., 2013).

Competitiveness of an industrial enterprise can be represented as the ability to organize activities with the full use of potential opportunities aimed at improving production efficiency. This determines its development, on the basis of its competitive advantages, the ability to compete with other enterprises

- competitors in the industry market with acceptable risk for it in a certain period and satisfy consumers with the supplied goods, services and performed works. From the above formulation it follows that not all properties of an enterprise enter the concept under consideration, but only their totality. In combination, the properties of the enterprise include only those that enable the enterprise to compete and function in the market (Dadabaeva D.M., 2009).

A competitive strategy is an enterprise plan to ensure a certain level of its competitiveness. According to Michael Porter, a competitive strategy can be defined as “a framework for decision-making with priority actions that yield results in a competitive market” (Porter M., 2005, p. 26).

In Kazakhstan, the development of the food industry is important, both from the point of view of ensuring the country's food security and the development of the agricultural sector of the economy, since the food industry is one of the largest consumers of agricultural products.

In recent years, in various areas of the food industry, enterprises have emerged that, in a competitive environment, through improved management, marketing, and modernization of production with an emphasis on advanced technologies, are emerging as leaders and increasing production.

Some sub-sectors of the food industry face the problem of shortage of raw materials, in particular, the oil and fat sub-sector. In the dairy and sugar industry in 2009, there was a problem of rising raw material costs. Reducing the area of used arable land, reducing the number of animals - all this affects the level of production in the food industry (*Sectorial analysis of Kazakhstan's industry for competitiveness*, 2011).

The food market, as a structural element of the entire aggregate market, is a system of economic relations that form in the production, processing, storage and sale of food. It is directly related to meeting the needs of the population in food, its saturation largely depends on direct interaction with other sectors of the consumer market. The economic specificity of the food market is determined by the hierarchy of needs, high degree of locality and autonomy, institutional and structural stability of consumption of its goods, low price elasticity and strategic importance at the macro and micro levels.

The most important sector of the food market is

the market for milk and dairy products.

Consumption of the latter directly affects the health of the nation: according to scientists, milk is one of the basic food products, an important component of a healthy diet of people of all ages throughout the world.

At present, the domestic market has a fairly stable trend of stable growth in milk and dairy production. The dairy industry in Kazakhstan finished 2010 with an increase in output of marketable products by 23%. The output also increased in physical terms: milk - by 28.7%, cheese and cottage cheese - by 13%, yoghurts, milk and cream fermented or fermented - by 25%. The volume of investments in the fixed capital of the dairy industry in 2010 increased almost 3 times. The quality of dairy products, regulated by technical regulations, in general, corresponds to market requirements. The production capacities of the dairy enterprises of Kazakhstan are sufficient to meet the needs of not only the domestic market, but also the market of near abroad. However, the potential of the industry is not being implemented effectively enough: today, about 25% of production capacity is used. One of the reasons for this situation in the dairy industry in Kazakhstan is the high competition from imports, primarily Russian producers. The share of imports in providing dairy products remains high. In the import structure, the share of butter, cheese, cream of condensed, dry, whole and skim milk, cottage cheese is high.

Of course, in the presence of foreign players in the dairy market there are not only negative aspects. Competition for the attention of consumers forces domestic producers to switch to modern packaging materials, improve technologies, introduce new production lines, modern equipment, develop new product formulas and create demand for them. In a word, imported products stimulate the development and improvement of the Kazakh dairy industry (Nakipova G.N., Kamenova M.Zh., Akhmetova K.A., 2013).

“Milk is one of the basic food products, an extremely important component of a healthy diet of people of all ages throughout the world. We believe that in the coming years the level of milk consumption in the world will be determined by two main trends: the continued growth in consumption in emerging markets, The shift in consumer preferences towards the consumption of packaged milk”, con-

siders Denis Jonsson, president and CEO of Tetra Pak (Shaternikova A., 2010).

Milk and dairy products are among the most consumed food products in the world and in Kazakhstan. Milk and dairy products are generally understood to mean liquid whole milk and sour milk products, cream, cheese and cottage cheese, butter, milk powder (skim and whole), dry milk fat, whey, condensed milk products, milk protein concentrates, ice cream. Among fermented milk products, yogurt, yogurt, acidophilus, yogurt (including Greek), tan, ayran, kumis are the most popular. Buttermilk, fermented baked milk, varenets, sour cream.

World prices for dairy products are set by the Global Daily Trade auction, which is held by the world's largest producer of dairy products and is held once every two weeks (Miroshnichenko D., 2016).

Products of the Kazakh dairy industry, despite the overall increase in production, remain uncompetitive for the products of neighboring countries in many product groups.

For the Kazakhstan dairy producers, the activity in the market conditions was fraught with serious problems and considerable risks. Despite the fact that the agrarian sector has traditionally been given a significant role in the development of the national economy, and hence, at the first glance, the development of the dairy production industry should be brought at least a decent raw material base, the producers and analysts state a slowdown in the industry growth rate and Anxiety talk about the onset of imports. At the same time, prices for dairy products can hardly be called democratic, and some consumers, not related to the secured category, already today cannot afford to indulge themselves with the purchase of cottage cheese or, for example, sour cream. Meanwhile, the consumption of dairy products directly affects the health of the nation and reflects the level of welfare of society. While in the first half of the prosperous 1980s, Kazakhstani people daily consumed up to 600 tons of dairy products, during the crisis of the 1990s this figure dropped to 125 tons per day. The current global crisis, of course, affected the state of the dairy market, but analysts believe that in the coming years, their consumption will not just decline, but will increase (Shaternikova A., 2010).

The slowdown in the growth of the industry in-

dicates the onset of imports. At the same time, prices for dairy products are quite high, and some consumers, not related to the secured category, can already today not every day buy cottage cheese or, for example, sour cream. While in the first half of the prosperous 1980s, Kazakhstani people daily consumed up to 600 tons of dairy products, during the crisis of the 1990s this figure dropped to 125 tons per day.

The tendency to reduce own production is also observed in 2009: the production of cheese and curd by domestic enterprises decreased by 4.2%, and condensed milk and cream - by 19.5%.

Accordingly, the positions handed over by the domestic industry for the production of dairy products in the growing market are replenished by imports. According to the results of 2008, the import of dairy products amounted to 144.4 thousand tons for the amount of \$ 227 million, while for certain products import supplies noticeably prevail over the output of Kazakhstan producers. The share of imported butter in the total market volume was 31%, cheese - 61.3%, condensed milk and cream - 85.3%. The main supplier of dairy products to the Kazakhstan market is Russia, which accounts for more than half of all deliveries, or about 70 thousand tons, for a total of \$ 122 million. About 15.8% of the total volume of imports falls on Belarus, 15% - to the share of Ukraine, 7.7% - to the share of Kyrgyzstan (Tleuberdinova A.T., Shalataeva G.T., 2013).

Already ten years ago, dairy products in the market of Kazakhstan were the same, like clones - both in quality and price. Four or five items: milk, kefir, cottage cheese, cheese - and we did not expect more. Then in each area there were a couple of large monopolistic associations with a capacity of 50 to 200 tons of processed milk per shift and a network of district plants and reception points.

Today in the republic there are about 250 small plants with a capacity of 5 to 50 tons of milk per day. Having voluntarily undergone technical re-equipment and modernization, they enriched our market with suzbe, kurtom, irimshik, shubat, ryazhenka, yogurt and so on. Kazakhs also willingly buy Russian yoghurts, Kyrgyz butter and drinks like "Tana", Ukrainian cheeses and other imports.

The early accession to the WTO, when we will have to broadly open domestic markets to foreigners, will provide the country with a favorable trade regime with 140 member countries of the organiza-

tion. But can the dairy enterprises of the republic become full participants in the international division of labor in this sphere; enter the world markets with their products? This is a big question (Utesheva A., 2017).

An important factor that has influenced the growth of milk consumption, especially in emerging markets, is a radical change in the approaches to the question of packaging and consumption of liquid dairy products. In the period from 2005 to 2008, the share of unpackaged milk in the world market fell by 1.8%, while the share of the ultra-pasteurized milk market, which can be stored, closed and transported at room temperature, increased by 3.2%. According to the forecasts of Tetra Pak, in the period until 2012 the annual cumulative growth of world consumption of ultra-pasteurized milk will be 5.2%, and annual consumption will exceed 70 billion liters. Consumption of packaged milk and other liquid dairy products demonstrates higher growth rates compared to the category of liquid dairy products. It is expected that by 2012 the share of packaged milk will be 72% of the world consumption. This change in the structure of consumption, including in emerging markets, indicates an increase in consumer awareness. Until recently, in many countries, buyers were convinced that the best milk is that which is delivered directly to them from the cow. But over time, they have learned that such milk can contain pathogens that can cause diseases such as salmonellosis and brucellosis; In addition, it spoils much faster than packed. Finally, at the current pace of life, not every landlady has time and the desire to boil milk, not to mention the fact that this procedure changes the properties of the product (Shaternikova A., 2010).

At present, with the transition of the economy to market relations, the independence of enterprises, their economic and legal responsibility increases. At the same time, the role of competition is also increasing, as the main mechanism for regulating the economic process. In such conditions the firm cannot be limited only to the current planning and operational management of its activities. There is a need for strategic thinking, which must be embodied in a program of actions that clarifies the goals and means of the chosen path of development. Just a few years ago, strategic marketing was presented primarily as a definition of the general direction of the

company's activities, oriented to the future and reacting to changing external conditions. Recently, the main focus is on the formation of a market-oriented effective organizational and managerial system and distribution in accordance with these management resources of the firm. In other words, the marketing strategy is viewed as a unified system for organizing the entire work of the firm.

Strategic planning is necessary, as it allows the company to respond quickly to changing market conditions. Each company must find its own style of work, which best takes into account the specifics of the conditions, opportunities, goals and resources.

The strategy is a general, non-detailed plan of an activity covering a long period of time, a method of achieving a complex goal that is indefinite and central to the manager at the moment, further adjusted for the changed conditions of the existence of a strategic manager. The objective of the strategy is to effectively use the available resources to achieve the main goal.

A marketing strategy is a set of long-term decisions on how to meet the needs of existing and potential customers of the company through the use of its internal resources and external capabilities. The purpose of developing the strategy is to determine the main priorities and proportions of the company's development, taking into account the material sources of its provision and market demand.

The strategy should be aimed at optimizing the use of the company's capabilities and preventing erroneous actions that could lead to a decrease in the company's performance.

Development of the organization's marketing strategy is the need for each organization to conduct its activities planned.

Marketing strategy determines not only the ways of development of the organization, but also outlines the struggle with competitors, targeted separation and isolation from competitors in order to fill the high leading positions in the given sector of the market.

Outreach and marketing strategies

A marketing strategy is a general definition of an organization's actions that can exist in the form of:

- the organization's long-term development plan;

- a plan of surgical interventions in case of a sharp dynamic surge in a competitive market;
- algorithm of actions of reorganization of the enterprise and other.

Development of a marketing strategy is necessary to ensure the effectiveness of marketing activities. Development and implementation of the marketing strategy in the consumer markets requires from any company the flexibility, the ability to understand, adapt and, in some cases, influence the actions of market mechanisms through special marketing methods (Shaubert O.Yu., 2016).

At the enterprise level in the long run, an integrated competitive strategy should solve the following tasks:

- determination of directions of economic development and structural transformations under given resource constraints, which allows to analyze the features of the external and internal environment and compare them with the real and permissible possibilities of the enterprise;
- assistance in accelerating the integration of economic and social systems, monitoring changes in the external environment;
- promotion of the basic ideas of change, promoting their development and perception by different groups of people interested in the existence, functioning and achievement of the objectives of the enterprise.

The development of a competitive strategy is a component of the entire management structure, which is an interrelated set of management decisions for the creation and use of the organization's competitive advantages.

In order to improve the process of forming marketing strategies, we propose a model of the process of developing marketing competitive strategies at the enterprises of the agroindustrial complex. This model is proposed for use in the strategic planning of marketing activities of agricultural enterprises.

The model is used to form a system of marketing strategies of the enterprise on three levels of strategic management: corporate, functional and instrumental. Accordingly, the process of forming marketing strategies occurs in three stages:

Stage I: Formation of corporate strategy of the enterprise. A strategic alternative to the enterprise (corporate growth strategy) is determined on the basis of a comprehensive situational analysis of the marketing environment of the enterprise, taking into account the current mission of the enterprise. The first step is to analyze the influence of environmental factors on the activity of the enterprise under study. Factors influencing the enterprise indirectly through various economic, political, legal, socio-demographic and technical-technological institutions and processes (PEST factors) that shape the macro environment of the enterprise, as well as the factors of the immediate environment of the enterprise: consumers, suppliers, intermediaries, competitors, and contact audiences, which together form the microenvironment of the enterprise. Evaluation of these factors allows us to identify opportunities and threats from the external environment for the enterprise under investigation.

Stage II: Formation of functional marketing strategies. The development of a strategy for market coverage, positioning strategies and differentiation is carried out using STP-marketing tools. The first step is the process of segmentation of the enterprise market. Based on the data received, a decision is made to select one or several target segments, and a strategy for reaching the target market is formulated. If the division of the enterprise market into segments is impractical, the strategy of aggregated (undifferentiated) marketing is applied. The next step is the market positioning of the enterprise and its products, that is, the creation of a certain image in the minds of consumers, different from the images created by competitors. For this purpose, differentiation strategies are used, which in this case act as competitive strategies, since they are aimed at establishing differences between the enterprise and its competitors. There are four main types of differentiation: image, product, service and personnel. Functional marketing strategies are designed to determine the position that the company seeks to take on the market.

Stage III: Development of tool marketing strategies. To achieve this goal, the enterprise must develop a set of marketing toolkits that must ensure the effective positioning of the enterprise and its products in the target market. Strategic decisions are

made on the following elements of the marketing program: product, price, distribution channels, promotion methods and personnel. At the same time, it is necessary to ensure a systematic approach to the formation of strategies for individual elements of the marketing mix: to agree on their goals and overall orientation.

Effective positioning and development of the appropriate marketing mix for the target market is the source of the company's sustainable competitive advantage in this market (Yurkova E., 2008, p. 171).

There is a wide area of market competition strategies that can be combined into a set of strategies aimed at adapting the enterprise to changes in the conditions of competition and strengthening its long-term market position (Figure 1).

The system of competitive strategies includes: strategies for the formation of competitive advantages, a strategy for ensuring the competitiveness of an enterprise and strategies for its competitive behavior.

Strategies for the formation of competitive advantages are common strategies of competition. One of their varieties is the strategy of "leadership on the basis of reducing costs (prices)." It is based on the optimization of all parts of the production and management system.

The implementation of the strategy to ensure the competitiveness of enterprises of milk branch may face problems and the need to adjust actions depending on changes in the external environment that cannot be controlled. Therefore, after the development of the main stages of the strategy, it is necessary to organize the operational management of its implementation, which is based on a series of continuous interrelated actions, that is, as specialists note, management functions. Thus, effective management of the implementation of the strategy involves the following basic functions: planning, organization, motivation and incentives, control.

Implementation of the enterprise development strategy to ensure competitiveness should begin with planning. Successful implementation of the strategy requires coordination of strategic, tactical and operational plans of the enterprise. The planning process should be flexible: during the implementation of the planned tasks, others are subject to adjustment and refinement. The function of the organization is aimed at creating such a structure, in

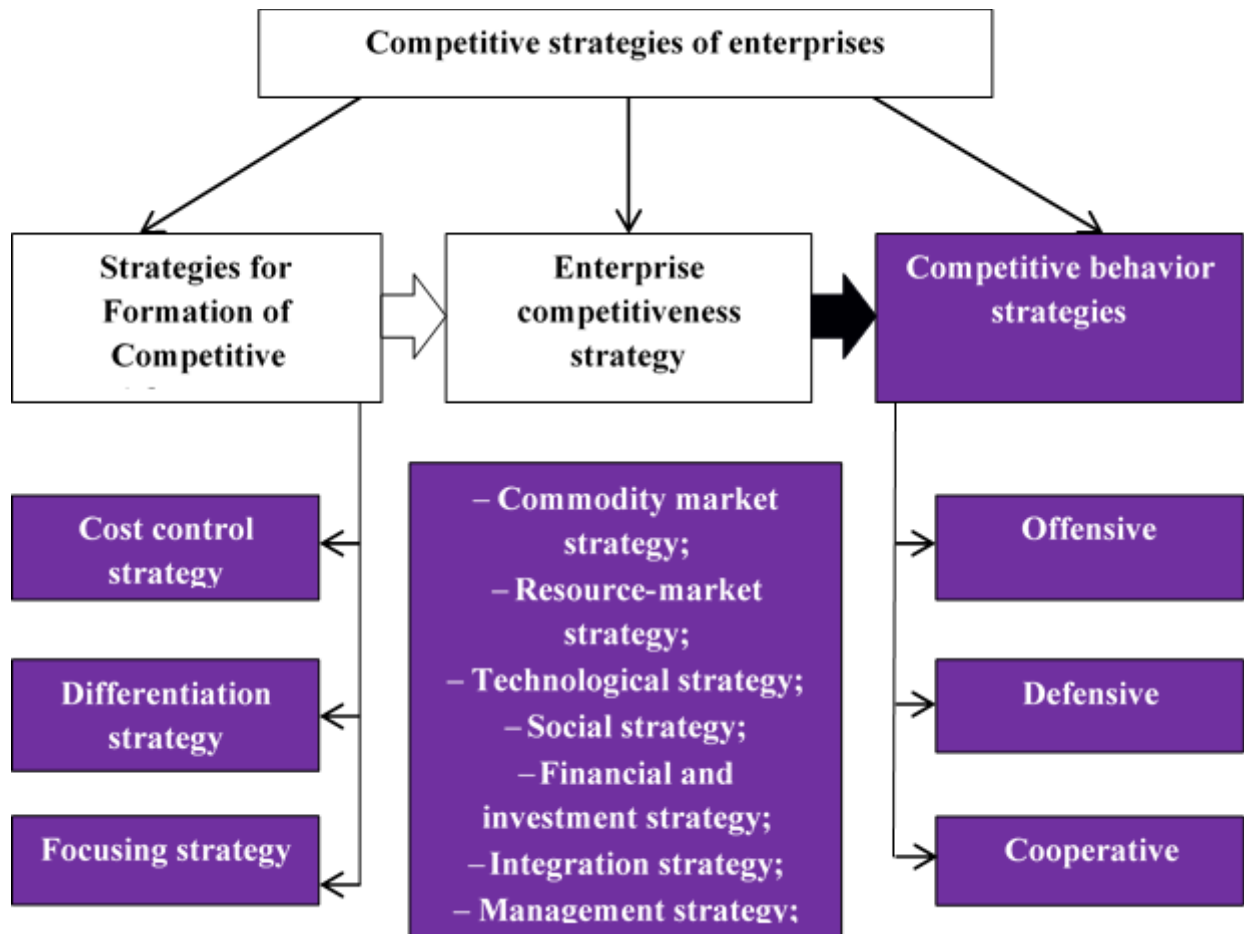


Figure 1. The system of competitive strategies of the enterprise (Fatkhutdinov R.A., 2005)

particular marketing, which would allow ensuring the long-term competitiveness of the enterprise.

The next step in implementing the strategy is to motivate and stimulate all stakeholders in the enterprise to implement the plans. This includes the implementation of all types of activities to develop and implement a management strategy to ensure the competitiveness of the enterprise: the development of the concept of marketing, information support, market research, stimulating the competitiveness of the organization, developing an enterprise strategy, operational management of the implementation of strategic plans.

The final control function is control, which allows you to implement feedback in the marketing system. Control is needed as a form of targeted impact on the collective of the enterprise, for systematic monitoring of its activities, comparing actual performance with planned ones. The end result of

the action should be the development of corrective decisions regarding the factors that can be managed, and recommendations on how to adapt the enterprise to the factors that influence the competitiveness of the enterprise, which cannot be controlled (Domozhilkina Zh.V., Dzhabbarova N.O., 2016).

The application of the marketing strategy is a gradual implementation of an interconnected set of operational-level strategies, which include sales, advertising, pricing strategies, etc. In the modern world, companies often do not just keep or increase the share of the existing market, but search for new markets.

Since the market situation is always dynamic, the marketing strategy is also characterized by flexibility, mobility, the ability to constantly be adjusted. There is no single strategy in the field of marketing, suitable for all types of companies and goods. To increase the sales of a particular firm or promote a

particular type of product requires a separate development of activities.

The formation of a marketing strategy can be influenced by the following actions: a detailed analysis of the state of the market, the allocation of its key segments; Assessment of the current financial condition of the company; The analysis of the enterprise's activity in a competitive environment, as well as the actions of competitors; Analysis of strategic alternatives and choice of marketing strategy; An approximate economic evaluation of the chosen strategy; The definition of methods for monitoring the implementation of marketing strategy (*What is a marketing strategy?*, 2017).

The competitiveness of modern enterprises in the long term depends both on the correctly chosen development strategy, and on the ability to respond in a timely manner to changes in the external environment, taking operational management decisions and restructuring functions or entire business processes (Trufanov S.A., 2014).

The advantage of the industrial sector in the choice of strategy is the fact that production can be continuously upgraded in accordance with the emerging need in the market, which in its essence is already a strategy of differentiation. Producers resort to this strategy, when the tastes of all market segments cannot be completely met by releasing a standard product. In this case, do not forget that the costs incurred to introduce differentiation should not exceed the mark-up on the final product; otherwise the implementation of the strategy will be irrational (Krivorotov V.V., 2006).

Enterprises specializing in the production of whole milk products and butter have a predisposition to introduce a differentiation strategy. The production of butter and whole milk products, at present, has a number of restrictions in connection with the society's orientation to the consumption of products with lower fat content to reduce the risk of obesity, atherosclerosis, etc. Therefore, to achieve this goal, it is necessary to carry out differentiation aimed at introducing products that meet the requirements of proper nutrition, dietary and special purposes (Tselikova L.D., 2000).

Conclusion

The problem of assessment and management of

competitiveness of milk industry enterprises in the Republic of Kazakhstan is complicated by problems of the general decline in production, the lack of a market for information on the characteristics of competing enterprises. The majority of enterprises face the problem of survivability, overcoming financial difficulties, and many businesses face bankruptcy proceedings. In these conditions, on the one hand, it is quite difficult to assess the competitiveness of an enterprise, on the other hand, for the enterprise to reach a high level of competitiveness, it is necessary to assess its potential by analyzing all factors of the enterprise's competitiveness, without this it is impossible to develop a strategy for further development of the enterprise. In this regard, the creation of a competitiveness management system is becoming an essential condition for the continued existence of enterprises (Asylbekova N.T., 2013).

In today's world, there is a steady trend of growth and development of enterprises in completely different spheres. Consequently, the level of competition is also growing. To develop and optimize the business, you need to make maximum efforts, to develop an effective plan for implementing the desired tasks. A marketing strategy is a detailed plan for the maintenance and organization of the work process.

The marketing strategy of the enterprise allows us to understand how to plan and implement all kinds of activities in the company aimed at implementing plans and tasks. It is worth remembering: marketing strategy is one of the parts of the company's overall strategic plan. The marketing strategy is related to issues aimed at increasing the sales and income of the enterprise. The marketing strategy, which can be developed by experienced specialists, allows you to learn more about the correct use of the resources available to the enterprise, learn how to dynamically sell products for a long time. This is the goal of marketing (*Marketing strategy: types, development and analysis*, 2016).

Thus, the development of a marketing competition strategy is, in our opinion, one of the essential components in increasing the competitiveness of milk branch enterprises. This involves choosing, identifying the features of the process of developing and evaluating an alternative competitive strategy and shaping it. Competitive marketing strategy of the enterprise summarizes the behavior model,

ensures coordination and combination of the company's goals and resources for obtaining long-term competitive advantages. Thus, the development of a modern complex competitive strategy of an enterprise must combine and harmonize the goals and objectives of a strategy of different levels (Domozhilkina Zh.V., Dzhabbarova N.O., 2016).

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Vigyan Prasar - All India Radio science serials: An evaluation

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This paper evaluates the ten science radio programmes which broadcast on All India Radio over a period of ten years from 2004 to 2013. These Tamil radio serials produced by the Vigyan Prasar in collaboration with Tamil Nadu Science Forum and All India Radio, Madurai. The survey data provide us demographic details of the science radio serials' listeners. The data also help us understand the reach of science serials, media consumption for science content and impact on audience in Madurai district; including other important insights related to science programme listeners, not tapped so far.

Keywords: Diffusion of science, Media consumption, Radio listening behaviour, Radio science serials, Vigyan Prasar.

Introduction

Radio is considered as a democratic medium because it allows the listener to listen to the programmes without affecting their work. It is the only cheapest electronic medium which anyone can access from anywhere. With less investment everyone can get a radio, so we call it as layman's medium. In the digital age, the medium of radio, particularly FM, became more popular through mobile phones. A survey of Nielsen in the year 2010 proves that radio is not a dying medium. The report says that "ages between 25-54 are listening the radio on an average of 24 hours 23 minutes in every week". So it is understandable that still the radio enjoys its wide presence.

In the globalized world, knowledge about science and scientific information is essential. Science has become a part of human life and it plays an eminent

role in the nation's development. It is the scientific approach, the adventurous and yet critical temper of science, the search for truth and new knowledge, the refusal to accept anything without testing and trial, the capacity to change previous conclusions in the face of new evidence, the reliance on observed fact and not on pre-conceived theory, the hard discipline of the mind - all this is necessary, not merely for the application of science but for life itself and the solution of its many problems.

After independence, India was in the process of modernisation. The first Prime Minister Jawaharlal Nehru believed that popularisation of science and technology would remove the social inequality and improve the country's economy. So the government had given importance to the popularisation of science and promotion of scientific temper among Indian people. The state owned media like AIR and other print media were used for the diffusion of scientific

knowledge. But over the period, other media genres like entertainment, fiction, etc., got more space in the Indian media than the science content. In this historical background now various media are being used by the Vigyan Prasar for the popularisation of scientific knowledge. Spreading scientific information through radio started even before independence by broadcasting educational programmes. So we can say radio is the oldest popular media for science communication.

In the field of communication, most of the studies were focused on print and visual media, and radio remained less studied. Much has been written on print and television but not on radio. In order to fill this void and assess the efficacy of Vigyan Prasar radio programmes, the content of science and the listeners of radio were studied. In the age of FM many people believe that there are only a few listeners for AM Radio. There is an assumption that no listener interested in educational radio programmes. These set of assumptions required a systematic study on science radio programmes. We studied the science serials in Tamil produced by the Vigyan Prasar and Tamil Nadu Science Forum for the last ten years from 2004 to 2013.

Role of radio in science communication

Radio is one of the most important and cheapest mass media through which the messages can be conveyed quickly to a large audience, irrespective of distance and literacy level. Radio communication can reach even the place where there is no electricity. It is effective for literates and illiterates. It has a great variety of content related to farm, home, community and entertainment. Broadcasting science lessons on radio started as part of educational programmes beginning from 1932. Radio played a crucial role in spreading agriculture communication during the Green Revolution and White Revolution. During the Green Revolution period, All India Radio played a vital role in spreading new agricultural technologies, and fertilizers. In Tamil Nadu AIR broadcasts regular programmes with agricultural department officials and scientists. These programmes acted as bridge between the agricultural scientists and small level village farmers. From the statement of Norman E. Borlaug we could understand the overall development of the Indian villages during

the Green Revolution:

“More electricity is being used to light the houses and to drive the motors on the wells. There also has been a rapid increase in the demand for consumer goods, The purchase of transistors and radios for use in the villages has increased rapidly, and thereby the governments for the first time can effectively reach the remote villages with educational programs. Sewing machines, bicycles, motor scooters, and motorcycles are coming to the villages, and truck and bus service between villages is improving.

Joshi, P.C., also states that “Radio has played an important role as a development agent, especially as an aid to the Green Revolution.....it is to be noted that one of the high yielding varieties of Rice ADT 27 popularised by radio came to be known to the farmers of Tanjore district as ‘Radio Rice’” Radio science serials are very popular and it is one of the sources to the school children to know about science. Santha, in her study on “An evaluation of method of science radio serial”, states that one of the boy from a remote village described the pains he took to listen the radio programmes. The boy said that if he fails to listen to method of science programmes on radio, that day he feels despair. This study was done in the year 1990, but still we could find many active listeners for radio programmes. So the radio has very long connection with science communication.

Radio programmes of Vigyan Prasar

Vigyan Prasar (VP) is an autonomous organisation, which was established in the year 1989 under the Department of Science and Technology by the Government of India. Its main motto is to promote scientific knowledge by using different media. It also conducts training programmes to encourage science writing. It produces science content in different media forms, like print, radio and television. VP organises online discussion forums in which people can share their ideas and clarify doubts. VP broadcasts radio science serials in association with All India Radio (AIR) in 19 languages all over India. For the past ten years VP is broadcasting these science serials and reaching out to a wide range of listeners. For the last ten years, Vigyan Prasar is promoting scientific knowledge through different media like print, visual and audio.

Titles of serials

1. Uyirin Uyirae (Biotechnology), 2003
2. Ariviyal Ezhuchi (19th Century Science and Technology)
3. Alai Kadal Ariviyal (The Ocean), 2007
4. Boomi Namadhu Boomi (The Earth), 2008
5. Ellai Illa Vaanam (Astronomy), 2009
6. Thanga Alaigal (Science and Technology of India), 2010
7. Uyirin Oviyangal (Biodiversity), 2011
8. Vinnai Viyakkum Pennai (Science and Technology for Women Empowerment), 2011
9. Ellam Vannamayam (Chemistry), 2011 - 2012
10. Verkalin Velicham (Grass-root Innovations), 2013
11. Kalam Thorum Kanitham (Mathematics), 2014

Objectives of the study

- To know the Impact of science serials broadcast on Madurai AIR for listeners in Madurai district.
- To know the opinion of the listeners and script writers on formats and content of science serials.
- The study also tries to find out the role of radio in science and technology communication.
- To understand the process of the production of science serials.
- To evaluate the suitability and reach of Tamil language in science serials.

Methodology

The methodology included, review of content, audience survey, focus group method and interview method. The review of content involves the systematic narration of the text, voice, genre, BGM (Back Ground Music). etc. The audience sample survey conducted among the radio listeners particularly science serial listeners by using a questionnaire. The selection of sample was non probability convenience sampling, because from the pilot survey we came to know that there is no general audience for these science programmes. Moreover, there are less audiences for AM (*Amplitude Modulation*) radio so the convenience sample was very suitable for the study, including active listeners of the science radio programmes. Group discussion conducted

among the listeners. Interviews conducted among the script writers. The sample size for survey was 60 from Madurai district. Most of the listeners are school children. For listeners survey data collected through structured questionnaires from the sample listeners. The collected survey data analyzed by using descriptive statistics.

Discussion

Table 1: Demographic profile

Options	Percent
Age	
1-15 Years	50.0
16-20 Years	10.0
21-25 Years	28.3
Above 25 Years	11.7
Sex	
Male	45
Female	55
Education	
Elementary education	43.3
Higher Secondary	10.0
Under graduation	10.0
Post graduation and above	36.7
Profession	
Government Employee	3.3
Private employee	1.7
Self employee	8.3
Student	86.7
Marital status	
Married	15.0
Unmarried	85.0
Community	
OC	11.7
BC	31.7
MBC	50.0
SC/ST	6.7
Religion	
Hindu	93.3
Muslim	3.3
Christian	3.3
Area	
Rural	63.3
Urban	36.7
Radio availability	
Yes	40.0
No	60.0

- In this study, up to 15 age group of respondents were 50 percent, 16 to 20 age group are 10 percent, 21 to 25 age group are 28.3 percent and above 25 age group are 11.7 percent.
- Among the respondents of the study, 55% were female. Male listeners comprised 45%. There is only 10% difference between male listeners and female listeners.
- In this study, 43.3 percent of the respondents

were studying in elementary classes. 10 percent were in high school. Another 10 percent of the respondents were undergraduates. Remaining 36.7 percent were postgraduates.

- Occupation pattern of respondents was: 86.7 percent students, 8.3 percent self employed, 1.7 percent private employees, and 3.3 percent government employees participated in this survey.
- 85 percent respondents were unmarried and 15 percent were married.
- 50 percent of the respondents belong to MBC category, 31.7 percent are from the BC category, 11.7 percent of the respondents are general category and 6.7 percent are from the SC/ST category.
- Data shows that 63.3 percent of the respondents were from rural area and 36.7 percent from urban area.
- 60 percent of the respondents do not have radio sets in their homes. Only 40 percent of the respondents having radio sets in their homes.

Table 2: Radio listening behaviour

Options	Percent
Regular listening of radio	
Yes	30.0
No	70.0
Network listening	
AM only	5.0
FM only	38.3
Both	56.7
Where do you listen radio	
School	1.7
Home	45.0
Friend's Home	41.7
During Experiment	11.7
Do you listen science radio serials	
Yes	41.7
No	58.3
Listening of radio science serials	
Alone	13.3
With family	23.3
With friends	28.3
With science club members	1.7
None of the above	33.3

- Table 2 shows that all the respondents are radio listeners, but 70 percent of the respondents are not regular listeners. Only 30 percent of the respondents are regular radio listeners.
- The listeners choice of network: There were only 5 percent of the listeners listen AM wave. FM listeners were 38.3 percent. 56.7 percent of the listeners were listening both AM and FM.

So we can understand that (5.0 + 56.7) 61.7 percent of the respondents are listening AM Radio.

- 45.7 percent of the people are listening the radio at their homes. Due to unavailability of radio or based on liking, 41.7 percent of the people listen the radio at their friends' home. In few schools, teachers are encouraging students to listen recorded radio science programmes by playing them in the evening time.
- Regular listeners of science serials on radio were 41.7 percent, whereas 58.3 percent of the respondents were not regular listeners.
- The above Table shows the respondents listening nature. 28.3 percent of the respondents listen to the radio with friends. 23.3 percent of the respondents listen to radio with their families. 13.3 percent of the respondents listen alone. 1.7 percents listen at science clubs. 33.3 percent says none of the above.

Table 3: Impact of Radio Science Serials

Options	Percent
Serials helped you in day to day life	
Yes	70.0
No	30.0
How it helped	
Education	41.7
Knowledge	38.3
None of the above	20.0
Do you discuss the content of the science serials with others?	
Yes	58.3
No	41.7
With whom do you discuss about the content?	
Friends	45.0
Family members	18.3
Students	3.3
None of the above	33.3
Do you suggest the science serials to others?	
Yes	63.3
No	36.7
Which format do you like?	
Drama	58.3
Interview	3.3
Discussion	26.7
Others	11.7

- Table 3 shows the impact result of respondents, 70 percent of the respondents say that VP science serials helped them in their day to day life. 30 percent of the respondents said no.
- 41.7 percent of the respondents say that science serials helped them in their education; and 38.3 percent of them say science serials provided

- knowledge. 20 percent of them chose none of the above.
- It also shows that 58.3 percent of the respondents will share the content of the science serials with others. 41.7 percent of the respondents are not willing to share the content of the serial with others.
- 45 percent of the respondents will discuss the content of the science serials with their friends. 18.3 percent of them discuss with the family members; and 3.3 percent will discuss with the students. Only 33.3 percent of them chose none of the above.
- It shows the respondents' willingness to listen and encourage others to listen to the science serials. 63.3 percent of the respondents were willing to suggest the serials to others.
- 36.7 percent of them were not willing to suggest the serials. Table 23 shows reasons why respondents were not willing to suggest the serials to others.
- The Table 3 shows the format of the serial which listeners like more. 58.3 percent of the listeners voted for drama format, 26.7 percent of the audience liked discussion format, 3.3 percent of the listeners preferred interviews; and 11.7 percent of the listeners opted for other formats, like songs and narration.

Table 4: Media consumption for science content

Options	Percent
News papers	78.3
Magazines	6.7
Television	10.0
Website	1.7
None of the above	3.3

- The Table 4 shows the respondents consumption pattern of media other than radio for science content. 78.3 percent of the respondents are depending on the newspapers for science content. Only 10 percent of the respondents are depending on the Television and 6.7 percent of them reading magazines for science content. Only 1.7 percent using web for science content and 3.3 percent of them chooses none of the above.

Conclusions

The study clearly brought out the fact that there exists a good number of listeners for Vigyan Prasar science serials. Most of them were from rural background. However, the number of listeners was fluctuating for different serials. For the serial *Vinne Viyakum Penne* (Women Empowerment), so many NGO's, Women organisations and women listeners responded apart from general listeners. School students showed much interest for *Kalam Thorum Ganitham* (Mathematics) serial. The authors could understand that the topic of the programme played a vital role in bringing new listeners for the programme. It was found that the listenership was varying for serial to serial. But there were stable listeners for all science serials. The listeners also requested the VP to give regular response to their letters. During the survey, 41.7 percent of the listeners agreed that they are listening to science serials regularly.

Despite the fact that many other sources are available for getting scientific information, like television, newspaper and internet, etc., VP radio science serials remained the source of attraction especially for the regular listeners, possibly because of well composed scripts, content and usage of different formats. Vigyan Prasar science serials have made an impact in the lives of listeners and also helped listeners enhance their knowledge on science.

The Vigyan Prasar serials impacted a lot of listeners even though they listen only one episode of any serial. As part of survey we played few sample episodes from the serials like *Ellai Illa Vanam* (International Year of Astronomy) and *Verkalin Velicham* (Grass root Innovation) for the university students. After that we asked them to write their opinion and understanding of the content. Surprisingly they had gave very positive response than the regular listeners. Thirty six percent of the students agreed that the VP serials provide lot of useful information and they learned lot of new things after listening the serial. But they also expressed their inability in concentrating for half an hour for listening a programme. But school children expressed their interest in adopting the scientific knowledge. Among the listeners, 26 percent of them are school students, they are regular listeners of science serials and few of them are involved in science serial production. It shows that school level students are very enthusiastic in knowing scientific information and they are interestingly involving themselves in the production of science

serials. Apart from student listeners general listeners like homemakers, employees, small scale business people, self employed and other category of listeners are also showing interest in listening the serials. About 11.7 percent respondents expressed the inconvenience of time to listen the serials, few school teachers requested to supply science serial in the form of CDs to encourage the students to listen in their convenient time.

Now a day's, even though TV and Internet are dominating media, the radio keeps its own space in the commercialized media world. Comparing to the FM, listeners are less for AM network. There are few regular listeners for AM. They have expressed that content of the serial is very useful for their day to day life and it helps to learn new things and knowledge. They are all in the age group of 25 to 60. But in few rural areas AM is enjoying more listeners than FM. These listeners are following AM regularly and they are aware of the serials schedule also.

From early days till today as far as Tamil Nadu is concerned the diffusion of scientific knowledge has happened in every form. Tamil Nadu is the second state that started educational radio serials in the early 1935's. There are different organisations to spread scientific knowledge. Tamil Nadu government also has Tamil Nadu State Council for Science and Technology to spread scientific knowledge. VP science serials helped people overcome their scientific knowledge gap. Still there are active listeners for AIR; they write feedback letters regularly to AIR and VP. Letters are responded regularly through mail or post that gives encouragement to the listeners. The field data indicates that the project of science popularisation through radio is very useful for the people cutting across the social and geographical diversities.

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UNESCO World Science Day for Peace and Development

Societal Challenges: Air Quality, Environment and Public Health



Crops stubble burnings in the neighbouring states of Delhi contribute just 8% of the smog that has engulfed the national capital for about a week now. In fact, the major contributors to the smog are vehicular pollution and construction work that load particulate matter in the air. The drifting particles from the burning crops stubble only exacerbates the existing poor air quality that has resulted in Delhi becoming a gas chamber. There is good news in the offing though. Delhi is likely to receive some showers on 14 November. The showers combined with winds would settle the particulate matter enabling safer breathing.

These views emanated from lectures and discussions held on the occasion of the UNESCO World Science Day for Peace and Development organized at CSIR-National Institute of Science Communication and Information Resources (NISCAIR).

The UNESCO World Science Day for Peace and Development is celebrated on November 10 every year to highlight the prominent role of science in society and the need to engage the wider public in debates on emerging scientific issues. It also underlines the importance and relevance of science in our daily lives.

Given the significance of the day and the prevailing rampant smog triggering a medical emergency in Delhi, CSIR-NISCAIR focused on the ‘burning’ topic of air quality on the important day this year.

Dr. K J Ramesh, Director-General of Meteorology, India Meteorological Department (IMD) and Dr. R K Bhandari, Chairman, Forum for Disaster Mitigation and Management, Indian National Academy of Engineering spoke on the occasion.

In his talk on “Societal Challenges-Air Quality, Environment and Public Health”, Dr. Ramesh highli-



ghed the air quality monitoring initiatives of the IMD. Dr. Ramesh said that the situation this year is better than that of last year and with the measures being taken to control air pollution, it is most likely that 2018 would be remarkably better. The prevailing situation is owing to multiple factors including the weather, existing poor air quality and burning of the agricultural waste, he said.

Dr. Bhandari called the Delhi smog a Frankenstein--a result of our own creation. In his lecture on "Frankenstein of Smog in Delhi and the Rising Threats to Human Survival in a Multi-hazard Context", Dr. Bhandari said that the alarming increase in vehicles in Delhi is a major cause of air pollution. He also focussed on the many construction and civil works as major contributors to the smog. Speaking of mitigating the problem, he said that it is a collective responsibility and we cannot look up only to the government to address the issue and must do our bit to tackle it. He exhorted that every citizen should play a responsible role in reducing environmental pollution. He also added that we should coordinate for better disaster preparedness and management.

Dr. Manoj Kumar Patariya, Director, CSIR-NISCAIR chaired the event. In his opening remarks Dr. Patariya stated that while technologi-

cal developments are beneficial to mankind, they also leave behind undesirable effects such as pollution. He added that we need to strike a balance and appropriate policies need to be devised. He informed that CSIR-NISCAIR being a national communication institute can play an important role in enhancing the two-way communication between common man and the policy makers. Dr. Patariya also informed about the major project on climate change being carried out by NISCAIR.

CSIR-NISCAIR scientists, invitees and media personnel participated in the event and had detailed deliberations with the invited experts. In response to a query on the lack of credible climate change data from coastal region, the expert responded that for rainfall there is a robust mechanism for collecting data however there are no effective mechanisms for collecting data for other civil weather monitoring or weather sensitive parameters which are damaging the crops such as strong winds or hail. There are plans to set-up panchayat level weather stations to collect data.

Mr. Sanjay Burde, Head, Information and Human Resource Division proposed the vote of thanks.



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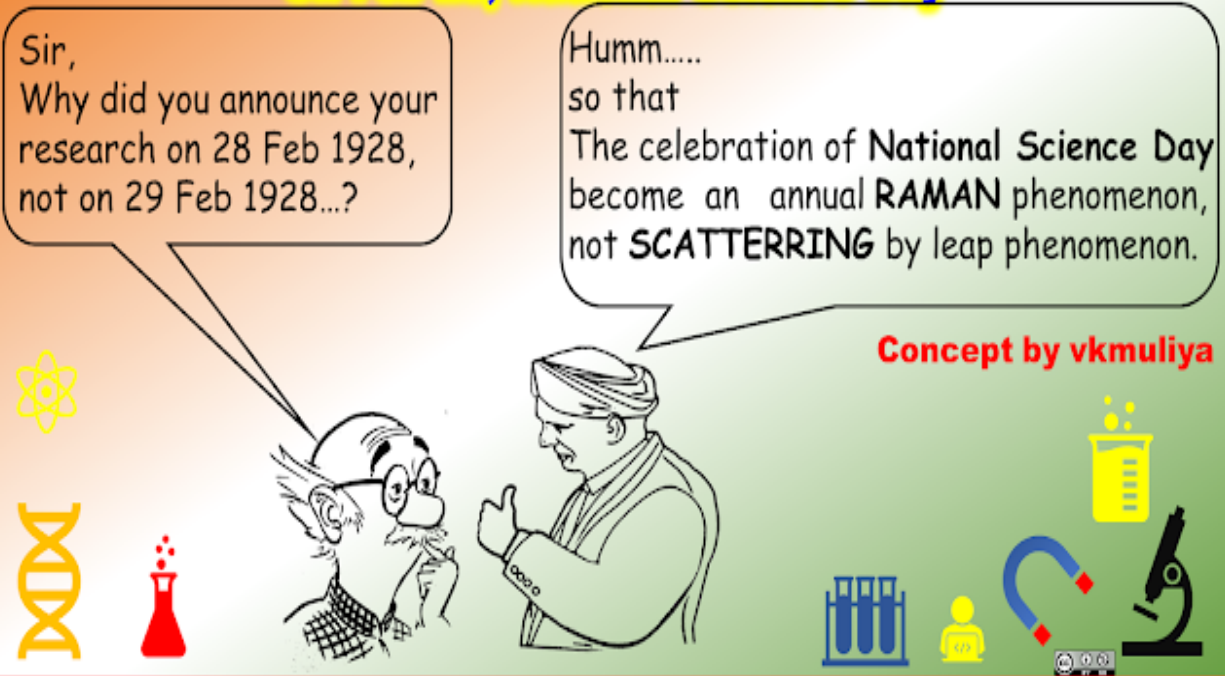
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Hypothetical Conversation between Common man & Sir C V Raman On Feb 28, National Science Day



India developes fast and economical test for corona

Scientists from CSIR lab, Institute of Genomics & Integrative Biology, New Delhi have designed a paper strip-based testing assay that can detect coronavirus in sample within an hour & with less than Rs. 500.

It takes 12 hrs to test me ...
You will be tired.
It's expensive too...

You fool,
You are in wrong country ..

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