

PROMOTING SCIENCE CULTURE THROUGH SCIENCE MUSEUMS

ABSTRACT.

The development of science culture takes a long time, especially in a country like the Philippines. With the current weak state of science culture, there is a need to promote it. Some of the ways suggested to make science more appealing to the senses of the general public is through the revisiting of the incentive system, reengineering of science and mathematics curricula and inculcating science-related traits to children. Promoting science culture through science museums is very promising for the reason that science museums can serve as venues for alternative science education. Lessons and exercises in science that are usual in a school setting can be complemented by exhibits, interactive displays and seminars and trainings of science museums. The Philippine Science Heritage Center is one of the science museums in the country that advocates the promotion of science culture through its interesting exhibits and seminars. Science culture plays a major role in the promotion of science and technology among all sectors of the society. This has a positive impact on national development, as majority of services and industries in the Philippines rely heavily on research and development, which is a primary attribute of science and technology.

INTRODUCTION.

In the Philippines, the rank and title of National Scientist is the highest distinction that can be given to someone who has contributed to science and technology. This can be given to any scientist, researcher or anybody who works for the advancement of science and technology or imprints a scientific legacy to the Filipino nation. Outstanding scientific accomplishment that leads to the advancement of science and technology and improvement of human welfare are the two main considerations for this prestigious award. It is necessary that a person must not only have the capability to produce new records for science but can also disseminate the results to the public and entice them to appreciate science. As National Scientist Gelia Castillo would put it, *science must serve a human purpose.*

Science and its corresponding culture must be promoted to achieve and reap its golden benefits. According to Guerrero (2009), science plays a major role in national development. Improvements in medical services, industries, military services rely heavily on research and development. It also makes us better people and stewards of the environment.

Science in the Philippines was deemed to have existed long before the Spanish landed in the country. Velasco & Baens-Arcega (1984) tried to lay down the history of science development in the country. According to them, navigation, boat-making and weather forecasting were among the science-related activities and skills of early Filipinos. However, just because there were no written reports of these scientific activities, these can only be classified as craft.

During the Spanish colonisation period, science was taken to new heights. In 1578, Fr Juan Clemente founded the first leper hospital. A printing press was established in 1593 but it

did not prosper like in Europe. In 1781, Jose Basco y Vargas formed the *Sociedad Economica de los Amigos del Pais* as an association of selected learned persons in the country capable of producing new ideas. Fr Manuel Blanco wrote *Flora de Filipinas segun al sistema sexual de Linnaeo* consisting of four volumes in 1837, 1877-1880 (Velasco & Baens-Arcega, 1984).

Majority of the science-related works was focused on medicine and allied fields. The focus was shifted to another direction when the Americans arrived in the Philippines.

After gaining control over the archipelago, the then President William McKinley ordered to check the status of the country. One of the results of the survey was the enactment of Philippine Commission (PC) Act No 156 in 1901 that created the Bureau of Government Laboratories for biological, chemical and other studies. All scientific works were consolidated under BGL. After four years, the agency was renamed to Bureau of Science and mandated to undertake research in all fields of science.

The Jones Law of 1916 that introduced the Filipinisation of the Philippines was a political milestone. It provided opportunity for the Filipinos to govern their own country. Unfortunately, science was refocused to a direction other than what was set by the founders. Even the *Philippine Journal of Science*, which became the leading scientific journal in the Pacific by 1909, had suffered (Rodriguez, 1996). Quantity and quality of articles published in the journal were greatly affected.

Science development was never allowed to sprout and aid in national development. Though there were science-related undertakings, the priority of the government was more on public health and economic activities. The then Senator Emmanuel Pelaez saw the stunting of

the growth and improvement of science in the country. This made him decide to father Republic Act 2067, also known as the Science Act of 1958.

The minimal support of the government to science and technology has a strong bearing on the progress of industries and service-oriented institutions that rely on research and development. As early as 1984, low budget allocation to science and technology has been noted by Velasco & Baens-Arcega. The then Budget Commission was sympathetic to the then National Institute of Science and Technology (NIST) in securing funds for the agency because there was uneasiness in doing it. NIST was torn on the issue of promise-and-performance, wherein a major factor in allocation was either the ability of the NIST head to get more funds for more projects or to do more projects for justifying the acquisition of higher budget.

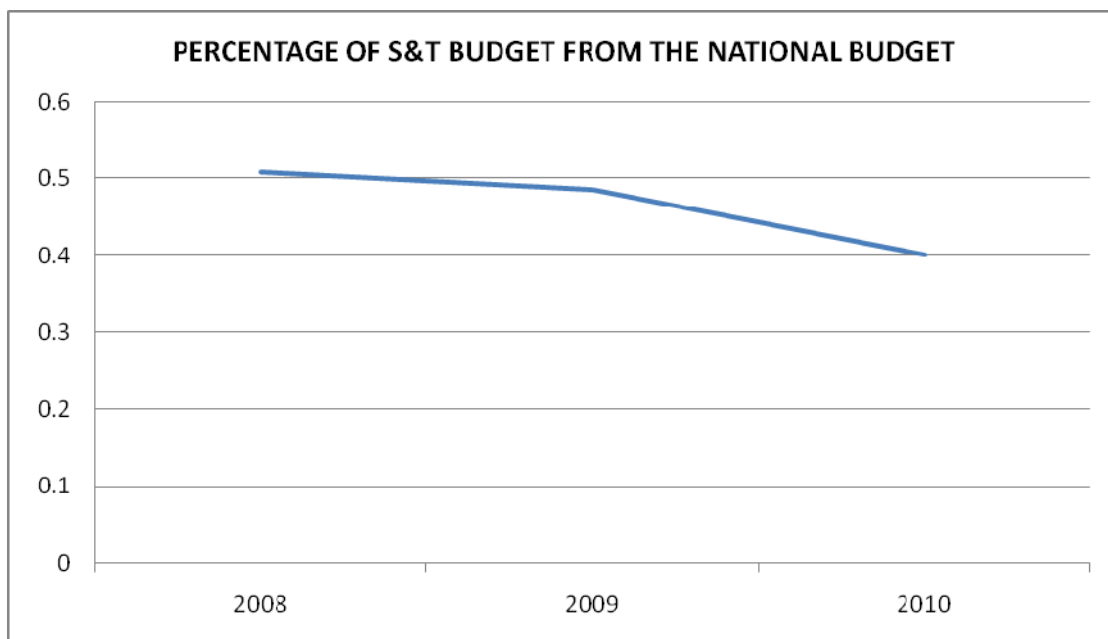


Figure 1. A simple graph showing the percentage allocated to science and technology by the national government.

At present, the Department of Science and Technology (DOST) is given a minuscule bite from the annual general appropriations. Figure 1 shows the declining percentage of national

budget given to science and technology as represented by the budget of DOST. In 2008, it had a budget of 5.41 billion, comprising about 0.51% of the national budget. For 2009, S&T budget comprised 0.48% of the national appropriation. This further decreased to 0.40% for this year. For three consecutive years, S&T budget has been steadily declining. This has serious implications to the scientific and technological development of the country (DBM, 2008, 2009, 2010).

The National Academy of Science and Technology (NAST) Philippines, which is the highest governing body on issues and matters related to science and technology, also suffers from the same fate. In 2008, it only received 0.0065% of the S&T budget. It decreased to 0.0061% in 2009.

The small amount of budget allotted to science and technology is really disappointing. This only shows that policy makers and the national government do not prioritise research and technology, or science and technology for that matter. With the low priority setting from the government, it is no wonder that the country has been struggling. Policymakers would always argue that the focus is on the economic development of the country to aid the ailing nation. Little can they realise that it is science and technology that would give better solutions to the burgeoning problems of the country.

This paper examines in general how science culture is promoted by science museums in the Philippines. Specifically, it aims to:

- a) list the existing science museums in the Philippines and their distribution across the country; and

- b) assess the exhibits and programs of the Philippine Science Heritage Center in relation to the promotion of science culture.

REVIEW OF RELATED LITERATURE.

Science culture can be loosely defined as a set of behaviours and norms anchored on science and its corresponding attributes. In the Philippines, it became popular and staple at least for the scientific community in 2007 when it was made the focus of the Annual Scientific Meeting of NAST Philippines.

Nebres & Intal (2007) identified the characteristics of science culture:

“The following can be considered among the most important: empirically-based and systematic knowledge generation, research, attention to detail, precision, emphasis on measurement and quantification, accurate written records, a problem solving approach to things, persistence, striving for excellence, following of systems and rules, an emphasis on facts rather than opinion, curiosity and observation, creativity, tolerance or openness to new ideas, rigor, discipline, honesty and objectivity.”

It can be noted that the features are derived from the basic features of science. They added that scientists, mathematicians and engineers are highly-regarded in a society with high science culture.

However, as what Licuanan (1998, as cited by Nebres & Intal, 2007) pointed out, the weak state of science culture in the country is brought about by several factors. One of these is the attitude of Filipinos towards science and the traits distinct to it, or the whole science culture. In a typical Filipino home, children are not encouraged to be curious and observant. Asking a lot of questions is labelled as nuisance.

This is also the same scenario in schools, where students are not encouraged to ask questions. Science education is basically equated with absorption of information. Teachers

normally do not create an environment for curiosity to sprout among young schoolers, especially in the elementary and high school levels.

There are also television programs that cater to the promotion of science and mathematics. This includes *Sineskwela* and *Math-Tinik*, which are aired by ABS-CBN Broadcasting Corporation. With the popularity of animated series and soap operas, these science-related shows weakly attract viewers, especially the young people. In a culture like what the Philippines has, wherein children should respect and obey adults, choice of television shows is skewed to what the older member of the household likes. Since the older ones prefer sports or drama shows, the tendency is that younger members do not have other choice but to watch these shows also. Moreover, because of this, media mileage gained by scientists and researchers is lagging behind that of an actor or an athlete or a singer. This leads to low regard for Filipino scientists.

One of the indicators of the weak state of science culture in the Philippines is the low performance of students in the Third International Mathematics and Science Study. With high scores incurred by the students of Japan, Hong Kong, Singapore and even Thailand, Filipino students are waving at the rear end of the list. This is a piece of evidence that science and mathematics education in the country is decreasing quality-wise. And this can be further attributed to the limited support of policymakers and government officials to science and technology (Nebres & Intal, 2007).

The Department of Science and Technology (DoST) is the government agency in-charge of all S&T-related activities, projects, endeavours and programs. One of its service institutes is the Science Education Institute (SEI), which is in-charge in the awarding of S&T scholarship to

deserving students. Applicants are given a list of college degrees and accredited schools and universities. From the list, an applicant chooses which he/she deemed fitting for his capabilities. SEI determines the recipients of the scholarship by a qualifying examination. Benefits include monthly stipends, tuition fee assistance, clothing and book allowances and a chance to be included in the roster of scholars. This is a way of encouraging young people to take science-related courses.

RESULTS AND DISCUSSION.

Science culture can be promoted in various ways. But it takes courage to take the burden of doing it in a culture unaccustomed or inadequately familiar with it. One of the ways of doing it is the establishment of science museums. Museums, in general, serve as venues for alternative learning.

Science museums in the Philippines are owned either by the government or private companies. Exhibits vary in topics and themes. The National Commission for Culture and the Arts (NCCA) created a Subcommittee on S&T Museums to group all science museums in the country.

Table 1 shows that there are only eleven science museums recognised in the subcommittee. All of the science museums are in the island of Luzon, with the majority in the Greater Manila Area. The government-owned science museums are in line with the nature of work or mandates of the agency. For instance, PSHC is under the management of NAST Philippines. So it is not surprising that the exhibits are Filipino scientists and their works, outstanding scientific products and other accomplishments in science.

Table 1. Members of the NCCA – Subcommittee on S&T Museums in the Philippines.

| SCIENCE MUSEUM | LOCATION | EXHIBITS | PUBLIC/PRIVATE |
|---|-------------------------------|---------------------------------------|----------------------------------|
| Philippine Science Heritage Center (PSHC) | Taguig City (Metro Manila) | Filipino scientists and their works | Public |
| Museo Pambata (MP) | Manila (Metro Manila) | Old Manila, science, environment, etc | Private |
| Philippine Science Centrum (PSC) | Marikina City (Metro Manila) | Basic science | Private |
| Manila Ocean Park (MOP) | Manila (Metro Manila) | Marine ecosystem | Private |
| Philippine Air Force Museum (PAF) | Parañaque City (Metro Manila) | Military science | Public |
| National Museum of the Philippines (NMP) | Manila (Metro Manila) | Herbarium, zoology | Public |
| Museum of Natural History (MNH) | Los Baños (Laguna) | Botanical and zoological collections | Public |
| IRRI Rice World | Los Baños (Laguna) | Rice-related exhibits | Owned by an international agency |
| Coca-Cola Pavilion | Sta Rosa (Laguna) | Coca-Cola related exhibits | |
| NIDO Discovery Centre (NDS) | Pasay City (Metro Manila) | Various topics, planetarium | Private |
| <i>Nayong Pilipino</i> | Subic (Zambales) | Anthropological exhibits | Private |

The first science centre was the Philippine Science Centrum (PSC). Erected by the Philippine Foundation for Science and Technology (PFST) in 1990, it championed interactive learning system for the Filipinos and debunked that science is hard and boring. Aside from the interactive displays on basic science, PSC also holds trainings and seminars for S&T promotion.

In 1994, the Museo Pambata was established at the historic Elks Club Building in the heart of Manila. It also features hands-on learning for children. Thematic exhibits include a brief glimpse of old Manila, environmental awareness, body parts, and basic science concepts.

During the centennial celebration of Philippine independence in 1998, the science community offered the Philippine Science Heritage Center (PSHC) as its contribution. Under the management of NAST Philippines, it serves as a repository for the outstanding achievements and accomplishments of Filipino scientists and researchers, including their contributions to the advancement of science and technology. This is also the only science centre enacted by law (RA 9107) and the only of its kind that focuses on Filipino scientists.

With the advancement of technology, more and more science centres and museums are established. Covering various topics, students and other young people are given the chance to browse through the exhibits and display themes of these museums. Interactive exhibits can stimulate their interest and encourage them to pursue careers in science. They are also given the idea that science, indeed, is enjoyable.

All of the museums mentioned except for Museo Pambata are full-blown science museums. Museo Pambata features science as one of its exhibit themes.

Manila Ocean Park and the Philippine Air Force Museum are visual treats due to the unusual and unique interactive displays. The Manila Ocean Park is currently the only oceanarium in the Philippines. So, students and other young people are always delighted to see marine life, especially those kids who have grown up in the concrete landscape of urban areas. The uniqueness of the Philippine Air Force Museum can be attributed to the fact that many people have never seen actual fighter planes or war helicopters and the science behind these planes.

Science communication plays an active role in science museums. For PSHC, this is very necessary to laymanise and popularise jargons, which are confined only in the world of scientific learning. It is very pertinent to relay the result of research and scientific endeavours.

Table 2. Exhibits and programs of the Philippine Science Heritage Center in three important periods.

| EXHIBITS | DETAILS |
|---|---|
| Order of the National Scientists (with Centerpiece) | Memorabilia and citation of National Scientists |
| Agriculture & Environment | Biodiversity (Philippine endemic species), tilapia sex reversal technology, coconet, world-class products (banana, mango, abaca, carrageenan, <i>makapuno</i> and <i>nata de coco</i>) |
| Society & Industry | Quink, <i>alibata</i> , pontoon bridge, yoyo, karaoke, IT experts |
| Health & Wellness | meconium kit, artificial bone system, tiki-tiki, conotoxin, ilosone |
| Gallery of Awardees | DOST Council awardees, Outstanding Young Scientist awardees |
| <i>Bioteknolohiya!</i> | DNA model, genetic engineering, advances in biotechnology |
| Meet Your Scientist program | Scientists are brought to schools for presentation and science career orientation |
| <i>Salinlahi</i> Symposium Series | Symposium on a pressing issue on science held in Luzon, the Visayas and Mindanao areas |

When PSHC was established in 1998, exhibits were grouped into National Scientists and their contributions, *Sariling Atin* (Filipino products), *Sa Atin Galing* (From the Philippines), *Kagalingan ng Pilipino* (Filipino ingenuity), Cutting Edge of Science and Gallery of Awardees.

The exhibit on the National Scientists serves as the core exhibit featuring the topnotch scientists of the country. The purpose of the exhibit is to showcase the career and achievements of the National Scientists. This is to encourage the youth to pursue a fulfilling career in science. It is assumed that by seeing the achievements of these scientists, they could be inspired by science.

Sariling Atin featured world-class products like *pili* nut from *Canarium ovatum*, *nata de coco* and *makapuno* derived from *Cocos nucifera*, abaca (*Musa textilis*) – the strongest natural fibre and *waling-waling* (*Vanda sanderiana*). Since these are agricultural products, the exhibits were moved to Agriculture and Environment, in addition to the Philippine endemic species comprising the exhibit on biodiversity. This provides a glimpse on the richness of biological diversity in the country and the treasure hidden in plants like bananas and mangoes. Seeing the Philippine eagle, which has been adjudged as the noblest among the birds of prey, gives Filipinos a feeling of pride for species that can only be found in the country.

Exhibits were regrouped into Agriculture and Environment, Society and Industry (for advancements in social and engineering sciences, including computing), Health and Wellness (for health and medical advancements) and Gallery of Awardees (for the awardees of the various DOST sectoral councils and Outstanding Young Scientists).

Aside from the exhibits inside PSHC, seminars and symposia are also held in far-flung areas and locations in dire need of science awareness and promotion. The *Meet Your Scientist* program brings scientists to different schools and communities. This program enables youngsters to meet scientists and have face-to-face conversation with them. The setting is classroom type and the scientist is given the chance to introduce himself/herself and the career he/she has taken in science. The scientist also presents career options when young people take a similar degree. After the presentation, the audience can ask the scientist. With this, students and children are exposed to scientists and the reality of choosing a science-based career.

The *Salinlahi* Symposium Series is a series of symposium held in Luzon, the Visayas and Mindanao areas. The symposium series can take any science-related topic. Venue selection is

generally based on the distance from key cities. If a province is far from major cities, then it is likely that the place can be chosen for the symposium. Another consideration is the potential of that place for students to be recruited to take science-related courses. For instance, a symposium series on science communication was held in Dumaguete City last year. The purpose of this was to encourage more high school students to take courses in science communication or other related degrees.

Of the mentioned science museums and centres, only the PSHC and PSC have directly used *science culture* in their undertakings. Science culture was attached to their visions and missions. Though the other museums have science-related exhibits, science culture is out of the picture. What is actually promoted is the core theme of the museum. For instance, botanical and zoological displays of the National Museum of the Philippines never mentioned about science culture. The emphasis is all about the nature and ideas related to the display.

Developing and promoting science culture takes a long time. Nebres & Intal (2007) stated that in doing this, Filipinos need to modify the incentive system, reform the educational system and inculcate new traits to the children.

Modifying the incentive system includes revisiting the reward system for careers in engineering, science and mathematics. Reforming the educational system means the reengineering of the science and mathematics education curricula. Inculcating new traits to the children regarding science culture is the hardest part because it involves the behaviour and practices of human beings. Additional burden is on the culture of parents towards science.

CONCLUSION.

Science culture is anchored on the effects it could give to people and national development. Developing and promoting it takes a long time in a society where science culture is not a domineering factor. But once it could be delineated on the values and traditions of the people, it could help in the economic development of the country.

With science culture, more students will be exposed and trained in research and development. This will later be reflected in the number of students with science-based courses and career. They will form the manpower for technical and scientific face of national development.

Science museums, on the other hand, could provide the necessary linkage between the general public and the scientific community. For ordinary people, including out-of-school youth, exhibits in science museums could ignite or rekindle their interest in science. With this, they could be attracted back to school or support government's project on science and technology. For young students in elementary and high school levels, they will be encouraged and inspired to take science seriously. They will consider science-based courses as one of their options when they go to college. Developing science culture among the young members of the population is very essential in making science a happy portion of life. When students land a job in science-related industries, he/she will feel happy about the career.

Developing and promoting science culture takes everyone's commitment. Scientists and researchers should find a way in making science culture an integral part of the society. The government, on the other hand, should support science and technology projects and endeavours. Lastly, people should be more than willing to convert their current practices to science culture. When everyone's in support of science culture, everything will fall into places.

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