

# LOOKING FOR EDUTAINMENT AT LITHUANIAN SCIENCE MUSEUMS

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## Abstract

The papers discuss challenges faced by science museums in Lithuania while undergoing a shift from traditional functions of science museums (conservation and preservation of heritage, research and communication) to aims raised by the 'Science Centres Movement' [1]. Empirical research presented in the paper is dedicated to analysis of expositions and websites of 7 science museums in Lithuania presenting various phenomena of science and technology – energy, radio and television, anatomy and medicine, pharmacy, etc.

In the empirical study the authors of the paper refer to the concept of the Science Centre which embraces such features as a move from artefacts having historical value and object-based epistemology to education and focus on a visitor, closer ties with local community and empowerment, links to formal education and aiming at educational outcomes, focus on leisure attractions and edutainment ([1], [2], [3], [4]). Other important theoretical considerations referred in the research while carrying out the empirical study of Lithuanian science museums is a definition of multiple functions of present-day science museums and science centres (scientific, cultural, educational, social, political, economic, conservational, and symbolic) ([5], [4]) and distinct modes of mediating science (science as relevant to everyday life, science as personal, science as fun, science as doing, science as a route into the public sphere, and science as multicultural endeavour ([2]).

Keywords: edutainment, museum education, science museum, science centre.

## 1 INTRODUCTION

The problem under analysis is based on the provision that a science museum is the space of nonformal education embracing scientific communication and presentation of scientific phenomena to the public. The identity of the present science museums is changing in the process of taking over the characteristics of science centres and joining the so called movement of science centres. The aim of the research is to present possible solutions for construction of the educational content of public museums in the context of Lithuanian museums in the process of transformation and the movement of science museums so that they would offer opportunities to perform science education and communication to the public more effectively. In the course of the aim realisation, the analysis of Lithuanian museum expositions and their websites was carried out.

Lithuania is the state that does not have the traditions of either science centres or science museums. In 2016, in Lithuania there were 103 museums with the character determined by the departmental-administrative subordination, but not by the typology of the activity content. Therefore, it is difficult to identify the type of individual science museums especially if it is related to the disclosure of scientific phenomena or science communication and non-formal science education. Though there is no tradition of the concept of science museums and science centres in Lithuania, some museums position themselves partly as performing science education and disclosing certain phenomena of science and technologies (e.g. Energy and technology, Medicine and pharmacy, Anatomy, Zoology, Sea, Money, Radio and television). The analysis of 7 museum expositions and public websites' content showed that their concepts differ significantly from the worldwide concept of a science centre or science museum. The museums offer a huge number of educational programmes for different groups, but there is lack of interaction between entertainment and education. Active creation of the new generation interactive museums is also observed, the design of a science museum in Kaunas has begun. The mentioned tendencies created preconditions for deep research of the content of educational science museums, science centres and expositions which would facilitate formulation of recommendations for purposive creation of the museum educational space enabling active cognition of scientific phenomena.

When discussing the identity of contemporary scientific museums, it is often defined in contradiction to a science centre [2]. A science museum usually has objects of historical value and belongs to the area

of heritage. A science centre most often does not have any collection and is made of an interactive exposition meant for “live” exploration of scientific phenomena.

The following stages of changes of science centres and science museums are distinguished ([3]): the first generation (from the 19th century) – traditional science and technology heritage expositions presenting the objects without a broader context; the second generation (from 1960s) – science centres with no collections and comprised of interactive expositions meant for exploration of scientific phenomena without a broader context; the third generation (from 1990s): thematic interactive expositions are meant to explore not only the scientific phenomena but also science related cultural, social and political issues.

The new tendency emerges as science museums incorporate the science centre as a structural part. The science museum is acquiring features of the science centre. Therefore, it can be said that science museums construct their identity in reference to several concepts and models – the hybridization of the identity is taking place. The concept of the Science Centre embraces such features as a move from artefacts having historical value and object-based epistemology to education and focus on a visitor’s learning, closer ties with local and surrounding community, empowerment of the visitor, links to formal education and aiming at educational outcomes, focus on leisure attractions and edutainment (education + entertainment) ([1], [3], [2], [4]).

Empowerment in the science centre envisages the new role of the visitor in the interaction with exhibits when the visitor is engaged, makes a creative contribution. Outcomes are determined by visitor’s input: ‘An interactive exhibit is one in which the visitor has a real effect on the outcomes. The result is dependent on the visitor’s input; if the visitor is not fully engaged then the result is diminished... The empowering exhibit must offer real choice with multiple outcomes, all equally valid.’ ([1] p. 7). It is a manifestation of constructivist approach in the science centres when multiple representations and understandings are produced. ‘Displays are deliberately presented to evoke a variety of responses. Visitors are encouraged to interpret their experiences and construct personal meaning’ ([3] p. 18).

This approach of empowerment is described by other authors as ‘science-as-doing’ ([2]) when science centres stress multi-sensory experiences and the hands-on interactivity of visitors with perceptible and tangible objects in opposition to ‘thinking’ in the traditional science. This science-as-doing could be combined with other cultural activities,

At the same time this approach of empowering the visitor differs from ‘didactical paradigm’ in traditional teaching since the educational goal is less clear in science centres and there is a less stress on didactic teaching; very often sciences centres’ exhibitions are criticized as being thematically eclectic assemblies of interactive exhibits without strong storylines ([1] p. 7).

Personalization of science communication as one more manifestation of a constructivist pedagogy becomes an important feature of science centres when a human face is put on the exhibition and interpersonal relations of visitors with explainers (staff, employees or volunteers/ students) and real scientists are created ([2]). Additionally, the personalisation of science deals with a way of framing of scientific information when the exhibitions present aspects of personal identity, social and cultural surroundings of the visitors. It allows science centres to become more culturally and socially inclusive, to bring the science closer to the public. Empowerment of the visitors, science as doing and personalisation are inextricably linked with ‘edutainment’ as a junction of education and entertainment. It becomes an important feature of science centres when science is presented as fun, enjoyable experience and leisure attraction ([1], [2]). Besides other factors, orientation of science centres toward entertainment and fun (‘Disneylandization’) could be explained by commercial basis of their functioning and the aim to generate a revenue. This orientation towards entertainment, leisure attraction and constructivism is also reflected in the architecture, interior design and ergonomics of the scientific centre, which seeks to create a cosy atmosphere for learning, leisure, allows to feel free and relaxed.

A link to local communities is mentioned as an attribute of science centre. This feature is characterized as a connection of exhibitions with science, engineering, and technology of local industries [1]. Exhibitions and activities around science centres are organised for and in cooperation with local educational institutions and scientists, pupils, student and others by solving distinct local problems [2].

Science centres as a space and environment for informal learning maintain connection and links to formal education by creating supplementing activities which complement formal curriculum. Teachers are invited to cooperate with science centres by strengthening students’ interest in science and

experimenting. Many science centres besides their main exhibitions have educational programs, workshops and lectures, laboratories, science theatres and camps.

The discussed features of science centres and identity changes of science museums signify their new functions - conservational, cultural, social, economic, scientific, political, educational, and symbolic [4].

## **2 METHODOLOGY**

To collect the research data, expositions of individual Lithuanian museums, presenting scientific and social phenomena – Money museum (banking and economics), Pharmacy and medicine, Anatomy, Zoology, Sea museums (natural sciences), Energy and technology, Radio and television (engineering) were analysed.

In order to disclose the new and changing identity of science museums, we resorted to the above mentioned features of science centres and new science museums: presentation of the scientific phenomenon and object; educational content (what knowledge is presented and how it is constructed), how the museum exposition complies with the concept of a scientific object and adds to the curriculum; what learner and visitor groups museums target, how they differentiate the content according to target groups and what educational effect they want to achieve; “science as fun” elements, what means are used to involve museum visitors into object cognition processes and how they facilitate knowledge acquisition and increase the attractiveness of the science object; multi-sensory experiences and the hands-on interactivity (‘science as doing’); link to local communities.

## **3 RESULTS**

### **3.1 The Object of Science and Educational Environment in a Traditional Science Museum**

This museum group includes the museums of Medicine and pharmacy, Anatomy and Zoology. The first two museums belong to the Lithuanian University of Health Science and aim at involving the students of the university in the process of knowledge development by analysing the exhibits. The museums of Medicine and pharmacy and Anatomy were established long ago by the university employees. The Zoology museum is attributed to the category of public museums, but together with demonstration, different research of nature is carried out.

#### *3.1.1 The Museum of Medicine and Pharmacy*

The museum of Medicine and pharmacy was established in 1936. Scientific objects in this museum are presented according to two story lines – medicine and pharmacy. The collection of exhibits is comprised of personal items, medical instruments, historical documents, equipment of hospitals and pharmacies, prescription books, samples of medicine, elaborate drug bottles donated by doctors and pharmacists. The aim of the museum has two components – accumulation, protection and demonstration of museum valuables and performance of research and popular science activities. The museum of Medicine and pharmacy is acknowledged as one of the most unique in the Baltic states and is distinguished by its spaces and design. The museum is situated in a 16<sup>th</sup> century house in the Town hall square, in the Old town which was once inhabited by a pharmacist. The furniture and exhibits here are original and reflect the history of the past – it attracts visitors. The exhibition of the medical content introduces Lithuanian medicine from 1918 to 1940. It is possible to follow several individual expositions related to the birth of medicine through the concept of shamanism, barber activities and instruments used in medicine of the 18<sup>th</sup> century. This story is told through exhibits and their description. The theme of pharmacy is oriented to visual presentation of pharmacy through furniture of the time, original herbal infusions, ointments, oils and equipment for making drugs. A guide tells about the activity of a pharmacist and rooms characteristic of a pharmacy; she also shows preparations and answers the questions. The historical educational content of medicine and pharmacy is told consistently by presenting the fragments of history and seen while travelling from the cellar to the ground floor. Here the variety of containers is displayed and some drug making equipment can still be tried out. The laboratory and the room of medical supplies offer an opportunity to explore infusions, bottles with inscriptions and smell strong aromas of herbs. The connection with formal education is seen here through study and participation of gymnasium pupils of senior forms in chemistry classes held there. Elements of entertainment are not numerous as the exhibits are mostly closed and not to be touched. Some equipment for making medicine can be tried out and that is all what concerns

entertainment. It was noted that little information is given in a foreign language for tourists from other countries; most of the stands are in Lithuanian.

### *3.1.2 The Museum of Anatomy*

The Anatomy museum was established in 1922. The aim of the museum is very specific and focused on the deepening of the students' knowledge of anatomy, as well as increasing of study efficiency while learning through real objects. The biggest part of the exhibits in the museum are made of the parts of dead bodies and only some of them are moulages. The exhibits consistently tell about the system of a human body and present stories how these bodies appeared in the museum. The exposition is divided into following parts: bone preparations, wet preparations, corrosive preparations, clear preparations and dry preparations. It is interesting that 80% of the objects in the museum were made before war. The museum is in the university premises and does not accept individual visitors; it invites groups of students, senior pupils and adults. Information about the exhibits is given according to strict classification and knowledge presentation. The target group of the museum, in addition to medical students, could include students of other universities, the elderly of the TAU university, pupils of senior forms. It has to be noted that a visit in this museum could evoke different feelings, therefore, younger pupils are not advised to go there. The feelings could range from curiosity to sadness and disgust with preserved bodies which compares to contact with death.

### *3.1.3 The Museum of Zoology*

The third museum attributed to the same sphere is the Zoology museum established in 1919 by a famous Lithuanian naturalist. Since 1994 the museum has been under the authority of the Ministry of Environment. The museum is situated in a very convenient place, i.e. in the central street of the city which makes it seen and accessible. The exposition of the museum is rather large and is displayed on 3 floors, in 6 halls, in 96 stands according to the scientific system starting with the most primitive organisms and leading visitors to the most complex ones. A new hall of hunting trophies was opened. During the visit, an exhibition of children's pictures was hosted there. The classical exposition of the museum is comprised of seven sections: invertebrates, insects, fish, reptiles, osteology and mammals. The exposition is supplied with interactive information terminals which allow the visitors to choose the theme and watch filmed material on every exhibit group. The information to the public, as well as scientific research. There are three scientific laboratories – for bioanalysis, workshop of biological preparations and experimental taxidermy. The exhibits in the museum are displayed according to the traditional classification and presentation, so that the story of evolution could be told, as well as the narratives about lives of the objects and the variety of the kinds could be disclosed.

The educational content is focused on different age groups starting with pre-school and finishing with the elderly. Pupils are offered various educational programmes: Animals of the world, Pathfinder in nature, I love, About a bird and its feathers. These educational programmes aim at the pupils of 1-2, 3-4 and 5-6 forms. There also are guided excursions. The connection with formal education is constructed through the subjects of biology and zoology, but there are no interfaces between the educational institution and the museum.

Elements of fun are related to observation of one or another exhibit through visualisations which explain how animals live; the exhibits can be analysed with the help of the magnifying glass or through the window. Such stories are of different themes: the anthill, the North Pole and white bears, life of seagulls, winter days of the crow family, a meadow in summer. The website offers a 360<sup>0</sup> interactive panorama view of the museum that enables visitors see the main exposition halls with the help of photos.

## **3.2 A Science Museum: Between Old Artefacts and New Entertainment**

### *3.2.1 The Museum of energy and technology*

The Museum of energy and technology is in the building of cultural and historical heritage – the former power plant of the city of Vilnius. The aims of the museum given in the website include the museum activity, research and educational activity (expositions, lectures), creative organisation of leisure and cultural events. At the same time the strategic plan includes one of the top tasks – to cherish the building and equipment of the old power station as the object of historical heritage. So the traditional function of a museum – to protect and preserve cultural artefacts is prominent. The part of the museum exposition devoted to the first Vilnius power station offers the visitors numerous authentic objects of industrial heritage – parts of the electric power station equipment of impressive size, metal

tubes, generators, fragments of the steam machine, consoles, electric metres). All these artefacts present the spirit of the industrial epoch – the construction of black metal, occupying huge spaces of the exposition hall, demonstrates magnificence, undeniable materiality, strength and reliability. Presentation of the first electric power station heritage is supported by historical information and photos of the power station history.

The second part of the museum is devoted to exposition on energy. The website of the museum offers a description saying that the visitors can learn about different models and principles of power stations (thermal, water, atomic), their advantages and disadvantages, know about the alternative sun and wind energy and their perspectives. This information and the educational content are mostly delivered during a guided excursion. With the help of the audio-guide that could be downloaded into the mobile phone, it is possible to learn about individual exhibits. Nevertheless, the overview of the exposition that a visitor can experience without an excursion led by an employee of the museum or an audio-guide gives an impression that the written and visual information is insufficient to understand the main principles how energy is produced, how power stations work and what their activity principles are. The majority of artefacts do not have more detailed descriptions. Following the classical principle of exposition which says that objects with information have to deliver essential data and provide knowledge about the main phenomena (in this case about energy and principles of power station activity) as a science museum, it could be acknowledged that this function is not fully realised. It could be explained by changing identity of the museum when there is transfer from care about heritage and emphasis of energy history to educational and entertainment activity. It is interesting that the main website of the museum says that they are in search of an educator-physicist. This circumstance only confirms the necessity realised by the museum personnel to enhance the science (energy and technology) part in the exposition.

The other two parts of the exposition reflect the new identity of the museum – new features of a science centre. The part devoted to Vilnius industrialisation and technological development of 19<sup>th</sup>-20<sup>th</sup> centuries presents different branches of industry (textile, leather, printing, glass blowing), products, historical periods. This part is dominated by colourful posters with a lot of photos and visual material and also presents many artefacts, demonstrating products, production equipment and household things. Visitors can read and see interesting exhibits and learn a lot of interesting historical information about the past.

The 4<sup>th</sup> part of the museum exposition reflects the principle of science centres the most – the so called ‘science-as-doing’ when multi-sensory experiences and the hands-on interactivity of visitors are emphasised. In individual halls, visitors find exhibits meant for children and obviously not only for them that illustrate certain laws of physics. Visitors can touch, move and push the exhibits. These are the exhibits that could be found in other world science centres (e.g. some exhibits are in the Polish science centre “Copernicus”). The value of the exhibits is explained by their function – to provide entertainment, science as fun. At the same time the equipment stimulates interest in science, different laws and allows visitors to experience the pleasure of discovery and experiment (it here that attitude ‘science as doing’ is manifested). Still, this exposition may be criticised as without the general interest in science and pleasure of experimenting it does not provide clear educational content. Equipment presents laws of physics that are not related to the general concept of the museum and even the most significant laws of physics are not presented – the majority of exhibits illustrate effects and interesting phenomena the practical utility of which is not clear, because application is not presented. So we see that an attempt to provide entertainment and the pleasure of experimenting, to ignite curiosity and surprise is realised there, but clear scientific knowledge and information about practical application are missing.

The museum has a colourful, informative and attractive website. Announcements on educational activity are ample – thematic exhibitions are offered and described (parts of the exhibition presented by guides/employees). The internet website provides information about a video guide (sign language), audio guide that could be installed in the mobile phone, an educational game. There are proposals to organise birthday parties for children in the interactive sector of the exhibition. The exposition and the website show that the museum attempts to attract visitors and develop educational and entertainment function.

### *3.2.2 Edutainment (entertainment+ education) in the museum as an active company*

Radio and Television museum presents the main object – the activity of a broadcaster as the main attention is focused on how radio and television work. In terms of the museum specificity the presented object is expanded including such spheres as engineering (TV equipment and different

constructions), electronics (system performance), computers and computer design, language, history arts. Such access on the presented object expands the educational teaching and learning opportunities.

Radio and TV museum was established in 1997 and is under the administration of the national broadcaster – Lithuanian Radio and Television. The museum is not traditional as the access to expositions is dynamic because it is difficult to plan the objects to be shown to visitors in advance. Interactivity is significant of the fact that visitors are given opportunities to see TV studios hosting film shootings and TV broadcasting, to see and examine equipment, communicate with the producers, journalists, directors, operators, make-up people and other employees.

The museum has a relatively small exposition presenting equipment of true museum value, like the first TV equipment. The aim of this exposition is to introduce the visitors to the historical development of TV technologies. One of the most unique aspects of the museum is the exposition presenting the history and facts of the January 13, 1991 military attack against the TV by the soviet army.

In terms of the presentation of the object of science, a museum does not have a very clear line or structure. The presentation of the historical technological context is more clear. In other respects, e.g. technological, artistic and engineering there is no clear and consistent structure, no related exhibits are presented or there is no explanation about how one or another technology works and special effects are created. A more detailed presentation or explanation happens only when visitors show specific interest. In this respect, the museum lacks consistency and clarity in presenting own activity and the object of science.

The museum does not distinguish individual groups of visitors- it is not reflected in either the website or during the visit in the museum; there is no clear position or orientation to the specificity of one or another visitor group. The interests of visitors are determined only at the arrival to the museum. Still when determining if the museum has traditional historiographic exposition that is displayed behind glass, it is possible to say that there is orientation to some conservative visitor approach. The assessment of interactivity that is more related to the younger generation or pupils, showed that there is no special equipment (computer portals, tactile material or other means) or material, but the interactivity is created by direct participation or observation of programme creation processes, e.g. it is possible to watch how the TV programme is created, what equipment is used for special effects, to monitor the camera together with the operator, to see and hear radio programmes. It creates the impression of interactivity and live attraction and helps to immerse into different processes and, as everything takes place in reality it stimulates learning.

The educational content in the museum is not created purposefully with exception of the part when the visitors are given a detailed story about different processes in action. There are no programmes or exhibits prepared that would focus on different visitor groups. Education is organised on the basis of visitor demands. If the museum provides certain knowledge it is consistent and argumentated as it is received directly from professionals-specialists. Still to receive this knowledge and information may pose difficulties as there might be direct broadcasting at that moment and there would be no possibility to communicate with programme creators.

Entertainment elements and their purposefulness. The museum's activity is directly related to entertainment – interesting, attractive and dynamic acquaintance with the TV and radio activity. The excursions there are organised only with the help of the guide (an employee who has worked in the company for 30 years), but the process is very active and interesting. The guide always reacts to the visitors' demands and if there is no possibility to see something she tells about it, shows recordings or direct broadcast. Employees (professional operators, directors, make-up people) also become part of the entertainment as they are very positive about the visitors (they are informed well in advance that a group of visitors will come) and tell about the specificity of their work. In the main news studio, visitors can be in the place of programme hosts, to see how a prompter works, who does lighting, sound and view effects, what broadcasting equipment is employed. The visitors are also given the opportunity to see and take pictures of a well-known children or family programme studio and explore the equipment. Edutainment (interaction of education and entertainment) in the museum covers a lot of feelings, sight, hearing, touching, participation, but it cannot be stated that this is directed to purposeful cognition. What is more, there are no recognisable connections with the official curriculum. Dynamic and active participation creates conditions for activity but it is not helping clear identification of learning processes.

The RTV museum creates perfect conditions for the public to learn about life and activity of the public broadcaster. The visitor can see not only beautifully designed and equipped hall and exhibits

displayed behind the glass, but also participates in the real life of the institution and feel its pulse. The visitor can also see the problems that the national broadcaster encounters – e.g. lack of financing (many rooms need renovation and there are only a few new modern studios). Visitors can talk to employees about the difficulties they face. Thus it can be maintained that the museum complies with its mission and vision.

### **3.3 The Establishment of a New Generation Science Museum and Science Centre in Lithuania**

#### *3.3.1 The Lithuanian Bank Money Museum*

The main objects presented in the Lithuanian Bank Money Museum are money and banking. In the traditional approach these scientific objects comply with the concept of a science object only to some extent because banking as science is attributed to the field of social sciences; money as the economic element of the state is also a social phenomenon, therefore in this context it is considered that the object presented in the Money museum may have significant influence on the development of mathematical skills.

The Money museum (<http://www.pinigumuziejus.lt/lt/>) was established in 1999 and is under administration of the Bank of Lithuania. In 2013 the museum, together with the Canadian, German Bundesbank, South Korean central bank and the USA Federal reserve system money museums, was included into the group of five best world central bank museums ([6]) as claimed by the scientific research journal *Mint World Compendium*.

The exposition of the museum introduces the visitors to the world money and banking history, Lithuanian currency, banking development from the establishment of the first credit institutions to the present day.

In terms of the presentation of the science object the exposition content demonstrates two clear lines: *banking* as a historical and economic process and *money* as a structural object of economy which is related to the declared aim of the museum. The connection of the storylines with the country community is clear. At the same time the global and world approach is very strong. For example, the exposition of “Money stories” presents the overall development of the world money from the primitive forms (grain, shells, fur, amber) to the present electronic banking. Lithuanian money of different epochs is demonstrated with the help of the samples of ancient coins and jewellery by comparing them with the money of other countries. The exposition is divided into understandable, memorable themes showing the most significant periods of money history: “When money were goods”, “When money became metal”, “Ancient Greece – the initiator of hammered coinage”, “Banking stories”. The exposition introduces the beginnings of banking operations, the first estate, central and commercial banks, shows the development of banking in Lithuania from the first credit institutions to this day and discloses the role of the Bank of Lithuania. Thus, the historical object presentation principle is observed through the disclosure of historical development of money and banking and the overall development logic from the like-kind exchange to technologically developed and virtual forms of exchange.

The distinguishing of the visitor and learner groups is directly related to the consistency, modernity and aesthetics of the museum exposition. The exposition could be visited/ seen in different ways. It is either an individual route without a mediator (a guide), a route with the audio guide (in English or Lithuanian; the installed multi-lingual system of portable electronic equipment with touch screens allow the visitors to choose other languages as well), the excursion with the guide, virtual expositions. The museum itself does not emphasize the purpose of its expositions for one or another target group, e.g. for children, teenagers, adults and the like; the emphasis is placed on certain experience, e.g. to study the material in the posters, use the equipment, answer the questions, etc. In this respect the variety of object presentations has to be specified as creating preconditions for receiving information in the cases of visitors with different experiences, attitudes or interests: adults would be introduced to banking history by presenting information in stands on the wall or in traditional museum stands. The younger visitors can find a lot of computer terminals – interactive monitors (to answer questions, listen to music), tactile material (to determine secret signs of money, compare the weight of gold, silver, copper and the like). The museum has a virtual exposition comprised of two lines: the Internet portal which offers a review of exhibits, equipment, exhibitions and allows visitors to choose the route and a purposeful virtual exposition of money and banking history that presents the most important historical aspects through filmed stories in Lithuanian and English. All the opportunities show that provided

access is orientated to certain visitor groups: tourists and visitors (individual or in groups) that are interested in the information on the object in the museum, the museum interactivity and attractive interior and exposition design, groups of pupils who seek the knowledge about presented objects and the interactivity and visitors and interests groups who are interested in knowledge acquisition, e.g. historians, teachers, economists who could receive specific information.

The educational content in the museum is constructed by including more visitor senses into activities related to both knowledge and historical context and aspects of entertainment. Consistent development of historical banking and money is presented through descriptive material and authentic exhibits combined with modern technologies. For example, the improvised money hammering workshop allows the visitors to follow the change of technologies from primitive 15<sup>th</sup> century tools, clothing details, rifle press to modern coin production equipment. Employing one of the oldest ways of production, a visitor can experience coin hammering and individually produce a token of 1 penny. The interactive programme "Which metal is heavier?" allows visitors to lift gold, silver and copper alloys and compare their mass, feel the difference, and find explanations in the stands about different metal parameters.

In connection to formal education content (curriculum), when disclosing the development and concept of money and banking, the museum itself does not emphasise such opportunity, but there could be found some connections with parts of mathematics, economics, geography and history. A lot of information is presented in English and thus there is a possibility to integrate subjects and themes through a foreign language. "The interactive map of world money" could be distinguished as it gives an opportunity to learn about financial systems of 200 countries, see their money and social, political and economic indicators. Another aspect related to formal content could be interactive tests presented in the exposition computer at the end when visitors having chosen the level of complexity can check their knowledge they acquired in the exposition.

Edutainment (interaction of education and entertainment). The equipment meant for entertainment is well thought through in terms of technological decisions and the place of activity. Some elements clearly related only to entertainment could be presented – there is a possibility to use mobile gadgets and receive necessary information; having answered the test questions, a visitor can expect a musical creation as a reward or get a photo of oneself or the friends. All this is related to the interface of education and entertainment.

Graphical solutions of the museum, integration of artwork, different interactive tools, sound, view and light effects are employed not only with the aim to attract the visitor and provide knowledge, but also to help him accumulate it, encourage to go deeper, interpret independently and find answers. Museum exhibits, means and equipment enable visitors to employ almost all senses: visual – the exhibits are presented clearly, artistic solutions are employed; hearing – audio guide; a possibility to hear the voice of the director of the Bank of Lithuania when answering the phone; tactile – an opportunity to touch the exhibits and actively participate, taste – a chance to try a candy. An interactive tool that is popular among the visitors is the special individual scales that answer the question about the price of an object of a particular weight if it were gold, silver or platinum. The equipment is connected to the Internet and the Lithuanian Bank data base. It turns the body mass of an individual person into the mass of gold or silver and calculates the human value according to the actual currency exchange in euro, dollars or other currency. A visitor can see the answer in the monitor or can print out a cheque. Computer terminals offer visitors detailed information about the functions of the Bank of Lithuania, an animated film about the bank activity, an interactive multimedia game about the bank note security and check a personal bank note with the UV equipment. The hall of Lithuanian money has eight automatic transporters moving vertically that show Lithuanian money of different periods. A visitor can himself regulate the height of the view of plates with coins, to move the magnifying glass and explore even the smallest elements of coins.

One of the most important aspects of correlation between entertainment and education is the representation of a bank as a state institution. All means and exhibits are displayed in aesthetic spaces that comply with the bank image of stability and reliability; monumental materials prevail – metal (multiple coin collections), stone, wood, quality glass, lighting. The whole interior of the exposition creates the impression of bank stability and reliability because the state bank as an institution, the money and other economic or financial aspects allow the state and an individual to feel stable. Together with the educational aim and the Lithuanian bank brand reinforcement the function of artefact exposition and preservation is of utmost importance. In this case these exhibits are coins, notes and equipment. Still this function is not the main, the others are more important.

### 3.3.2 Lithuanian Sea Museum

According to the presented object, the Lithuanian Sea museum could be defined as the closest to the science museum type as it clearly declares and consistently presents the natural sea variety in biological, technological and historical aspects.

A Lithuanian Sea museum is a state budget organisation under the administration of the Ministry of Culture and is of the *public* type. It was established in 1979 in the old military fort of Klaipėda. After the renovation and renewal of expositions, it was reopened in 2018. It is one of the most visited museums in Lithuania that hosts about 0,5 million visitors a year and has received more than 15 million guests in its lifetime. The mission of the museum is related to the research, nature protection, harmonious balance between nature and the man, joy of cognition which is the closest to the concept of a science museum. There are multiple expositions enabling visitors learning, cognition, experience and inclusion. The expositions are constructed outdoors and inside. The scientific research of marine natural variety is cried out and historical exhibits are accumulated.

In terms of presentation of the scientific object, two consistent lines are distinguished: live nature (plants and animals), sea history (ship development, the history of military navy, scientific-technical archive, an ethnographic home of a fisherman), marine equipment (fishing ships, sea technical equipment). The whole content of the exposition creates a broad understanding about the sea as a science object as a consistent story is created about what water is, how seas were formed, how the animals appeared, what role of the sea plays in the lives of people. Story lines historically are connected with the community and its history, e.g. authentic fishermen households, display of sea fishing ships. There are also connections of Lithuanian navy with world events, e.g. the story of a priest who died in the Titanic – his personal belongings and a collection of Lithuanian folklore are displayed.

The distinguishing of visitor and learner groups is declared in the museum activity presentation and is directly related to interactive elements. The website (<http://muziejus.lt/>) targets certain visitor groups: families and children, groups, schools, the disabled and the elderly. These groups are offered purposeful educational programmes. The expositions can be seen individually. There are traditional guides but there is lack of portable audio guides. It has to be noted that together with the historical exhibits there is equipment for individual tours with the help of which it is possible to listen to stories directly related with the displayed material, but the texts are only in the Lithuanian language. The presentation of the exposition structure and information is given in different formats for a variety of visitors: there is a lot of authentic material and information in posters, information stands, computer portals, as well as presented traditionally together with the exhibits; there is also a lot of tactile material and other opportunities to see the exhibits which is interactive and attractive.

The educational content is constructed purposefully and is focused on cognition of a versatile science object. The visitors get to know the plants of the fresh water, warm and cold seas. Animals and plants are also presented in aquariums, still moulages serve a replenishment of the collections. Additional information could be received in computer stands, e.g. to watch an animated movie, receive essential information and check the knowledge with the help of tests. Different kinds of stimulators are also used – what to do when the ship is sinking, how to manoeuvre the ship out of a complex situation. The educational content is authentic, consistent and purposeful.

The interaction of education and entertainment. The expositions aim at including senses in order to achieve the experience of joy. The exposition is very aesthetic and relatively compact which helps to create the feeling of cosiness. The exhibits are presented in different formats: big and small aquariums with magnifying glasses that allow close examination of small animals and plants; surprise factors: the exhibits that shine when stepped on, the change of colours, constant movement, exhibits that can be touched or simulated. The variety of means help to create surprise effects – the art installation about the relationship between the sea and the man (J.Tertelis), when visitors can listen to the sounds of the sea, read texts and reflect.

## 4 CONCLUSIONS

The analysis of 7 Lithuanian museum exposition discloses the fact that Lithuanian museums are going through the development of their identity, are turning into modern science museums and are joining the so called “science centres movement” [1]. Lithuanian science museums reflect different historical identity changes [3] covering the first generation (the 19th century) science museums when the objects/artefacts are presented without broader context; the second stage (beginning with 1960s) of

science centres that do not have collections and are comprised of interactive expositions meant for exploration of scientific phenomena without broader context and the third generation (1990s): thematic interactive expositions focusing not only on the science phenomena, but also on the cultural, social and political science related issues.

Research results show that 3 Lithuanian museums (Medicine and pharmacy, Anatomy and Zoology) comply with the notion of the 'first generation museum' which is represented by traditional technical or heritage museums that are object-oriented. It is interesting to observe that the mentioned museums are not public in the direct sense as they belong to the Health University and are first of all meant for student education. The most important function of these institutions is to provide them with quality education, so the identity of museums is directly related with the main target group (students or pupils as future students). Other target groups are secondary and are given a secondary role and significantly less attention by the museums. So the function of these museums as "sending science to the public" is rather weak. The science-as-fun function is not fully realised as the museums of Medicine and pharmacy and Anatomy are financially supported by the university and generating revenue from this activity is not an important basis. All three museums, in addition to exhibit preservation, emphasise the educational function and keep to traditional science didactic principles (knowledge classification when a systematic knowledge collection is presented). The museum of zoology, though public (with different target groups) has a strict didactic frame (classification of animal kinds), lacks entertainment and, therefore, realises the logic of traditional learning. There are no second generation science centres in Lithuania and the museums of science included into the research are not science centres according to their initial function.

Other museums under research (Radio and television, Energy and technology, Sea and Money museums) have clear features allowing them to be classified as the third generation of modern museums when together with the didactic access the area of certain science and knowledge is presented in a systematic way with the help of the principles of classification and historical development and the concept of "science –as-doing" or "science-as-fun". It also connects the phenomena of the presented science in a broader historical and cultural context, relates the exposition with the interests and activities of local communities. The Sea and Money museums present certain collections of artefacts that have value and can be collected, preserved and displayed. The exhibits of the Sea museum represent the variety of plants and animals. Together with traditional museum functions (preservation and display of artefacts, a strong traditional didactic frame), these museums successfully integrated a new role – "science-as-doing" and "science-as-fun" when the exposition gives the visitors enjoyable experience.

Radio and television museum and Energy and technology museum present a specific situation of museum identity. They lack a didactic dimension – clarity, detail, system and consistency when presenting objects (energy, television and radio science and technology phenomena), but at the same time they are prominent for strong entertainment elements (hand-on interactivity in the Energy and technology museum, display of TV as operating enterprise) that are not compared with the systematic presentation of the analysed phenomenon as it is not developed enough. Neither Energy and technology museum nor Radio and television museum consistently and didactically present a scientific phenomenon. The emerging practices of science museums in Lithuania partly reflect typologies specified by the researchers of other countries, but these cases show that in a specific historical and cultural context, the observed variety does not coincide with the determined ideal types (science museums, museum centres, historical typology and taxonomy) that have been recognised and described on the basis of the historical development of other countries.

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