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The Public Library of the Future: The "philosophy" of the space and the internal environment of the municipal library: the invisible enemies

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Introduction

The Municipal Library is one of the most important providers of information and culture services in the area that it serves.It provides access to a variety of sources and media as well as support for the public to be able to identify, evaluate, isolate, compose and use the information of its interest. However, ever-changing conditions in today's society, with the advances in information technology and communications, have not left libraries unaffected.On the contrary, the introduction of new technology in them has forced changes in all areas of their activities, in order to be able to meet modern requirements, and marked their entry into a new era, where their position,as knowledge and information channels, is in fact more upgraded. Its previous traditional function, ie to serve the public by providing books and other printed material, is maintained as a core and, in parallel with joining the Information Society, creates the conditions for the formation of the new potential of its role as a digital access center to information and therefore the need to acquire the necessary infrastructure in space, equipment and services is imperative.

These changes, of course, also affected the philosophy, the role, the functions, the services and the activities of the libraries, the flow of work, the equipment, but also the ones related to the space, the influence of the environmental conditions, security and protection, statistical adequacy, etc. The new orientation of the public libraries, the expansion of their activities, and in

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general the new needs that are called to serve, differentiate the provided services and consequently the way they operate.Given the relationship and importance,the physical space in which each library is housed,the effects of the above developments and in the form of the buildings are obvious.

The present study, with a brief reference to the current state of municipal libraries, focuses on the need to adopt architectural and bioclimatic design standards for a future building morphology of libraries with construction and functional suitability for hosting their collections and modern services.

A. Designing the space of modern libraries

Until recently, library architecture was an issue of little concern to the Greek library community.Rarely was it considered where and how the collections would be housed, and even more rarely studies were prepared for the construction or reconstruction of libraries, as their building morphology covered only one specific need: where knowledge would be housed.The imperative need to organize collections bypassed the architectural approach of the space, however the change of aesthetic perception, especially at a time when the content of the library and its form are undergoing serious changes through technology, proves that the search for new forms of construction and change of the form of libraries, is not a luxury but a necessity.Thus, within the limits of the imposed globalization, the need changed, shattering the traditional existing forms and giving the stigma of the flow of the evolution of society, for a future building morphology of libraries, with basic standards of construction and functional suitability for of their services.

1. Detailed binding specifications for the construction of new library buildings: necessary good

As is known, there has been a serious concern about the very important role that buildings play in the development of libraries. Especially when a well-designed library can make a significant contribution to the life of the urban area, where it is located, and develop into an important social learning center and meeting place of the residents, it is essential for those responsible for its operation to make the best use of thebuilding’s potential for the benefit of the community.

The International Federation of Library and Institute Associations (IFLA) in 1973 published standards for public libraries that were republished in 1977 with minimal changes. It was a set of quantitative standards for collection size, departments, opening hours, staff as well as specifications for library buildings.In 1986 these standards were replaced by the "Guidelines for Public Libraries" and then the dynamics of the introduction of new technologies in information services led to a new approach to standards.In this new edition of 2000, the Declaration, referring to the suitability of the library building, as a factor influencing the quality of services offered to users, points out that buildings must be designed to reflect the functions and services of the library, to

be accessible to all members of the community, have the appropriate technological equipment and infrastructure as well as the means of reading and study according to the needs of the public, be within walking distance of commercial or cultural centers and be available to the community for meetings, exhibitions and other activities, which in the case of large buildings can even be theatrical or musical performances[1].

According to the IFLA / UNESCO[2] Declaration, it becomes clear that the purpose of a library is to create an extroverted profile, in constant interaction with its environment. This is the point at which the declaration meets this article. Therefore, the desired face of the modern library cannot be satisfied with maintenance, because this will fatally lead to wilting.Especially when it comes to municipal libraries, which face many important challenges, such as reductions or zero funding, competition from the Internet and other electronic technologies as well as ever-changing socio-economic conditions, they need to ensure that they exist and function in such a way to be defined as Modern (B. Landau, 2008, p. 1).

Of course, there is no "perfect model" for one library, as communities differ and the perfect library in one city may be completely unsuitable for another.Professionals, therefore, should design libraries in order to meet the needs of their community and the library, whether it is part of the state mechanism and funded by a general fund or belongs to a municipality as an autonomous or controlled organization, should predict the challenges and cope.Therefore, the real test of a municipal library is to be able to provide just the right service in the right format and at the right time to its users. If a library recognizes, anticipates and meets its needs then it is a successful library (Hage, 2004, p. 18).

The library, in recent years, has ceased to be a place with shelves where books are stored, waiting for visitors to borrow them. As libraries grow, so does the need to provide as many services as possible to their visitors.Responding to this

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[1] Since 2000, there has been a great deal of mobility in the international Library Community with seminars, workshops and publications on Library buildings in the 21st century, library buildings in a changing environment, the future form of Libraries in the digital age, etc. - See : Philip Gill, (1997), The Public Library Service: The IFLA / UNESCO guidelines for development. IFLA publication Source: http://nppl.ir/wp-content/uploads/IFLA-Public-Library-Service-Guidelines-3.pdf https://www.academia.edu/15502548/The_Public_Library_Service_IFLA_UNESCO_Guidelines_for_Development

[2] https://www.ifla.org/files/assets/public-libraries/publications/PL-manifesto/pl-manifesto-el.pdf

need, they begin to create sections where lessons can be done, places with computers, printers, scanners, etc., places where one can listen to music, special rooms for creating art videos and documentaries, workplaces -reading for anyone who would like to work outside the walls of their home, theater rooms, Web 2.0 services, etc.. At the same time and always in line with modern trends, libraries incorporate in their space a wide selection of programs to attract, entertain, and educate children in the public library environment. (Hage, 2004, pp. 137-138). They create, therefore, spaces with available material, which is interesting and original, close to their choices, such as suitable book collections, comic book magazines, recent music CDs, electronic applications and games, spaces specially designed for children and teenagers, comfortable with mobile furniture and designed to attract and allow them to feel familiar. In addition, modern libraries organize spaces for music performances, reading clubs, workshops to promote "lifelong learning", manual activities, meeting places for professionals working on a business plan. Finally, a modern library must take care of the needs of special groups, such as people with mobility problems, people with visual impairments and people who cannot move, such as the elderly and prisoners. (Hage, 2004, pp. 139-143).

Therefore, the modern library should pay special attention to the way it shapes its space, the way it lists its collections, but also the way it has them, so as to provide an environment commensurate with the modern requirements of its public, avoiding watertight, regarding the groups and distinguishing the points where they intersect (Wakeham, 2004, pp. 239-240).As Michael Dewe characteristically states in the introductory note to his book "Planning Public Library Buildings", when designing a library building, the main focus of the design should be the function of the space as a meeting place for the community to which it belongsto (meeting place for the community).The design of a modern library should therefore: be related to the mission it sets as its goal, take into account the surrounding space and fit the building smoothly into it, the size should be chosen after carefully studying the requirements and possibilities of the organization, the location should be searched carefully, it should definitely, if not in all its functions, at least in most of them be "green", the people who will staff it should have a say in its design, have an identity and finally , be flexible and "ready" for change when needed. In conclusion, the "modern library" should be designed for the present, ready to face the future (Dewe, 2006, pp. 1-4).

2. The Greek reality

The challenge is how the Greek municipal libraries, through a process of coexistence and coordinated provision of services, can transform and evolve their mission based on the philosophy of the aesthetic approach of the space that will follow the rules of modern architectural practice.

Prior to 1990, no attempt had been made in the field of libraries to compile building specifications. The buildings were designed with the logic of a public building with offices and static services that did not evolve and did not change over time. Finally, the librarian or other librarian with relevant specialty or experience did not participate in the drafting team of the initial study.

However, the difficulties that arose then and the experience gained from the construction of the buildings afterwards, had a positive result. The services of the competent Ministry saw the need for specifications / instructions for the Library buildings and in 1990 assigned a working group, in which engineers and librarians participated, the compilation of the first manual of building specifications, which was completed in 1994.It was a pioneering work designed to help draft studies for the construction of new library buildings, to adapt existing libraries for housing, or to adapt / convert them to meet new needs or functions.

In the next decade the new orientation of the popular Libraries due to the continuous developments in the field of new technologies, the expansion of their activities and generally the new needs they were called to serve brought about a differentiation in the provided services and in their way of operation and consequently significantly influenced the form of library buildings.Taking into account these changes, the Ministry of Education entrusted the production of a relevant tool to the National Documentation Center and the Building Standards Committee for Public Libraries, which was set up, that completed the new study in 2004 entitled "Guidelines for Public Library Buildings[3]".

The way of organization and the development of the services and the departments in a People's Library, both in terms of the existing space, and in terms of the staff, are provided by the Rules of Operation.The summary analysis of the functions and services, the determination of the necessary spaces and the relevant sizes that are listed are not official Greek standards but can be used as a measure of comparison and to help determine the needs on a case by case basis. Equally important in the decisions for the configuration of the space is considered the equipment and the way of placement in the case of bookstores and reading rooms. The choice is determined by the forms of information that are accessible to the public, the systems it follows, at what ages it is addressed to. However, a very decisive factor that we must not forget is the available funds

[3]"Guidelines for Public Library Buildings" Source http://repository.edulll.gr/edulll/retrieve/3478/1041.pdf http://online.fliphtml5.com/mura/ylwt/. --The project "Support of the Educational Act from Mobile Libraries" - Business Program of Education and Initial Vocational Training (BPEIVT II, 3rd CSF), was co-financed by the European Union (European Social Fund) and the Greek State.

that influence the final decision. Finally, the selection of the appropriate equipment should take into account the following: safety and stability, flexibility, ease of cleaning and maintenance, comfort, aesthetics, and quality of material, space saving, ergonomic standards to ensure comfortable and safe working conditions for the public and staff, implementation of regulations for dealing with emergencies (fire, earthquake, floods).

Today, although most buildings need to remodel their spaces so that they can adapt to new needs, there are already tangible, positive results from the implementation of the guidelines in several that are either in the design-construction stage or in the search for new spaces for rent. Although the guidelines can be applied to all public libraries -Public and Municipal- for the development of their basic services and functions, however with regard to Municipal Libraries, as they belong to Municipalities, most of them are still housed in places that were given in completely different criteria from those that would have to exist in order to house a library.

In fact, a working group has never been set up to construct or reconstruct a space suitable for a library or even a rudimentary architectural study. The lack of basic technical infrastructure[4] makes the buildings inhospitable to the new technology so they do not cover either old or new functional needs. The narrowness of the space, or the lack of lighting, the inappropriate choice of color, the noise, the absence of ergonomic environment generally reign in most Municipal libraries. The problem is that the spaces chosen were unsuitable from the beginning, the new library buildings built did not anticipate new needs or were built on very small plots, with small budgets, without taking into account the specific categories of the population (visually impaired, mobility problems etc.).

Nowadays, everyone will agree on the social and educational role of the library, the requirement for well-equipped spaces, but above all for suitable spaces. If we gain awareness of the space we want and appropriate knowledge, and if we are not satisfied with this image we see around us, we have all the guarantees to properly organize its natural space, combining aesthetics and functionality and creating the conditions that will house modern needs giving emphasis on new services.

3. The importance of the aesthetic and functional suitability of the library space for hosting collections and services

"The functionality and aesthetics of a space contribute effectively to the quality of services offered" (Michelis, 1979, p. 285). Based on this path, the architectural concept and practice for the design of libraries of the 21st century, is called to expand its fields of research and organization. As the role of the

[4]Source: Standards of electronic systems in buildings http://www.elot.gr/

library today is different and its physical existence, which is not disputed but redefined through the exploitation of information technology, make it a center of production and dissemination of knowledge. Libraries as centers of learning and information circulation integrate cultural activities into their functions, support their social policy through various programs, open to local communities and emphasize their cultural role in various ways. Given that the library building continues to exist despite the developments of information technology and the physical space of libraries is not in danger of disappearing from the virtual, the new design of libraries must take into account the combination of physical space and cyberspace.

The modern architectural solutions and proposals for the design of libraries are many and interesting. Regardless of the external form of the library, whether its shell is futuristic, minimalist, or neoclassical, they all aim to support the functional needs of libraries: the coexistence of physical space, cyberspace, the relationship between them and in addition, the division of the library into two parts, the one that will support access to all available information via electronic search and research space that should be clear, defined and well - structured to facilitate the creation of knowledge through research.

The use of technology has already created the coexistence of physical and virtual space ensuring the expansion of their potential. There are international organizations[5] dealing with library architectural design issues as well as a variety of manuals dealing with standards[6], proposing solutions that aim at flexible schemes and rearranging the new services and functions that arise.

The data change with the explosion and continuous evolution of the information space through the internet and new technologies and therefore the management of the physical space undergoes changes. Therefore, architectural design must provide the environment that will welcome evolution and transformation. Understanding the coexistence of the potential with the real space is the invisible relationships that lead to the new perception we must have of the architectural design of libraries. The boundaries between the functions and the activities of the building are constantly changing position, with the constant changes that occur in the technology but also in the society, creating an indefinite area. This undefined area in the library space, is called to solve the problems of space flexibility and rearrangement of new services and functions that arise in a living organization of continuous evolution and adaptation such as the library.

B. Library environmental conditions specifications

[5] For an example, see: American Institution of Architects (AIA) http://www.aia.org
[6]See: ISO: http: //www.iso.org --UNESCO: http: //www.unesco.org

The technological progress that has taken place in recent years has brought about huge changes in the way of working and the working environment of man. New technologies are becoming more and more used, creating a problem of adaptation to new working conditions. The price of this change is high. The non-adaptation of man to the new environment brings problems such as accidents at work, health problems, stress, reduced efficiency, etc. Naturally these problems but also the relationship between man-machine-environment have not left libraries unaffected.

1. Improving the quality of the environment and the functionality of library spaces

Looking back at the past of Libraries, we see that they have changed a lot from their predecessors. There have been dramatic changes in their morphological and functional organization, primarily in size and distribution, forcing them to adapt and expand into an ever-changing environment.

Library buildings consume energy to maintain thermal and visual comfort conditions for users as well as to maintain special conditions (temperature, humidity, ventilation) of the maintained media. Large amounts of energy are used for artificial lighting and the use of devices in the library spaces where reading books are mainly performed. The integration of the principles of bioclimatic design in each stage of their creation, from the conception of the "central idea" to the used building materials is a response to the reduction of energy consumption and the consequent pollution of the environment.

Bioclimatic design is a new design trend adopted by many cities and recognizes the importance of landscape, nature elements, free spaces, and environmentally friendly construction structures, aiming at a cleaner and more sustainable urban environment (Kingsley, 2008). It is a design philosophy that should be applied in all Greek cities with the parallel introduction of energy saving systems in new or existing buildings as cities today are responsible for about 30% of final energy consumption and contribute to the production of 40% of carbon dioxide (Tsipiras K., and Tsipiras, Th., 2005).

Over time, it becomes increasingly clear that the construction of modern buildings or the redesign of existing ones must meet environmental challenges and offer opportunities for growth and upgrading again, but without compromising their well-being.

Bioclimatic intervention in existing library buildings[7] consists of ensuring user comfort conditions and improving library operating conditions while reducing

[7]An indicative example is the energy upgrade of the building of the "Vassilis Michailidis" library of the Cyprus University of Technology, in the light of bioclimatic

the use of non-renewable energy sources in order to reduce energy consumption and create a favorable internal environment. According to the principles of bioclimatic design, these interventions aim to improve solar protection of building volumes, to improve ventilation conditions, to improve the general urban climate (temperature, humidity, air quality, etc.) and in the harmonization of the structured space with the environment (Athanassiou, 2007).

2. Specifications of library environment conditions

2.1. Air conditioning-Ventilation-Heating

A) The term air conditioning defines an automatic air movement control system (heating, cooling, humidification, and dehumidification) inside the building. Excessive cold and unpleasant currents should be avoided when installing air conditioning, because its purpose is to create comfortable conditions. Properly designed air conditioning contributes to the health and well-being of both the librarian and the user of the library.

B) Ventilation. The library space is used daily by a large number of visitors, with the result that the atmosphere is burdened with CO2 due to respiration and heating in the winter months. In common areas such as the library, double to triple the volume of cubic air per hour is required, while the air velocity should not exceed 0.2 meters per second. The recommended amount of air in the library space should be m3 / h per person. There are two types of ventilation: natural ventilation based on the difference in air density between the environment and technical ventilation based on the use of machines such as air conditioners, fans, air ionizers, but it has the disadvantage of noise.

C) Heating. The search for the ideal environment in the library area has to do with the heating factor and the conditions that it must meet. The criteria for the correct choice of a heating system are to provide a satisfactory and uniform temperature of 20 – 230 C, to be simple to use, not to present maintenance difficulties, economical in terms of installation and maintenance costs, to be safe and to comply with international standards and finally, be environmentally friendly.

D) Lighting. The intensity, quality, color, direction, shape and contrast should be carefully considered so that there is uniform lighting and the user does not get tired while reading. The placement and use of lighting are adapted to the requirements of technique and aesthetics and are always determined in relation to space and man. Size, type of work, use of space, furniture, and energy savings are important factors to consider when installing lighting. In addition, the library should take into account the effect of lighting on its archival material (rare

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design, with particular emphasis on creating conditions of comfort indoors and saving energy See: https://ktisis.cut.ac.cy/handle/10488/5723

books, microfilms) that should be protected from light and radiation. In this case, special seals are used between a light source and an object. The radiation should not exceed 50 lux (unit of light intensity measurement = 1 lux).

At this point it is necessary to clarify that although natural lighting is more popular with humans, it has a disadvantage compared to the technician in varying its intensity depending on the time of year and the weather. Finally, for the lighting of the library with technical lighting, the allowed values are: a) between the object of work and the working level 10: 3 b) between the object of work and the environment 10: 1 (Fotopoulos, 1985)..

2.2. Noise

In the library space the user should perform the work of the unaffected by noise that distracts him and the concentration. The sources of noise in a library are photocopiers, printers, air conditioners and the noise coming from outside. Prolonged noise makes it difficult to communicate in self-concentration and possibly headaches and fatigue. The decibel (db) is the unit of measurement of noise with a scale of 0-150 db. With 0 db the noise is characterized as low with l00 db it becomes annoying. In order to check the noise in the library, the location of the building in relation to the physical or technical noise sources should be examined as well as the standards concerning issues of acoustics, noise, sound insulation (ELOT 172, 360, 442, 556, 819. Sellountos, 1996).

2.3. Fire protection

The provision of fire protection in the library space is an issue that should be of concern to those responsible when designing the library due to the flammable and rare material it contains. The purpose of fire protection is on the one hand to deal with human danger and on the other hand to protect the material of the library.

When designing fire protection, the following should be taken into account: a) Fire prevention b) Fire development restriction c) Route escape route d) Fire control with detectors as well as firefighting operations. Due to the peculiarity of its material, it is recommended to install a separate fire extinguishing network (fire nest) connected to the central water supply system of the library (Papaioannou 1992).

2.4. *Library decoration-colors*

The library should be attractive as it helps to use its spaces and the services it provides. In general, colors have a psychological effect on people and cause reactions such as melancholy, irritability, and optimism. Shiny and rough colors should be avoided as well as colors that create intense contrast. Neutral colors such as beige, light blue, ocher should be used in the coloring of the library (Diamantidis, 1984).

3. Hygiene and Safety in libraries

Recently, there has been a report on sick building syndrome and it has been used to describe buildings that are not intended for industrial use but to house services that have internal pollution problems, such as Public Services, Libraries, etc.. Internal pollution is defined as the poor quality of indoor air which contains natural, chemical and biological harmful factors. Symptoms include shortness of breath, dry cough, sore throat, tears, headaches, dizziness, physical fatigue, etc. Staying in a sick building for long periods of time can cause infections, allergies, skin conditions.

Good maintenance and cleaning of central air conditioning systems, air recycling, reduction of chemical products, help prevent and treat the phenomenon. Poor design of spatial planning equipment and adverse environmental conditions can cause problems: a) Musculoskeletal disorders RSI-Repetitive Strain Injuries (Tendonitis, cervical syndrome, back pain, carpal tunnel syndrome), b) Disorders. Working in front of a computer causes fatigue which is exacerbated when the right computer system and proper lighting have not been selected. Symptoms include stinging and redness of the eyes, loss of visual acuity, eye infection c) Effects of electromagnetic radiation. Computer users are concerned about the electromagnetic radiation they receive from the computer and its health effects. To date, although research is ongoing, no definitive conclusion has been reached and d) psychological problems, such as mental stress, monotony, and a sense of emptiness. There are basic principles and laws for safety and hygiene in the workplace from both the Greek state and the European Union[8].

4. Air Quality in the Interior of Library Buildings

The Quality of indoor Air (QIA) in library buildings is an essential factor that must be taken into account for the safety and health of workers as well as third parties who may be in them. This assessment will reveal all the necessary measures that need to be taken to make workers and visitors feel safe and protected[9].

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[8]89/391 E.E Directive: https://osha.europa.eu/el/legislation/directives/the-osh-framework-directive/the-osh-framework-directive-introduction -Directive E.E89 / 654 https://www.taxheaven.gr/circulars/15694--EE Directive, 90/269 https://docplayer.gr/415739-89-391-eok-90-269-eok.html and the laws 1568 / 85,397 / 94,399 / 94--Ministry of Labor (1993), Hygiene and safety in the workplace, Athens: YEPKA

[9]Code of Practice 'by the Minister of Labor, Welfare and Social Insurance, with the Decree on Occupational Safety and Health (Code of Practice for the Quality of Interior Air) Decree of 2014 (CPD 519/2014) and published in the Official GazetteJournal of the Republic, Annex III (I) No.4833 on 2

According to the American Society of Heating, Refrigerating and Air Conditioning Engineers (known as ASHRAE), an acceptable QIA is[10]:"*Air that does not contain known contaminants in concentrations that are considered harmful by the Competent Authorities and where the vast majority of exposed persons (at least 80%) do not express dissatisfaction*."

The problems concerning QIA appear in buildings where the concentration of chemical or biological agents is such that it can have negative effects on people inside the buildings. Some of the common symptoms in workers' health in cases of inappropriate or inadequate QIA are headache, nausea, fatigue, drowsiness, dizziness, respiratory problems, chest tightness, dry throat, skin rashes, and so on red eyes, stuffy nose, runny nose and loss of concentration. These symptoms are commonly known to be related to Sick Building Syndrome[11] and Building Related Illnesses[12] and may be associated with a specific set of symptoms and clinical abnormalities in employees working in the same field.

The aim therefore, for library space, is to maintain the indoor air temperature at high levels in winter (and correspondingly low in summer), thus reducing the load to meet the energy requirements of ancillary systems when using the building.

According to international organizations[13], the concentration of CO2 indoors should not exceed 1000 ppm in cases that exceed these limits it has been observed that problems with headaches-drowsiness-loss of concentration etc. are

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[10]SHARE American Heating - Cooling and Air Conditioning Engineering Company Source:https://www.ashrae.org/
American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), Standard 62.1-2010 «Ventilation for Acceptable Indoor Air Quality»
http://arco-hvac.ir/wp-content/uploads/2016/04/ASHRAE-62_1-2010.pdf
Indoor air quality guide (2003) Source:
http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/A2B442F4ADA5D942C2257E0C00414C35/$file/Odigos%20Poiot%20Esot%20Aera%202013.pdf

[11]The term "sick building" is used to describe newly built buildings that are not intended for industrial use but to house services or homes that have "internal pollution" problems. "Internal pollution" is considered the poor quality of indoor air. The term "sick building syndrome" is used to describe the poor state of health of at least 50% of tenants, which is characterized by specific annoyances that are attributed exclusively to the indoor air pollution of the building. The "Sick Building Syndrome" has been officially recognized by the World Health Organization since 1982. Drivas, S., (2004).

[12]Source:https://www.researchgate.net/publication/236019733_Environmental_Health_And_Building_Related_Illnesses
file:///C:/Users/hp/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/ccjm64_6-0303%20(1).pdf
https://www.ebssurvey.co.uk/docs/Building%20Related%20Illness.pdf

[13]American Society Heating & Refrigeration Engineers

created while above the maximum allowable limit which is 5,000 ppm there is also an increase in the rate of cardiorespiratory function.

CO2 Concentration Air quality indoors	
2200 to 2600 ppm	Unacceptable
2000 to 2200 ppm	Very poor
1600 to 2000 ppm	poor
1400 to 1600 ppm	Inadequate ventilation
1200 to 1400	Marginal
800 to 1000 ppm	Ideal

Table 1. Source: American Society Heating & Refrigeration Engineers

4.1. Possible causes of problems in indoor air quality in library buildings
The main problems concerning QIA appear as a result of the following parameters:

A. Insufficient outdoor air supply for heating, ventilation and air conditioning (Heating, Ventilation, Air Conditioning, HVAC).A standard HVAC system works in such a way as to remove air from the interior. The thermal operation of a library building depends on the local climatic and environmental parameters (sunshine, outside air temperature, relative humidity, wind, vegetation, shading from other buildings), but also the conditions of use of the building (residence, offices, hospitals, etc.) and is based on the corresponding energy behavior of its structural elements and (consequently) the built-in passive solar systems, but also the energy profile resulting from the operation of the building.

B. Poor design, insufficient maintenance, insufficient cleaning, and problematic operation of air conditioning systems. The main problems observed depend on factors such as:

- Carbon dioxide from human exhalation and from plants. Tobacco smoke.
- Equipment from office equipment, such as photocopiers, printers, photo processors and copy papers.
- Gases, vapors, dust, odors from nearby premises, such as car repair shops, restaurants, dry cleaners, gyms or vehicles.
- Gases and vapors from cleaning liquids.
- Carpet displays, carpet adhesives, furniture, varnishes and erasers. Fungi and mold from accumulation of moisture, slimy, stagnant water in the air conditioning system.
- Smells of colognes, perfumes and space deodorants.

- Smells of the human body.
- Powders and fiberglass from building materials.

C. Pollutants located in the outside air entering the library building. Air pollutants enter the indoor air through the ventilation system or windows. Sources such as vehicle exhaust, smoke, and emissions from nearby facilities are responsible for gaseous pollutants in modern cities.
D. Emissions from sources inside the building, such as gas emissions from building materials, furniture and other equipment.

E. Incomplete control of the temperature and humidity of the interior of the library building. The emissions of diesel engines are particularly complex mixtures of chemicals in the form of gases and particles. These particles absorb hundreds of chemicals on their surface, including nitrogen oxides as well as other irritants and toxic chemicals. Various epidemiological studies have concluded that long-term exposure to a diesel engine's exhaust in various working conditions may be associated with an increased risk of cancer, lung disease, cardiovascular disease and other diseases[14.]

4.2. Types of indoor air factors and their sources. Evaluation and control of airpollutants in the library
In order to be able to control the internal factors that pollute and burden QIA, in any case, their origin must be determined.It is not always possible to locate a single source.The following table gives some examples of indoor air pollutants and their potential sources.

A/A	Pollutant Factor	Source
1	Asbestos	Some old materials for fire protection or thermal insulation, ventilation wells and pipes, boilers
2	Ammonia (NH3)	Special photocopiers, cleaning chemicals, detergents
3	Petroleum, toluene,	Rubber, photocopy ink, cleaning solvents for

[14] Department of Labor Inspection.-.Department of Labor Inspection. The data are reported in the 'Practice Code' by the Minister of Labor, Welfare and Social Insurance, with the Convention on Occupational Safety and Health (Code of Practice for the Quality of the Interior Air). Decree of 2014 (K.D.P.519 / 2014) and was published in the Official Gazette of the Republic, Annex III (I) No. 4833 on 21.11.2014
Source:http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/$file/POIOTHTA_AERA.pdf
http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/A2B442F4ADA5D942C2257E0C00414C35/$file/Odigos%20Poiot%20Esot%20Aera%202013.pd
Last Access 4/5/2020

	oil-based solvents	erasers, some paints and coatings
4	Diethylethanolamine	Additional water used in steam boilers
5	Methyl alcohol	Solvent for photocopiers
6	Trichloroethylene	Some corrective fluids, inks, glues, cleaning chemicals
7	Gasoline vapors	Car exhausts
8	Viruses, bacteria, fungi	Ventilation and humidification systems, cooling towers, ventilation ducts, water collection containers (from condensation), carpets and furniture (with damage caused by water), moisture in windows, colleagues infected workers
9	Herbal medicines and biocides	Spraying plants, insects and fighting rodents
10	Formaldehyde	Furniture emissions, particle board resins, laminated wood
11	Flying organic compounds (VOCs)	Building materials - plywood, resins, adhesives, sealants, new furniture, carpets, oil-based paints
12	Sulfur dioxide (SO2)	External sources, such as fossil fuel combustion
13	Carbon Dioxide (CO2)	Carbon dioxide is released during exhalation as well as during combustion by burners, fireplaces, boilers and vehicles.
14	Ozone (O3)	Electrostatic air purifiers, photocopiers, ozone generators
15	Carbon monoxide (CO)	Carbon monoxide is a product of incomplete combustion and is released from vehicle exhausts, fireplaces, heaters (LPG and oil) as well as from lighted tobacco products.

Table 2. Source: 'Code of Practice' by the Minister of Labor, Welfare and Social Insurance, with the Decree on Occupational Safety and Health (Code of Practice for the Quality of indoor Air) Decree of 2014 (K.D.P.519 / 2014) and published in the Official Gazette of the Republic, Annex III (I) No. 4833 on 21.11.2014

Regarding the evaluation and control of gas pollutants in the library, we indicate:

Carbon Dioxide (CO2)
Exhale of workers/users in a library building is the main source of CO2 and must be removed through the ventilation system. In the case of a faulty or inadequate air conditioning system, there is an increase in the concentration of CO2 levels and at the same time, a decrease in normal oxygen levels inside the building. In the air, the concentration of CO2 is about 330-350 ppm (594-630 mg / m3). Indoors, its concentration is higher due to the fact that people exhale CO2 at a rate approaching 0.3 liters / minute (0.3 liters / min) when performing light work. Any increase in the concentration of this gas reduces the concentration of oxygen indoors and causes dizziness in humans. Recommended for CO2 levels in indoor air that do not exceed 700 ppm (1260 mg / m3) gas concentration in outdoor atmospheric air. CO2 levels in an indoor work area show how well designed and functional a ventilation system is space.

For a library, as protection measures, are proposed:

- Ensure that the heating, air conditioning and ventilation system is adequate and sufficient for the expected number of employees and users.
- Ensure that the ends of the air supply and supply air ducts are significantly spaced apart and that they are not blocked.
- Consider the possibility of installing local ventilation to remove CO2 in areas where high levels of this gas predominate.
- Provide an increased amount of fresh outside air to compensate for the accumulation of large numbers of people or the production of pollutants from other sources.
- Clean / remove any dust, moisture and microbial load at regular intervals.

Carbon Monoxide (CO)
Carbon monoxide (CO) is produced by incomplete combustion in boilers and tobacco smoke. Carbon monoxide makes it difficult for blood to absorb oxygen from the air people breathe. At low concentrations (more than 9 ppm), carbon

monoxide can cause headaches and fatigue. At higher concentrations CO can cause poisoning or even death[15].

For library buildings it is suggested:

- Ensure that all possible CO transit routes to the interior of a library building are sealed.
- Turn off the engines of motor vehicles when they are waiting near the building.
- Increase building ventilation levels.
- Install local ventilation in areas where CO is emitted.

Nitrogen Oxides (NOx)

Nitrogen oxides are commonly found in engine exhausts as well as in the emission of combustion devices, such as gas stoves, boilers, electric generators that run on oil for emergencies, etc. Any exposure to nitrogen oxides can cause respiratory problems and damage to the respiratory system.

For library spaces it is suggested

- Check for the possibility of contamination from the emissions of motor vehicles and indoor air combustion devices.
- Take the same measures proposed for Carbon Monoxide.

Ozone (O3)

Possible sources of ozone emissions inside library buildings are photocopiers, ozone generators, defective or poorly maintained electrical equipment and electrostatic air filters. One of the characteristic odors of photocopiers that are in operation is that of ozone.Ozone has a negative effect on the respiratory system. High exposure levels (greater than 0.05 ppm [0.098mg / m3]) can cause lung cancer. Ozone is considered to belong to category A4 of the American Society of Government Industrial Hygiene (ACGIH) for carcinogenesis.

For library spaces it is suggested:

- Ensure adequate ventilation when potential ozone sources are present.
- Place photocopiers as well as other ozone sources in well-ventilated areas.
- To report any excessive ozone odor to the employer for corrective action.

Formaldehyde

Many building materials, especially new materials, are likely to emit

[15] The American Conference of Governmental Industrial Hygienists (ACGIH) sets the threshold for carbon monoxide (Threshold Limit Values TLV) at 25 ppm (28.64 mg / m3).

formaldehyde in gaseous form. Such materials are carpets, furniture, erasers and glues. The slow release rate of these materials can cause formaldehyde accumulation in indoor air, depending on the source of emission, the rate of external (fresh) air intake from the ventilation system, humidity and temperature. Formaldehyde gases cause discomfort and sensitivity of the respiratory system. Symptoms of exposure include dry and sore throat, nosebleeds, headaches, memory and concentration problems, nausea, dizziness, burning and itching in the eyes and pain. Some symptoms occur when the formaldehyde concentration is only 0.01 ppm.

Formaldehyde is suspected to be carcinogenic in humans. ACGIH sets a TLV exposure limit for formaldehyde of 0.3 ppm (0.368 mg / m3) with theC label, i.e. this value should not be exceeded. Adequate ventilation should be provided where formaldehyde sources are likely to be present, so that air concentration levels do not exceed 0.1 ppm.

For library spaces it is suggested:

- Choose products with the lowest possible emission level of formaldehyde.
- Seal potential sources of emissions with fence material such as polyurethane varnish.
- New building materials should be stored before installation to allow time for any formaldehyde gas emissions to evaporate.
- Increase air supply in areas where new furniture and carpets are placed.
- Do not re-circulate formaldehyde-contaminated air.

Dust and fibers

Internal sources include dust from incomplete cleaning, inefficient vacuum cleaners, building materials, fungal seeds, smoke, pipe insulation, asbestos, carpet fibers and paper fibers from the use of photocopiers and other related equipment.

External sources include gaseous urban pollutants, construction activity, emissions from motor vehicles, factory emissions and emissions from fires and dangerous incidents.

The size of the particles determines whether the dust can reach the lungs. The potential health risk from certain types of dust is related to the toxicity and size of the particles. Dust particles are measured in millionths of a meter (μm). Particle-sized powders between 0.1-10 μm penetrate the larynx and lungs and may adversely affect human health. Dust particles larger than 10 μm are trapped in the nose. In contrast, inhalation of excessive dust particles can adversely affect the skin, eyes and respiratory system. Symptoms include eye, nose, throat and skin irritation as well as coughing, sneezing and breathing problems.

Some powders are toxic. Long-term exposure to asbestos fibers increases the risk of lung cancer. Other powders, such as those derived from lead and mercury compounds as well as silicon powders, can cause a variety of diseases such as poisoning and silicosis (a form of pneumoconiosis due to the accumulation of silicon dust in the lung tissue).extremely small particles (<0.1 μm) leads to their expulsion during exhalation.

For library spaces it is suggested:

- Maintain an adequate air purification system.
- Regular cleaning of the air circulation system.
- Frequent cleaning of dusty areas.
- Use of local ventilation in places where there is excessive dust due to renovations or movement of materials.
- Creating negative air pressure and local ventilation in designated smoking areas.
- Prohibition of air recirculation containing excessive dust levels.

Tobacco smoke

Tobacco smoke contains a variety of chemical compounds including toxic powders, carbon monoxide and volatile organic compounds (POEs) and is classified as a carcinogen. The effects on passive smoking workers in the workplace include:

- Short-term effects: discomfort, coughing, sneezing, breathing problems, laryngeal and eye problems.
- Long-term effects: increased risk of lung cancer.

Flying Organizations ((VOC)

Flying Organic Compounds are soluble in paints, coatings, coatings, paints, solvent containers, diluents, plasters, carpets, adhesives, photocopiers, ceiling or wall tiles, room deodorants, detergents, organic solvents and fabric softeners cigarette.

In conditions of reduced exposure, symptoms include fatigue, headache, drowsiness, dizziness, weakness, joint pain, blurred vision, eye and skin irritation, and general discomfort. Increased exposure levels cause employees respiratory distress, chest tightness, nausea, confusion as well as unpleasant odors. Some hypersensitive individuals may have severe reactions when exposed to very low concentrations.

For library spaces it is suggested:

- Increased ventilation in case the concentration of pollutants in the air inside workplaces is high.

- Storage of solvents, paints, cleaning liquids, diluents, etc. in a separate storage area equipped with local ventilation.
- Keep containers containing these materials tightly closed when not in use[16].

Biological Factors

A biological agent is any microorganism, cell formation or human endoparasite, including genetically modified ones, which can cause infection, allergy, toxicity or other dangerous human health condition. Microorganisms include viruses, bacteria, fungi and protozoa. Biological agents can be transmitted to humans through skin-to-skin contact, or they can be transmitted through the respiratory system by inhaling an aerosol or dry powder containing these agents.

Exposure to biological agents[17] can cause infectious diseases such as tuberculosis, viral hepatitis, AIDS, tetanus, parasitic diseases such as ankylosing spondylitis, zoonoses such as e.g. carbon, leptospirosis, brucellosis, Q fever, skin and respiratory irritants and allergies, and septic shock. International studies have shown that there is a positive correlation between high concentrations of fungi in the workplace and the occurrence of allergic and asthmatic reactions as well as lung diseases[18].

5. In conclusion

[16]'Code of Practice' by the Minister of Labor, Welfare and Social Insurance, with the Decree on Occupational Safety and Health (Code of Practice for the Quality of indoor Air) Decree of 2014 (K.D.P.519 / 2014) and published in Official Gazette of the Republic, Annex III (I) No. 4833 on 21.11.2014 Source:
http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/A2B442F4ADA5D942C2257E0C00414C35/$file/Odigos%20Poiot%20Esot%20Aera%202013.pdf

[17]The US National Institute for Occupational Safety and Health (NIOSH) gives the marginal value of bioaerosol particles (total microbial load) at 1000 CFU / m3 in indoor air. The American Society of Government Industrial Hygienists (ACGIH) has set a marginal price of 1000 CFU / m3 for the total microbial load in indoor air and 500 CFU / m3 for the total bacterial load in indoor air .--- Based on the guidelines of the Singapore Institute of Environmental Epidemiology, indoor air quality with a total bacterial load value below 500 CFU / m3 is considered acceptable. Also considered as acceptable quality indoor air with a total fungal load value below 500 CFU / m3 Source: Guidelines for Good Indoor Air Quality in Office Premises, Institute of Environmental Epidemiology, Ministry of the Environment, Singapore, 1st Edition, October 1996.
https://www.bca.gov.sg/greenmark/others/NEA_Office_IAQ_Guidelines.pdf

[18] Indoor air quality guide (2003) Source:
http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/A2B442F4ADA5D942C2257E0C00414C35/$file/Odigos%20Poiot%20Esot%20Aera%202013.pdf

The design of the library environment must take into account all the parameters that affect the smooth use of the library.

The study of human capabilities, limitations and limits in relation to the work environment and the adaptation of work to man through the discovery-diagnosis-solution of those working pressures and unpredictable events that adversely affect his performance, is a factor that determines the degree of success of the role of the Municipal Library in the local community.

The human factor is the key factor in the library's production chain. The librarian should be treated not as a simple executor of a project, but as an active partner with knowledge and skills and ready to control any adversity and problem that will arise. Creating a good working environment is a basic condition for development and proper library operation. As long as safety and working conditions both problems decrease and the library responds to its role.

The working environment in a library is satisfactory if it is adapted to the capabilities and needs of the librarian, when there is appropriate equipment, when it has the possibility of active participation in matters concerning the operation of the library. The user who will use its services is the one who benefits from the correct organization of the space and the functions in a library.

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