

Study on the attitude of users of nuclear techniques

M.A. Contreras Izquierdo¹, J.O. Alvarado Cartaya¹, I. González Montoto¹, M. Perera Pérez², A. Aguilar Núñez², J.M. Rivero Blanco³, R. Rodríguez Cardona³, I.M. Alonso González⁴, D.M. García Medina¹, O. González Solozábal¹

¹ Centre for Information Management and Energy Development (CUBAENERGIA), Havana, Cuba.

² Psychological and Sociological Research Centre (CIPS), Havana, Cuba.

³ Nuclear Energy Agency and Advanced Technologies (AENTA), Havana, Cuba.

⁴ National Centre for Nuclear Safety (CNSN), Havana, Cuba.

E-mail of the main author: mcontreras@cubaenergia.cu

Abstract. The paper presents the results of a study implemented in Cuba from 2004 to 2006, regarding the attitude of users of nuclear techniques towards nuclear applications. This study is a response to the need of the Agency of Nuclear Energy and Technologies to determine the attitude of the different publics towards nuclear energy for the strategic design of communication. For the research, a methodology with 2 basic tools was used: a questionnaire and a semi-structured interview to obtain complementary information of qualitative character. The analysis of the results was made using the SPSS statistical processor. The mentioned methodology allowed evaluating the opinion of users towards nuclear applications in terms of agreement or disagreement, acceptance or rejection, which was deduced from the inquiry about their knowledge, assessment and behaviour.

1. Introduction

The use of public studies to introduce a technology or to develop a methodology is a common and necessary world-wide practice. These studies are necessary to enable a communication that would allow us to fulfill the set objectives and to make the correct decisions.

Nowadays the area of public participation in decision making is an active area of research, and the outcome of such studies should contribute to design and implement the appropriate strategies.

In general, countries with nuclear energy applications are working in this sense. Groups and specialized centers are regularly carrying out studies on nuclear energy related issues (generally in the power branch) with the different publics involved.

1.1 National Background and present status on the topic

Cuba began its nuclear program at the beginning of the 80's and from the very beginning a great importance was given to its promotion, specially to inform the population about the construction of the nuclear power plant in Juraguá, the first of its kind in the country.

However, when the construction of the power plant in Juraguá was halted in 1992 for financial reasons, the existing panorama until then changed and the topic of nuclear energy was moving away from the social environment. It seemed that with the halting in the construction of Juraguá, nuclear energy in Cuba arrived at its end. The fact is that most of the applications of nuclear techniques in health, agriculture, industry and environmental studies, among other economic branches of the country, embracing are still unknown.

This is to a great extent due to the fact that no long-term strategy has been used in the dissemination of information on nuclear energy, and during these years, in general, few related studies that would allow elaborating an adequate communication strategy were implemented.

As antecedent of this study, at the end of the 90s was carried out an evaluation of the level of acceptance of nuclear energy in Cuba among leaders and journalists that are devoted to the field of science and technology.

In the year 2000 the international project “perception of radiological risks in hospitals” was developed within the framework of the Spanish Radiation Protection Society (GRIAPA) in which 11 countries from Latin America, including Cuba, participated. The aim of the project was to study how radiological risks are perceived by the public [1].

Considering these background and bearing in mind the results of a study carried out by the International Atomic Energy Agency (IAEA) [2] on the market potential for non-electric applications of nuclear energy, that reflects the state of the attitude of different publics regarding nuclear energy, including Cuba, for which the public attitude to nuclear energy at present is not definite, and the future attitudes is likely to be dependent on its performance.

A production research was designed and carried out, the social and psychological diagnostic character of which allowed to identify the information needs of the public object of study and to elaborate a communication strategy for the Nuclear Energy Agency and Advanced Technologies of Cuba.

2. Methodology

For the research study, a methodology with 2 basic tools was elaborated: a questionnaire and a semi-structured interview to obtain additional information of qualitative character [3]. The SPSS statistical processor was used for the analysis of the results.

The questionnaire is mainly aimed at studying the attitude through its 3 main components: the cognitive (knowledge), emotional (evaluation, level of acceptance) and behavioral (behavior or decision), making special emphasis on the first 2 components. Previously a pilot study was implemented to test the understanding of the tools used.

The selected public were specialists and technicians, identified as “priority” in the IAEA-TECDOC-1076 [4]. To that end, an inventory of the institutions in the country was implemented so as to select the most representative.

Finally 90 users were included in the sample, most of them were men (67%), mainly from 30 to 59 years (78%). The participants were from 5 sectors: Health (41%), Science and Technology (32%), Agriculture (12%), Industry (8%) and Environment (7%). The study was carried out in 6 of the 14 provinces of the country: Pinar del Río, Havana City, Cienfuegos, Holguín, Santiago de Cuba and Guantánamo.

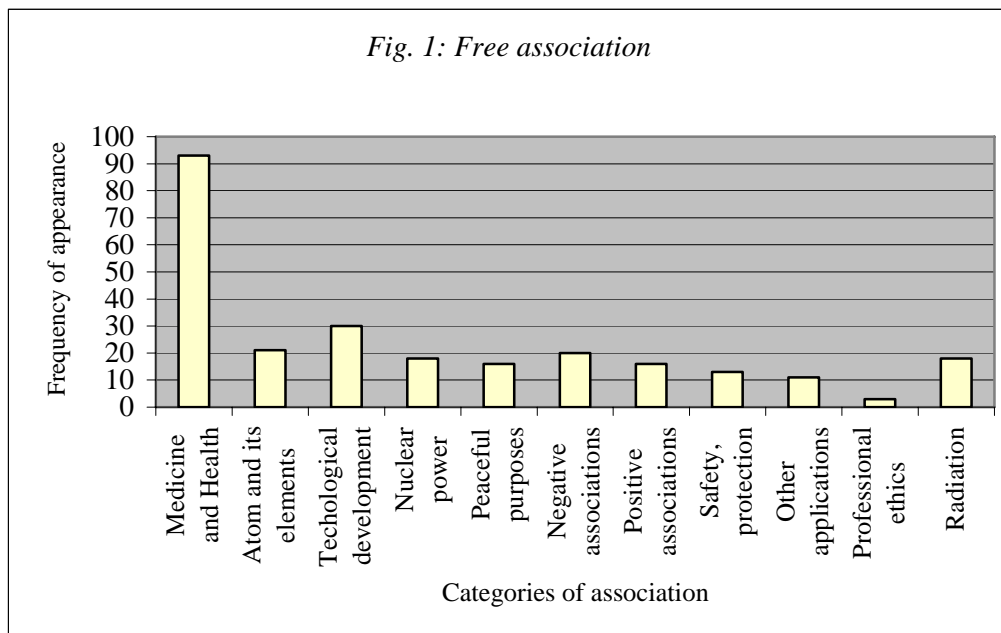
Designed to contribute to the research with more solid criteria, a total of 7 experts in nuclear issues from different branches of our economy, as health, industry and agriculture, among others, were interviewed.

3. Results and discussion

3.1. Associations Free of the term “Nuclear Applications”

Free Associations were conceived to explore the meanings to which nuclear energy was mostly associated with, which not only can make up the cognitive component of attitude, but also reflect elements of emotional character that potentially, determine the behavior of individuals in this sense.

Figure 1 shows that there is an image about nuclear applications that is notably associated with the field of health and medicine.

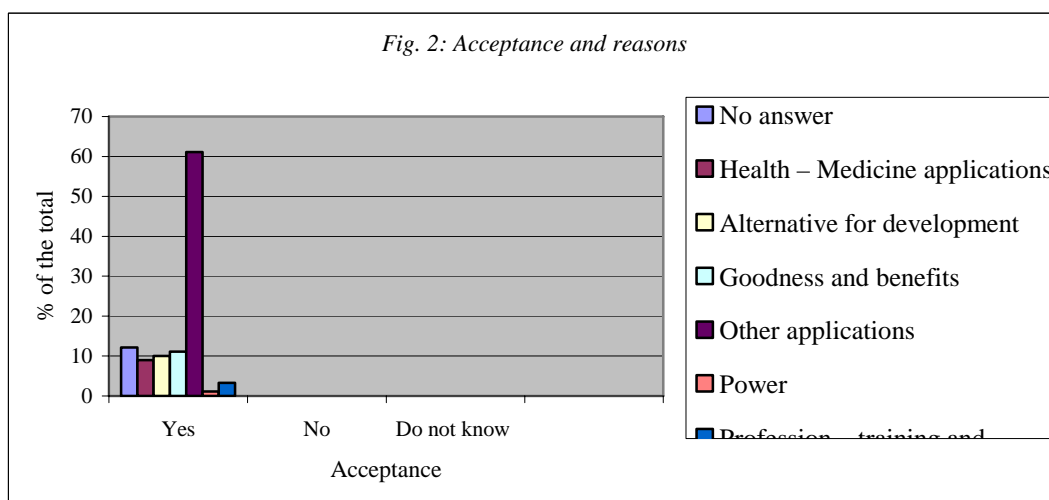


The aforementioned statement confirms that a lot remains to be done in terms of public information to create a more coherent and real image on this topic.

3.2. Acceptance of the use of nuclear techniques. Reasons for the acceptance

When directly questioned about the prejudices against the object of attitude, all the studied users (100%) accept the use of nuclear techniques. This widespread acceptance is an indicator, at basic level, of a favorable attitude concerning these applications (Fig. 2).

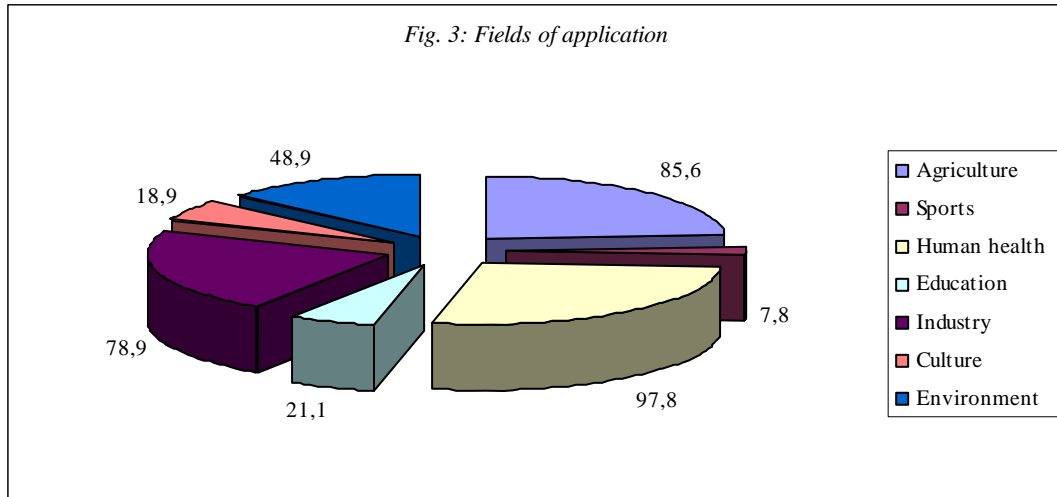
61.1% of the users included in the sample accept the use of nuclear techniques for their “kindness and benefits”, category that stands out as the main reason for their attitude and embraces answers like: useful, exact, precise, reliable techniques, better quality of life and being an inexhaustible energy.



3.3. Areas of application of nuclear techniques

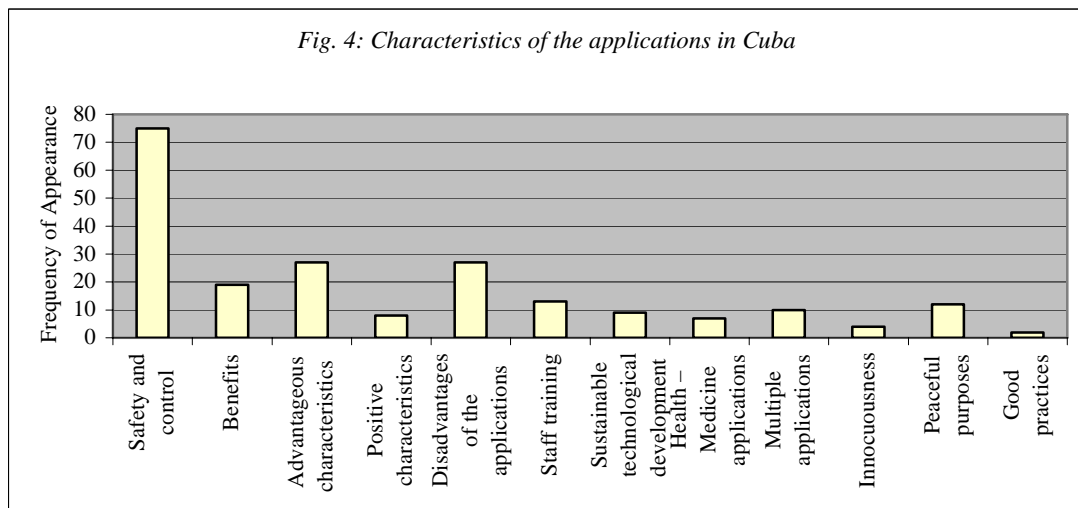
To the question on the main areas of application of nuclear techniques, the results show that there is an adequate level of knowledge (Fig. 3).

It is worth noticing that although the main areas were wisely identified, human health prevails as the most well-known area and Environment as the less known.



3.4. Qualities of the applications of nuclear techniques in Cuba

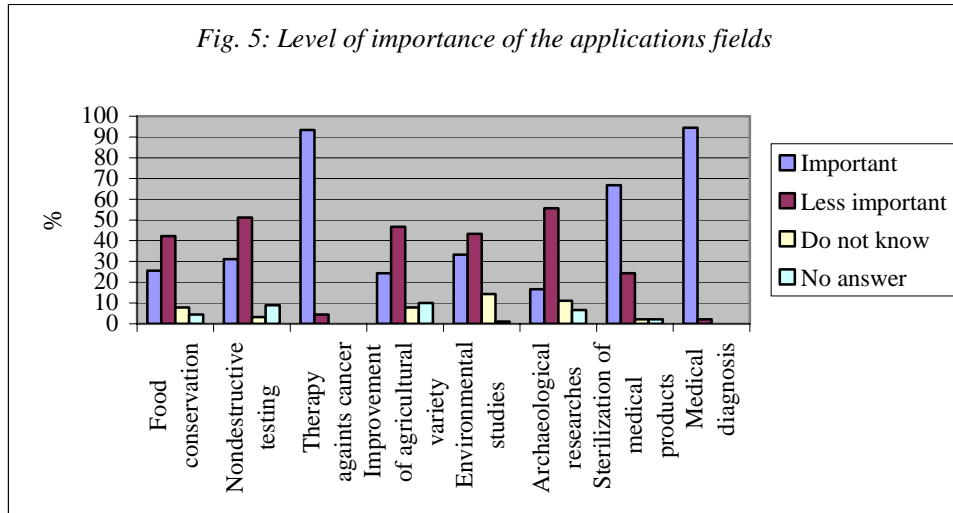
When making inquiries on the 3 qualities that characterize nuclear applications in Cuba, an extensive and a varied number of different qualities were obtained, both positive and negative that were grouped in categories for their analysis (Fig. 4). It can be clearly observed that, according to the studied users, applications in Cuba are remarkably characterized for their “safety and control.”



Regardless of these evaluations, it should be kept in mind that, although to a lesser extent, there are other evaluations or opinions associated to “disadvantages.” This category embraces answers like: expensive, require foreign financial support, poorly disseminated information, depressed, reduced, limited, unknown, backward, not very developed, with little equipment, misunderstood and unknown, among other reasons.

3.5. Level of importance of the application areas

The evaluation of some areas of application according to their importance, allowed confirming the prevalence of human health compared to all the others. Nevertheless, the entirety of the proposed areas is regarded either as “very important” or “important” by the majority of those surveyed as shown in Figure 5.



In this sense, “medical diagnosis”, “cancer therapy” and “sterilization of medical products” are the applications remarkably considered as “very important” for 94.4%, 93.3% and 66.7%, respectively, of the surveyed sample of the public.

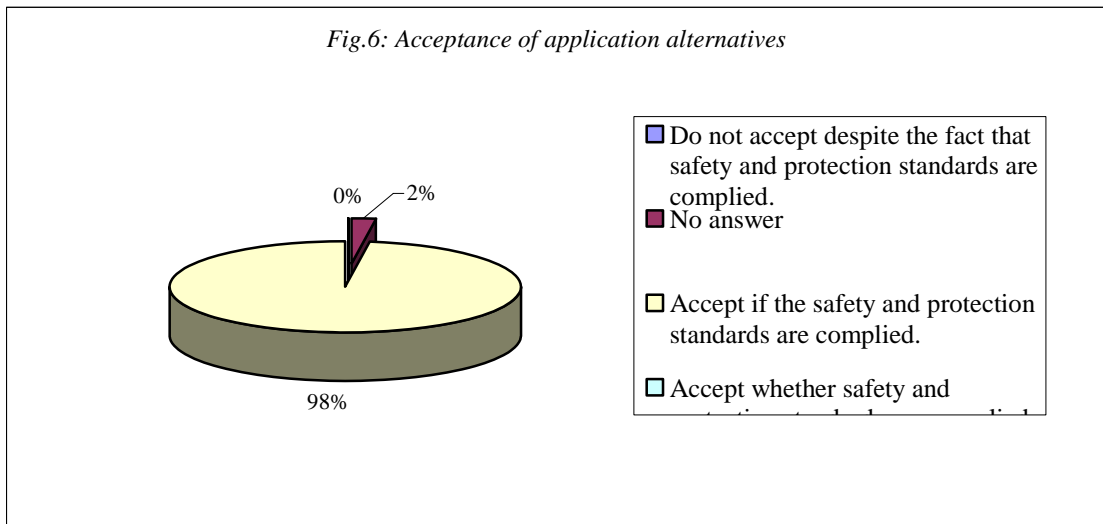
The rest of the answers go to “archaeological investigations”, “non-destructive testing”, “improvements of agricultural crops”, “environmental studies” and “food conservation”, considered as “important” in this decreasing order.

Given the emphasis and greater knowledge concerning human health, it is convenient and necessary that the communication with this public be focused on diversifying and strengthening the notions on the benefits of the remaining areas.

3.6. Application alternatives. Behavior-decision

The fact of being capable of choosing the different conditions for the application of nuclear techniques in Cuba reaffirms the acceptance of the majority of surveyed users. At the same time, it proves that there is a favorable context for these applications.

Fig.6: Acceptance of application alternatives



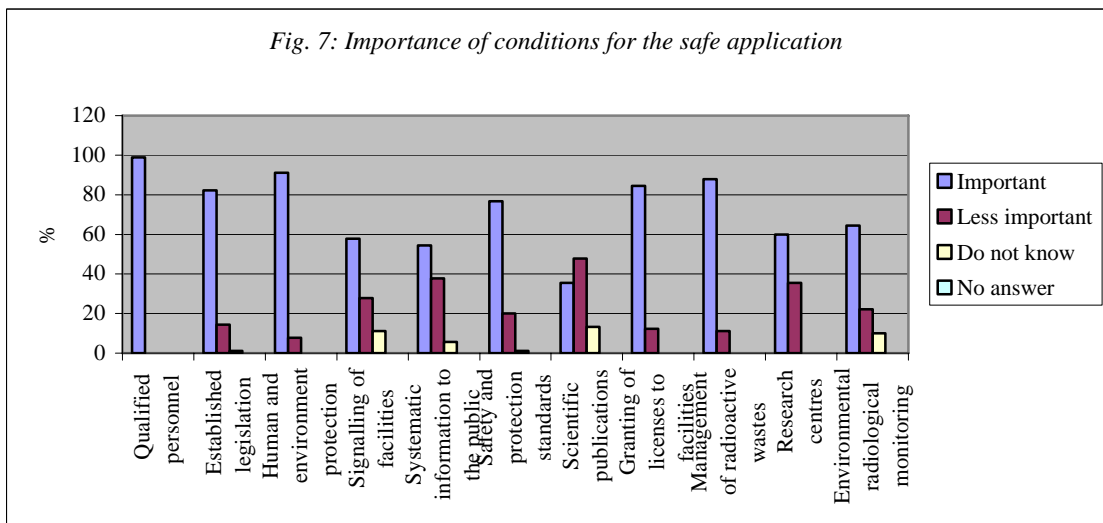
According to Figure 6, 97.8% of the studied users “agree with the use of nuclear energy in Cuba provided that safety and protection standards are fully met.”

3.7. Importance of the conditions for the safe application of nuclear techniques

These results further deepen the knowledge and evaluation of people about the safe application conditions, criteria that to some extent exert an influence or give account for the acceptance of nuclear applications and tend to determine the behavior in decision making.

It is evident that almost all the conditions are evaluated either as “very important” or as “important”, with a marked tendency to consider them as “very important” (Fig. 7).

Fig. 7: Importance of conditions for the safe application

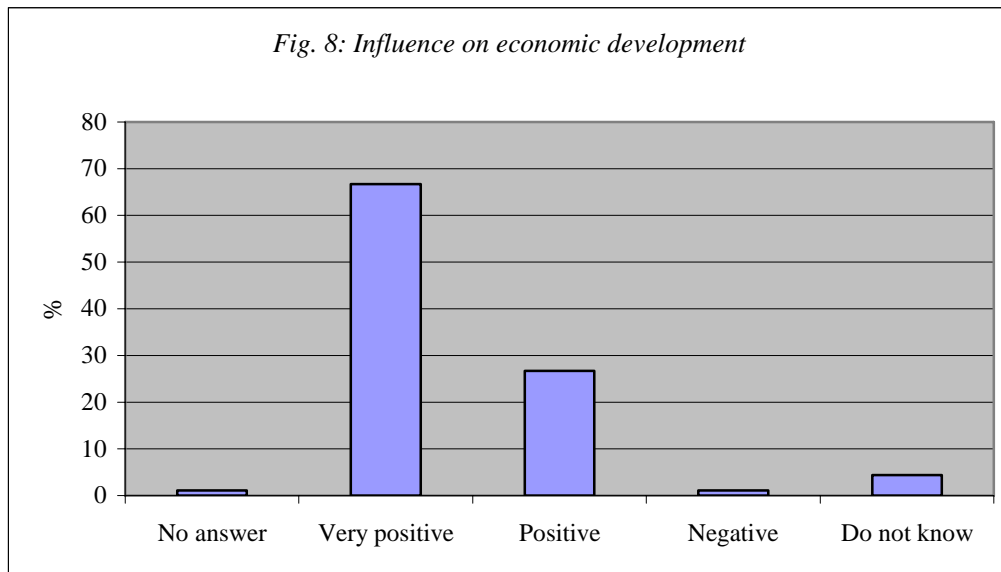


The case of “scientific publications” is unique, given the fact that 47.8% of the sample considers it as “important”, being it the only category in which “important” surpasses the “very important” values. It is worth noticing that specialists and technicians, who are closely linked to scientific publications, underestimate those publications as a prerequisite for safety.

On the other hand, it can be observed that although “systematic public information” is considered as positive, it is last in the list of evaluations. Moreover, the “not very important evaluation”, that is also found in “warning signals in nuclear facilities” and in “scientific publications.” appears in this category. All the aforementioned is related to public information.

3.8. Influence of the application of nuclear techniques on domestic economic development

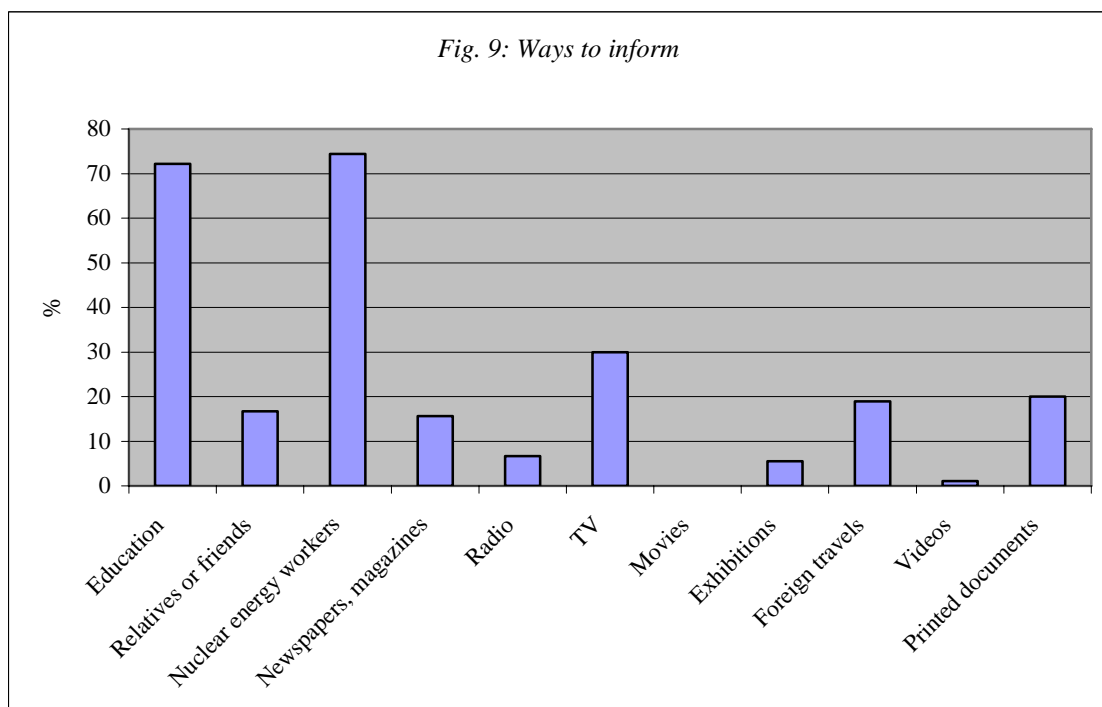
The results show that the application of these techniques has a favorable impact on domestic economic development. 66.7% of the surveyed users consider that influence as “very positive” and 26.7% as “positive” (Fig. 8).



Consequently this means that most of the users (93.4%) recognize the benefit of using nuclear techniques for the country’s development, in spite of the existing insufficient knowledge about their diversity.

3.9. Ways to inform on the application of nuclear techniques

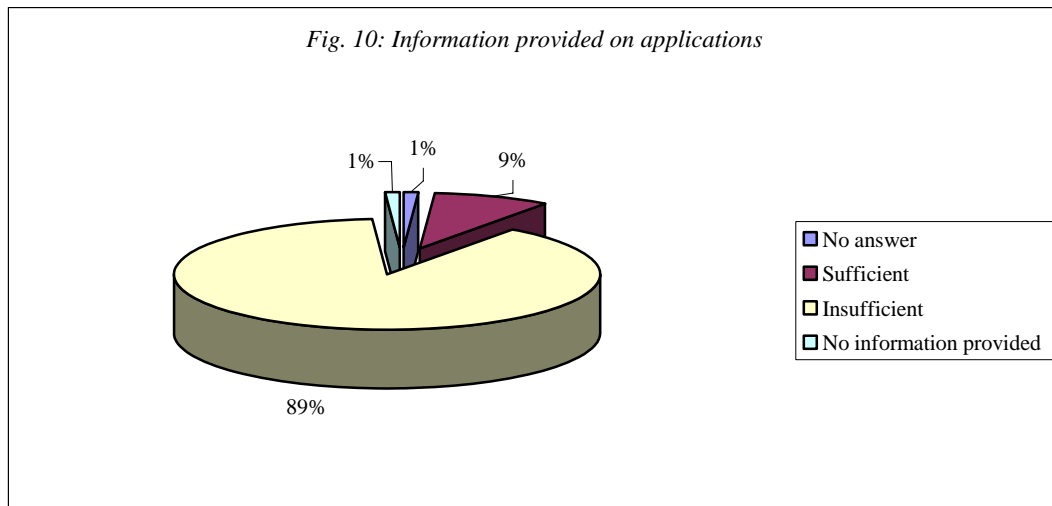
The results on the ways to inform are explicit enough. The main ways to obtain information that have contributed to public knowledge on the topic are the own “workers involved in that activity” and “education”, according to the opinion of 74.4% and 72.2%, respectively (Fig. 9).



In general, the relevance of the remaining ways to inform is not very significant. Accordingly, it is possible to recognize interpersonal relations and personal experience as the main sources that have greatly contributed to the attitude of the studied population concerning nuclear applications.

3.10. Information provided in the country

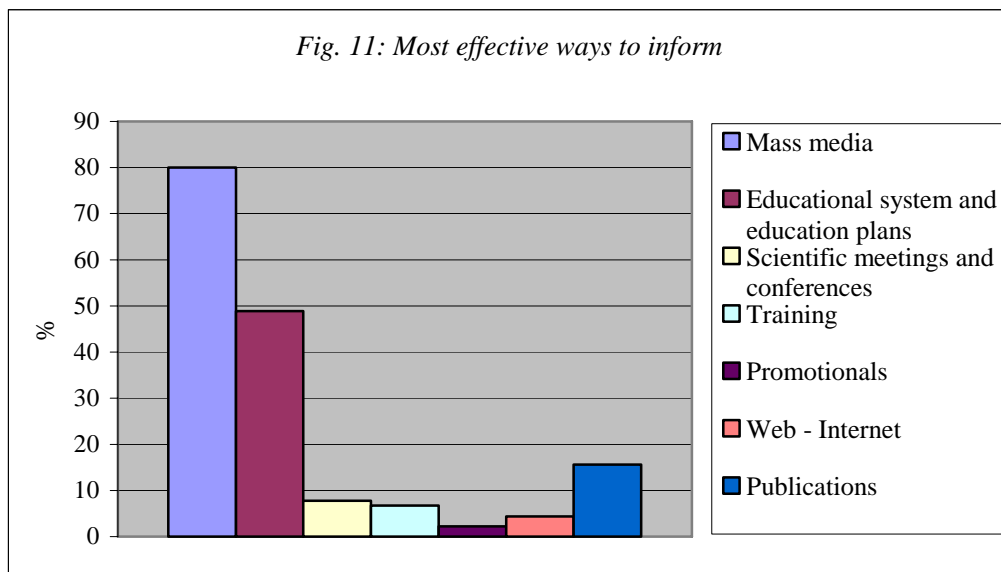
As to the following statement “The information provided in our country on the use of nuclear techniques is...”, 88.9% of the surveyed responded “Insufficient” (Fig. 10).



According to the previously identified ways to inform, the passive role played by the mass media and other sources considered as “not very significant” in the knowledge-building process of those surveyed then becomes quite obvious.

3.11. Most effective ways to broaden knowledge

To the question on what ways to inform they considered the most effective to broaden their knowledge on nuclear applications, 80% of those surveyed replied “mass media” referring to TV and the written press as the most suitable (Fig. 11).



The great influence exerted by the mass media on the opinion and knowledge building process of the population on any topic has been proved. Therefore, the mass media should be given proper attention.

On the other hand, 48.9% of those interviewed mention the “educational system and study plans” as another suitable source to develop knowledge, for example the inclusion of such contents in the educational programs of secondary and pre-university schools in the country, as well as in related university careers. This represents a potentially safe way for knowledge building, as it contributes to create the base for the development of these applications, from the very beginning of the vocational training of the population.

3.12. Interviews to experts

The interviews approached outstanding topics as the peaceful use of nuclear energy, the present status of the applications in our country and their opinions about the most clear and effective ways to provide information.

1. Considerations about the most common associations that the term nuclear energy evokes

According to the interviewed, this topic has a negative connotation to people because there is not enough information, i.e. not much scientific information is disseminated on this issue and the press generally refers to it in a negative or even sensationalistic way, even at global level.

2. Criteria on the peaceful use of nuclear energy

Experts stated that our country has a highly professional reference safety system for the countries of the area. They expressed that in Cuba there is qualified personnel and the conditions are created, but the potential domestic clients are not familiar with nuclear techniques. As to the present status of the applications in Cuba they consider that in medicine these techniques have maintained a good level, but in industry and in other branches they were standstill and are now in a recovery stage. In general, the surveyed consider that nuclear power does not have many perspectives in the country.

3. Information to the public

The interviewed affirmed that public information is insufficient and is dealt with negative connotations. What is widely known is the effect of radiations as a non-peaceful use of nuclear energy, for example, the atomic bomb and the Iraq issue. Positive aspects are not disseminated; there is no balance on the information regarding the cost-benefit ratio.

The most effective ways to inform considered by experts were the following:

- Educational programs
- Information to leaders
- Appropriate use of INTERNET and Web pages.
- Brochures and printed materials
- TV programs and videos
- Promotional campaigns to support Nuclear Medicine services

The main results of the study were:

- The image of nuclear applications is associated with health and medicine (93%).
- 100% of those surveyed accept the use of nuclear techniques and consider it as **very important** for medical diagnosis (94%), cancer therapy (93%) and for the sterilization of medical products (67%).
- The main ways to inform are the workers involved in the nuclear activity (74%), the educational system (72%) and in 3rd place the mass media (57%).
- The information provided in the country on the use of nuclear techniques is **insufficient** (80%).

4. Conclusions

The results obtained allow us to conclude that the methodology used was adequate. No differences were found within the groups by age and gender. Consequently no reference to those variables is made throughout the analysis.

Therefore we can state that the attitude of the surveyed population is positive and in general the population accepts the use of nuclear energy.

These results can serve as a starting point for the elaboration of a communication programme, and, consequently to reinforce the positive attitude of the Cuban population on nuclear applications.

REFERENCES

- [1] Perception of Radiological Risks in Hospitals, Rev. Radioprotección No. 29, Vol. IX (2001)8-52.
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Technical Reports Series No. 410. Market Potential for Non-electric Applications of Nuclear Energy, IAEA (2002)133.
- [3] KLINEBERG, O. Psicología Social. 10ma. Reimpresión. Ed. Fondo de Cultura Económica, México (1992).
- [4] INTERNATIONAL ATOMIC ENERGY AGENCY, Communications on Nuclear, Radiation, Transport and Waste Safety: a Practical Handbook, IAEA-TECDOC-1076 (1999).