Introduction

The post-Second World War period ushered in rapid developments of technological innovations and application of technology in quick pace in the area of tools and equipment, machines and devices, audio-video-print media and global communication network through satellites. The electronic technology in this age is so fast changing phenomenon that every decade of last fifty years could be identified as a new era of technological innovation leaving behind the preceding decade as backdated or outdated.

Against this forceful stepping in of technology with electronic sciences hand in hand, the museums of the day cannot remain unaffected by new technology in its orientation and functions. Any museum lagging behind the pace of such technological incomings every year will become antiquated. In fact, no time is left right now to think of constraints and limitations of the institutions, known as museums, in respect of technological application in functioning of the museums. No small or big, resourceful or deprevated museum can ignore what is happening around it as technological orientation of human living. The museums for their own sustenance have to be aware of it and endeavour to know how they can make best use of it in their better functioning for deliverance of collection, care, research, information input-output and public services.

In the post World War period, some basic considerations regarding the museum policy have undergone tremendous changes as a result of the impact of ever-continuing technological innovation in every decade. In the developed countries, introduction of new technology in every sphere of museum functions has brought a lot of changes both in the concept of museum and its potency. Awareness has also developed all over the world to protect our natural and cultural heritage by application of better scientific and technological methods. Now-a-days India is also regarded as an effective member of International Museum Movement.

In the present dissertation, the scholar attempts to highlight the need of technological application in the areas of collection and care of museum objects and deals with other aspects of museum works, such as, technology of information input-output, exhibition innovation, both inside and outside of
The museum and mass communication techniques as well.

Thrust Area

The research area includes present situation and viability of technological application in the area of collection and care of museum objects, better documentation and dissemination of information, effective publication and publicity, widening of the horizon of museum oriented community through online in-house communication throughout the Country.

The case study and area of intensive work has been confined mainly to the museums in the metropolises in India, particularly Kolkata.

Through the research work, a full assessment of the present application of modern instruments, equipment and systems, mainly audio, video, print and transmission systems in museums and possibilities of future use of hi-tech equipment and services in museums in metropolitan cities, particularly in Kolkata is done.

The museological areas of investigation include mainly documentation, conservation, security and public service in museums. This work hopes to help in developing the knowledge about relevant modern technology suitable for museological applications.

Relevance/Potentiality

Instrumentation facilitates documentation work to make the job more extensive, accurate and scientific. Many museums today look to the technological appliances as an invaluable means of obtaining, storing, processing and exchanging information. Network systems are capable of communicating with each other and form a huge information chain.

 Conservation and preservation of objects is now regarded as the main function of collection-oriented museums. Conservation includes not only preservation, but also perpetuity of collection. Different types of electronic and mechanical devices, other microscopic and micro-clinical apparatus, x-rays and radiographs, spectrometers, chromatographs, computers, etc., may prove to be allies in this regard. Better equipment lead to better
documentation, better conservation and better community services.

Security involves the protection of objects in store and display against thefts, fire and vandalism. Now-a-days Cultural Terrorism is becoming more and more ominous one. In order to prevent all of these, installation of modern devices is essential. Radio and television networks have made world smaller. Live telecasts have made remote hamlets and busy cities part of the same communication world. The scope of outreach services programmed by the museums has been widened. Museums may take advantages of modern technology for publicity, public announcement, marketing, educational and recreational services. Museum management may be easier.

Comparatively museums in India, except a few science museums under the National Council of Science Museums (NCSM) are far behind than the museums in the developed countries in adoption of hi-tech appliances in museum functioning. But India has vast potentiality in these fields.

The books and articles, which are noted under Bibliography, are mainly discussions on different types of modern technological devices, systems and methods and their applications. Only few of them contain discussions on the application of modern technological devices in museums of the advanced countries. But almost no work has been done in this field in the Indian context. It may be mentioned here that technologically and economically India is a developing country. So it is not always possible for museums in India to install modern devices due to shortage of fund and infrastructure, want of trained personnel, erratic supply of powers and for other reasons, particularly in respect of identification of priority area of resource mobilisation.

All these, taken together, have motivated the present researcher in undertaking a thorough fact-finding, analytical and critical study in this highly topical yet unexplored area of museum technology.

Research methodology

So far very few museological literatures have come out highlighting the area of research undertaken by the researcher. However, a thorough
search of the published materials and other papers, which were available at various libraries in the museums and outside the museums, has been undertaken. The methodology also covered library research and upgrading knowledge in technological area. In addition, most current information provided by organisations, conferences and individuals actively working in this field were accessed. Information have also been obtained from the ICOM's International Committee for Documentation (CIDOC), Museum Documentation Association, UK (MDA), Museum Computer Network (MCA), ICOM's International Committee for Audiovisual and New Technologies in Image and Sound (AVICOM), ICOM Documentation Centre, Smithsonian Institute, International Police Organisation (INTERPOL), National Research Laboratory for Conservation (NRLC), Indian National Trust for Art & Cultural Heritage (INTACH), Central Research & Training Laboratory (CRTL) of the National Council of Science Museums (NCSM), India, etc.

The other side of the methodology has incorporated survey of museums and analytical study of the present condition and future potentiality in adopting technological device, service, maintenance and proper utilisation. The researcher, in search of published materials and to study for the research work, has visited the libraries of the following museums and institutions:

2. Library of the National Science Centre, New Delhi.
3. The National Library, Kolkata.
5. Library of the National Council of Science Museums, Kolkata.
7. Library of the Asiatic Society, Kolkata.
9. Central Library of the University of Calcutta, Kolkata.

During research, extensive surveys have been conducted in the following museums, institutions and conservation laboratories:

Museums and alike institutions:

2. National Science Centre, New Delhi.
3. The National Library, Kolkata.
10. Sulabh International Museum of Toilets, New Delhi.
11. Prince of Wales Museum of Western India (Chhatrapati Shivaji Vastu Sangrahalya), Mumbai.
12. Nehru Science Centre, Mumbai.
17. Raja Dinkar Kelkar Museum, Pune.
22. The American Institute of Indian Studies, Ramnagar.
23. Mehrangarh Fort Museum, Jodhpur
24. Orissa State Museum, Bhubaneswar.
27. Museum of the Don Bosco Cultural Centre, Shillong.
28. The Asiatic Society, Kolkata.
29. Indian Museum, Kolkata.
30. Victoria Memorial Hall, Kolkata.
32. Science City, Kolkata.
33. State Archaeology Museum, Kolkata.
34. Asutosh Museum, University of Calcutta, Kolkata.
35. Rabindra Bharati University Museum, Kolkata.
37. Police Museum, Kolkata.
38. Philatelic Museum, GPO, Kolkata.
40. Kolkata Panorama, Kolkata.
41. Gurusaday Museum, Kolkata.
42. Gandhi Memorial Museum, Barrackpur.
43. Environment and Man Museum, Narendrapur.
44. Bengal Natural History Museum, Darjeeling.
45. Everest Museum, Darjeeling.
46. Akshay Kumar Maitreya Museum, North Bengal University, Darjeeling.
47. Acharjya Jogesh Chandra Purakriti Bhavan, Bishnupur.

Conservation laboratories:
1. National Research Laboratory for the Conservation of Cultural Properties (NRLC), Lucknow.
2. Indian National Trust for Art and Cultural Heritage (INTACH), Lucknow.
3. Conservation Laboratory of the National Museum, New Delhi.

Chapterisation
The thesis comprises following divisions apart from a thorough Bibliography:

The Introduction gives an overview of the dissertation, the rationale behind selection of the topic and the potentiality.

The first chapter entitled, History of Technology, chalks out the major milestones in the development of technology since 1947.

Different methods of collection practised in the museums are discussed in the second chapter, Gadgets and Tools for Collection of Objects.

Documentation Technology, the third chapter, contains different methods used by the museums for documenting their collections, including photo documentation and computerised documentation.
The fourth chapter, named, *New Waves of Museum Communication*, includes different communication channels used in museums, computers, information processing & retrieval and the role of mass media in museum communication.

Display methods, exhibit fabrication techniques of different types of museums, like the science centres, natural history museums, art museums, multipurpose museums, personalia museums, etc., are illustrated in the fifth chapter, called, *Science Centres and Traditional Display Methods*.

*Modern Equipmentation of Conservation Laboratories in India*, the sixth chapter, details the scientific instruments used in various conservation laboratories in India.

The seventh chapter, *Security Technology*, entails the security arrangements in various museums of India.

In the last chapter, *Potentiality of Technological Applications in Museums*, the researcher tried to depict the trends and potentialities of using technological advancement in the museums' functions and services.

The resultant analysis and discussions comprise the Conclusion of the thesis.

The data collected through survey works have been duly incorporated in the relevant chapters.

An exhaustive *Bibliography* of the books, journals, and articles has been annexed to the end of the thesis.

The questionnaire that was used to obtain data and information from the museums has been given in the *Annexure*. 

The fourth chapter, named, *New Waves of Museum Communication*, includes different communication channels used in museums, computers, information processing & retrieval and the role of mass media in museum communication.

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