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Posted Date: 6 February 2024

doi: 10.20944/preprints202402.0358.v1

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*Article*

# Beauty and Utility in Architecture, Interior Design and in the New European Bauhaus Concepts

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**Abstract:** The feeling of beauty is one of the positive human feelings. In architecture and design, it is associated with forms appropriate to their purpose. The usefulness of products to meet needs is also important. They are well received by users. The task of designers is to achieve perfection in their work. The rational design and use of artificial living environments are expressions of concern for natural resources (sustainable environment). These issues are addressed, i.e., by an interdisciplinary initiative of the New European Bauhaus. The aim of the paper is to expand knowledge about beauty and utility. They are important when choosing mass-produced goods. The article uses research methods: interpretive research, analyses, comparisons, logical argumentation, etc. Experimental qualitative research using a checklist was used. The results expand the knowledge on the selected topic and research scope of the research of the paper. The survey can be used to rationally evaluate architecture, interiors, and design facilities. It can be helpful for various aesthetic and functional strategies dedicated to different users. The paper demonstrates the role of beauty and functionality in the built environment. They are analyzed in the context of social and technical conditions, as well as contemporary sustainable design

**Keywords:** architecture; interior design; beauty and utility in architecture; New European Bauhaus; built environment; sustainable design

## 1. Introduction

Beauty is the property of creation that evokes positive feelings. It is identified with a psychological reaction to specific features, mainly visual ones. It results from maintaining proportions, harmony in space, colors and sounds [1]. Features of the natural environment, the world of plants and animals, are associated with it. This scope also includes human creative activity. It concerns shaping the built environment on an urban scale, architecture, interiors, and everyday objects. Activities that meet higher-level needs, less related to everyday life, also include works of "fine arts": literature, music, painting, sculpture, as well as philosophy and other sciences.

Beauty in the built environment is related to the positive atmosphere and aesthetic perception of space by people who emotionally observe the surroundings. Individuals and larger social groups have a similar ability to perceive space. They can practically and emotionally evaluate the beauty and utility of places and express different opinions. Assessments are justified according to individual or collective moral, aesthetic, and cultural values. Many landscapes, cities and buildings are widely recognized as extremely beautiful. They are the destination of tourists from other regions of the country or abroad. They are particularly valuable aesthetically, socially, and economically, especially to their communities.

For centuries, philosophers, artists, and designers, art theorists and critics, as well as other scientists from fields such as psychology, sociology, social anthropology, etc., have been studying the feeling of beauty. Architecture and interior design are all about combining positive experiences in visual perception of the surrounding space and a feeling of satisfaction when using various products of human activity.

In the field of architectural design and applied art, beauty is currently associated with the purpose of the product, moderation in the use of forms and utility. These features are combined with the technique of production. Moderation of forms is a more subjective concept. It can be viewed in a

historical context, taking into account technological developments, social processes, and individual and collective tastes (fashion). In turn, the utility of an object is supposed to benefit a person in the sphere of meeting his basic and higher-level needs. The products are then positively evaluated and accepted by the general public. Nowadays, their users expect mainly high functional values, and their designers also strive to achieve aesthetic perfection.

Man has the ability to creatively transform his environment according to the known principles of forms and structures seen in nature. The sense of beauty (aesthetic awareness) can be associated with harmony in the natural environment and even in the environment built by humans. The technical subjects are very different. Some do not have to be used directly to meet the needs of a specific person. Man is free in relation to the product. He can therefore create according to the canons of beauty. The aesthetic sense and the ideal of beauty are not a permanent property of the mind. They are historical and relative. They depend on external factors, including social ones.

Nowadays, beauty is perceived in the context of the phenomena of the surrounding world. They are determined by machines and large urban environments. The last century has shown dynamic changes in aesthetic trends in architecture, design, and various fields of art. It is difficult to indicate a clear ideal of beauty. It is not expressed in the form of "pure art". It is associated with the "utility" of products in the context of sustainable development, ecology, and social inclusion.

In various past periods, specific styles were preferred and used in newly constructed buildings and their interiors. The change in style depended on technical progress, which influenced building techniques. Social conditions, including economic and even religious ones, were also of great importance. Subsequent industrial revolutions and related new production techniques have made it possible to create shapes and forms previously unseen in nature and in the artificial environment of human life. These changes occur along with a better understanding of the world on a micro- and macro-scale. The development of consumerism is accompanied by the need for newer and newer goods, accompanied by high pace and economics of production, access to raw materials and the method of their processing.

The article expands the knowledge about the role of beauty and usability in the built environment. The focus was mainly on architecture and interior designs. This is particularly important in the context of industrialized technologies and building standards and the supply of mass-produced goods. Rational design and use of artificial living environments are expressions of concern for the Earth's natural resources (sustainable environment). This is facilitated by the design of beautiful, functional, and durable buildings and everyday objects. These issues are addressed, i.e. by an interdisciplinary initiative of the New European Bauhaus.

## 2. Materials and Methods

The article is about the beauty and usability in the architecture of buildings and their interiors. The topic is expressed, i.e. in the title, keywords, and introduction. The research part is divided into five main chapters. Various research methods and techniques were used in the study. Considerations are carried out in different contexts. The following are analyzed: available scientific literature, patterns of beauty and usability of technical products, their chronological evolution, the application of the New European Bauhaus (NEB) concept in practical, aesthetic and sustainable technical design, as well as a universal design quality control tool, and the conditions of its use. The scope of the paper contains some limitations. The considerations did not address the topic in relation to the built environment on a large urban scale and the collective perception of societies. The volume limitations of the publication also preclude considerations in a wide cultural and geographical scope. The focus was on aesthetic trends in the Western world.

The chapter on the state of research is based on a review of the professional literature published at various times. Historical and interpretive research and literature research were used - an analysis of the intellectual achievements of design masters in relation to the aesthetic trends and production (technical) possibilities of the time. The content of selected books on beauty and utility in architecture and design is briefly discussed. The selection of literature and the author's commentary can be described as a case study.

The next chapter deals with the perception of beauty and usability in the built environment. Various visual forms used in the architectural design of objects with high utility values were discussed. Inspiration was cited from the world of nature, human nature and the achievements of science. The following chapter presents the historical evolution of the canons of beauty and the socio-technical abilities of people to create buildings, interiors, and everyday objects. The review material is an introduction to the analytical chapter on interwar concepts in architecture, contemporary sustainable architecture, and the related NEB. The considerations also take into account the ideological, social, and ecological context of architectural design in the 21st century. Three chapters use the method of logical argumentation, descriptive historical and interpretative research, explanations, observations, the author's literature and illustrative resources and a case study.

The article also contains a chapter on the objective examination technique the feeling of beauty and functional values of spaces, buildings, and individual everyday objects. For this purpose, the "Davos Baukultur Quality System" checklist is used, the content of which is consistent with the NEB concepts. The checklist is a means for experimental, qualitative research (rational assessment of the object according to universal criteria), and comparative analyses. Its structure includes a picture survey and a text interview. It allows for scaling the assessments of beauty and utility. It can be used individually and collectively in research.

During practical activities related to the implementation of research and preparation of the paper, the following recording tools were used: text description, photographic illustrations, and a checklist in the form of a table.

### 3. Beauty and utility in design - state of research (literature review)

Considerations about the beauty and utility of the surrounding world have been carried out since ancient times. Already in antiquity and the Middle Ages, philosophers perceived goodness, spirituality, morality, and reason as synonymous with beauty. They were associated with perfect structure and moderation: maintaining proportions and appropriate composition. In the visual sphere, beautiful was what was pleasing to the eye. They wrote about it, i.e. Aristotle and Saint Thomas Aquinas [1].

In the architectural field, beauty and utility were described in the 1st century BC. the Roman architect Marcus Vitruvius Pollio (Vitruvius). He wrote a monumental work, the treatise *Ten Books on Architecture*. The author indicated several criteria in the books for designing beautiful and useful architecture:

- ordering and arrangement of individual parts, resulting primarily from proportions and specific numerical ratios (*Ordinatio*);
- arrangement of building elements (*Dispositio*);
- proper mutual proportion of individual parts (*Eurythmia*);
- harmony between parts of the building (*Symmetria*);
- appropriateness of shapes, arrangements, types of decorations, etc. (*Decor*);
- proper management of construction materials and location (*Distributio*).

The most famous is "The Vitruvian Triad", which defines three equally important elements of good architecture:

- strength (*Firmitas*);
- functionality (*Utilitas*);
- beauty (*Venustas*) [2] (pp. 27-31).

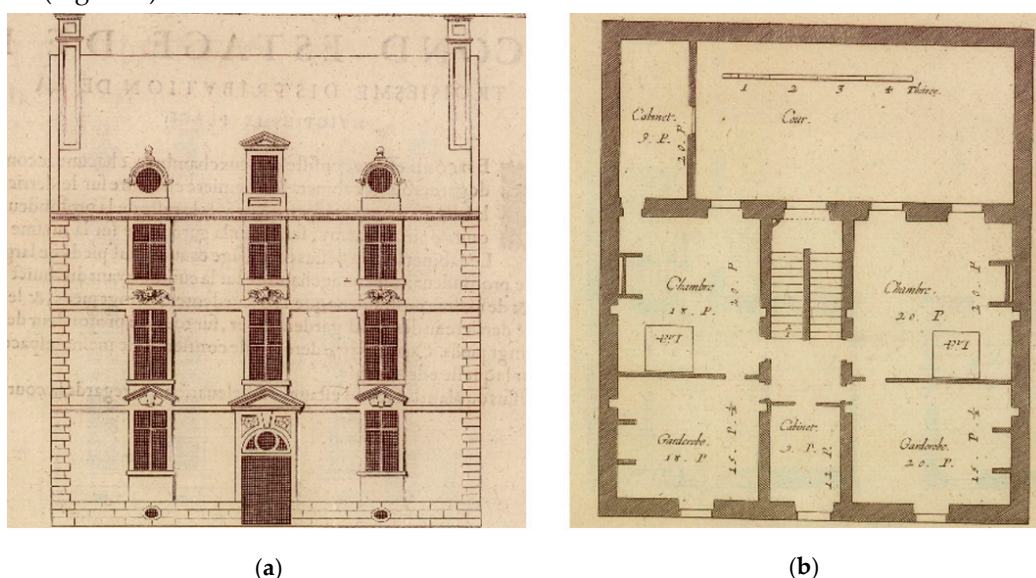
They define the general tasks of designers in terms of developing the structure, selecting building materials, implementing a functional and spatial program, and presenting the building and its interior. *Ten Books on Architecture* has been a source of knowledge about Roman architectural styles, classical orders, and construction techniques for centuries. Moreover, they are still relevant in terms of rational aesthetic and ecological design in a sustainable built environment.

Vitruvius was the creator of the currently best-known canon, the description of the proportions of the human figure. "The Vitruvian Man" was presented in the form of a naked man inscribed in a



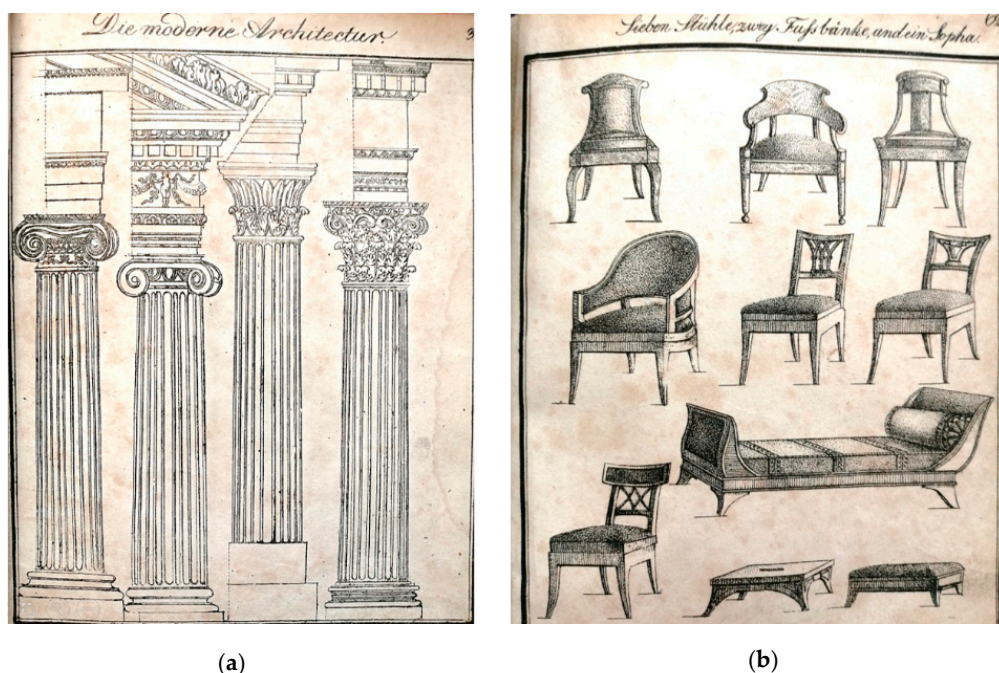
circle and a square. The diagram was rediscovered and developed graphically in the Renaissance by Leonardo da Vinci.

Medieval and Renaissance thinkers wrote more philosophical treatises on aesthetics and beauty. Architecture books were rare back then. Only the popularization of printing and the model of absolute power in France and other countries in the Baroque period facilitated the publication of architectural books with a wider scope of impact. They were often original guides to the functional and aesthetic planning of buildings. The book deserves attention *Manière de bâtir* (authored by Pierre Le Muet), published in 1623 and later [3]. It presents many examples of city houses of various sizes and functional and spatial standards. The building elevations were carefully designed and standardized in the baroque style then in force. Their aesthetics and beauty included an orderly and symmetrical layout, architectural arrangements, rhythmically arranged windows, dormers, rustications, and other façade details. The building plans included practical and useful functional solutions in the interiors. In the rooms arranged in an enfilade, specific purposes of the rooms were proposed. This was evidenced by the arrangement of beds and fireplaces in bedrooms, and separate closets. The owners' representative and private rooms were located in the main buildings. The adjoining rooms were located in the annexes, for example, horse stables, carriage houses, and large kitchens (Figure 1).



**Figure 1.** Design of a baroque house in the book *Manière de bâtir*: (a) the façade has carefully designed divisions with rustication, cornices and window architraves; (b) the simple plan shows rooms in an enfilade arrangement, the arrangement of beds and fireplaces is visible [3] (pp. 51,52).

In the following centuries, books on architectural topics were published more frequently. Classical styles, orders, and details were still replicated: columns, cornices, windows and doors, gates, stairs, balustrades, etc. (Figure 2a). Some publications presented the latest trends in furniture design [4]. The boards and drawings showed furniture decorated in the spirit of the era. The examples represented the canons of beauty of the time, e.g. classicist or French-Empire furniture. The latest models and current technical achievements that improve the comfort of everyday life were also shown: a secretary desk, other desks, a mechanically foldable bed and a table, etc. [5]. Some furniture to sit and lie on suggested the value of ergonomics (Figure 2b). They were probably comfortable and optimally suited to the human body. As described, the examples have been developed according to the latest taste from London, Paris, Vienna, and Berlin. They presented achievements from almost all of Europe.



**Figure 2.** Examples for 19th century designers: (a) architectural classical orders and details; (b) comfortable, upholstered furniture for sitting and lying [4] (plates 9, 62).

With the popularization of mass-produced goods, catalogues of manufacturers of furniture, lamps, upholstery fabrics, and other applied art with very different designs, technical and functional quality and prices appeared. The British *Arts and Crafts* and the German *Werkbund* (*Der Deutsche Werkbund* - German Creative Association) promoted useful, functional architecture and art with high aesthetic value. At the turn of the 19th and 20th centuries, many professional manuals for construction craftsmen were published, especially in Germany. They included a description of working methods and creative achievements, including: in the field of masonry, stonemasonry, blacksmithing, construction, and furniture carpentry. Examples of buildings, interiors, and furniture represented the building and production techniques of the time, as well as fashionable aesthetic styles. The compendium of general construction knowledge contained three volumes of the book *Allgemeine Baukonstruktionslehre* from 1900-1903 (author G.A. Breymann). The first volume discusses and illustrates brick and stone structures and details. The second volume covered construction and interiors made of wood. The third volume dealt with the use of cast iron and steel in architecture and construction [6]. Illustrative examples come from the most beautiful and significant European buildings. They were drawn very carefully. They mainly represent the neo-Gothic and neoclassical styles. In turn, carpentry techniques in wooden construction were presented in the textbook entitled *Das Holzbaubuch* (author A. Opderbecke) discusses and illustrates in detail the acquisition, preliminary processing, and impregnation of wood, carpentry joints of wood, the construction of walls, ceilings, roofs, dormers, and scaffoldings [7]. Similar books were also published in the USA. For example, in the book *Radford's portfolio of detail of building construction* (author W.C. Radford), there are drawings of classic architectural details of houses built using brick and wood (timber frame construction). The most interesting were the designs of unified built-in furniture, for example, for the kitchen and wardrobe [8].

In the field of interior design and furniture, the book entitled *Die gesamte Möbelschreinerei* was published (author T. Krauth). It discusses and shows such examples as: wooden interior elements (doors, windows, cornices, profiles, columns, pilasters, wall paneling, ceilings, bas-reliefs, reliefs), furniture fittings (hinges, locks, handles, hooks, etc.), various types of furniture (tables, desks, secretaries, side tables, school desks, flower stands, stools, chairs, armchairs, sofas, park and church benches, wardrobes, bookcases, showcases, sideboards, buffets, chests of drawers, chests, dressing tables, and washing tables, counters, beds, and cradles, etc.) [9].

Publications from the turn of the 19th and 20th centuries were used mainly in vocational education and construction practice. They showed the latest technical achievements and preferred visual canons. Beauty and aesthetic values in architecture were also presented in magazines on broadly understood art, such as literature, painting, and sculpture [10]. However, functional and utilitarian issues in design were obscured by formal features expressed in rich ornamentation and decorative details. These conventions were abandoned after World War I.

Original editions or reprints of books from the 19th and early 20th centuries are now gaining in collector, substantive, and practical value. They can be helpful in protecting material, classical, or Art Nouveau cultural heritage. They are a source of valuable knowledge, including the conservation of historic buildings, historic interiors, and antique furniture. They can also be used to design classically styled buildings and contemporary interiors.

After World War I, the modernist trend dominated. The concepts of functionalism without ornaments were implemented, that is, in the form of model housing estates. Then these achievements were presented in various professional and popular publications. One of them was *Der Baumeister*, published from 1903 to the present [11]. Over the years, descriptions, drawings, and photos have shown the beauty of technical achievements (e.g., frame structures, use of reinforced concrete) and new functional and aesthetic concepts (meeting basic housing needs, simplicity of forms). In 1927, the practical book *Der neue Haushalt* (author E. Meyer) was published. It showed the rational design of residential interiors and spaces for daily work, furniture arrangements, and aesthetic forms of furniture and everyday household items. Particularly interesting was the discussion of rationalization of work in functional laboratory kitchens [12].

Contemporary publications also present the achievements of interwar modernism in architecture, taking into account the social and economic context. In this case, the most important publications concern the activities of the Werkbund and Bauhaus. They describe construction, functional, and aesthetic achievements in the example of completed housing estates, individual buildings, and unrealized projects, sometimes futuristic. Here, we can point to a publication about a model Werkbund housing estate in Wrocław (Breslau): *Wuwa 1929-2009 The Werkbund Exhibition in Wrocław* (author J. Urbanik) [13]. In turn, she wrote about the social and technical achievements of Bauhaus, i.e., M. Droste, in the book *Bauhaus: 1919-1933* [14].

During the Third Reich, German construction and aesthetic achievements were presented in the literature. The book *Neue Deutsche Baukunst* by the famous architect A. Speer was popular at that time. It presented the beauty of classical forms modelled on the aesthetic achievements of the ancient Romans. It showed monumental engineering structures (bridges, highways, stadiums), public buildings (theaters, government buildings), artistic details and sculptures. A model of the planned new urban layout and monumental architecture in Berlin was shown in detail. All these examples had symbolic and propaganda significance. They were a material image of the desires for the power of Germany and the role of Nazi ideology [15]. Similar publications also appeared in the Soviet Union, praising the achievements of socialist realist architecture. They were also based on the classic canon of beauty.

The functional concepts of the 1920s and 1930s were continued in the postwar period. More comprehensive studies of the relationship between humans, technology and the environment were carried out. They were carried out in the field of ergonomics to effectively adapt products and the built environment to the diverse needs of people. The usability of technical products was treated as a means of improving the sense of security, comfort of life, and efficiency of work in the built environment. Most publications in the field of ergonomics in architecture and design were published in the United States. For example, the book entitled *Human Factors Design Handbook* deserves attention (author W. E. Woodson) [16]. It shows the functional and spatial arrangements of various types of interiors, furniture, and everyday objects in relation to the psychophysical capabilities of people. The spatial and movement requirements and the ability to perceive space of various users (men, women, children, disabled people) were taken into account.

Numerous books and press articles present the beauty of buildings and their interiors in the context of functional (purpose of space), economic (investment costs and rational production), and



social (changing tastes and fashion) conditions. The most famous books include *A Pattern Language*. Its author is Ch. Alexander. This is a book about the basics of designing the built environment in relation to the needs of individual people and entire social groups. The author paid attention to the needs of the people for whom the space was created. It was about a sense of security, identification with the environment, belonging, bond, and identification with a place and a social group [17]. Universal and general recommendations are presented in the context of the function, aesthetics, and social significance of space at various scales (city, building and its structure, interior). It is a popular textbook on timeless ways of designing and building. It refers to constant human needs.

The principles of rational, aesthetic interior design and applied art as well as the objective perception of beauty are presented in two German books *Geschmack ist erlernbar* (author A. Lutz) and *Wohnraumgestaltung* (author F. Wilkening). The main elements that contribute to the sense of beauty in space were indicated. The works presented such issues as: perception and psychological division of space, form-function relations, rational use of materials, the impact of lines, surfaces and solids on humans, material and texture, the size of objects, harmony and order in space, clear forms, symmetrical, asymmetric and radiant balance, scale and proportions, rhythm, contrast, accent and dominant, characteristic expression, harmony of forms, light and color. Considerations were carried out in the context of contemporary architecture and modernist design [18], [19]. Historical stylings and ornaments were not included. These books may still be valuable to designers concerned with the aesthetic perception of the built environment. The use of classic styling in the designs of American houses is presented in the book *Get Your House Right* (author M. Cusato). It contains many illustrations of characteristic orders and details modelled on ancient canons. The forms of buildings and their elements with correct shapes, proportions, and architectural divisions were shown, compared to incorrect concepts implemented by less experienced architects. It is particularly valuable to show the details of buildings, taking into account their distortion in the field of view. Such phenomena are caused, for example, by changing viewing angles, looking upward, perspective vision, and optical illusions. The introduction to the book was written by the former Prince of Wales, current King of the United Kingdom [20].

Beauty and utility are now extensively discussed in the literature and other mass media. On television and on social media, a lot of attention is paid to e.g. the beauty of the body, home, clothing fashion, aesthetics of food and dishes, etc. Advertising of various consumer products is also very important in the media sphere. They refer to the beauty of the products and their practical use in order to meet real or initiated utility needs. These activities are of a popularizing nature and are intended for the general public. Consumption preferences are increasingly influenced by the trend of sustainable development of the goods and services market. More attention is paid to the impact of various goods on humans and the natural environment. Consumer choices are influenced by, i.e. key names and slogans: low-emission products, natural materials, healthy food and cosmetics, energy saving, etc. Numerous books and websites about architecture mainly present aesthetics (nice façades) and construction and construction features of buildings (material solutions, construction systems), less frequently - projects interior designs. Most often, newly constructed facilities are shown, occupied by users for a short time. Therefore, it is difficult to assess their actual usability and ergonomic quality. The presentations are rather superficial, dedicated not only to designers but also to larger groups of interested people.

The selection of literature presented in the chapter is representative but subjective. It covers only part of the scientific and popular achievements. It can be considered representative of research on beauty and utility in architecture and design.

#### **4. Perception of the beauty and utility of the surrounding world and the products of human activity**

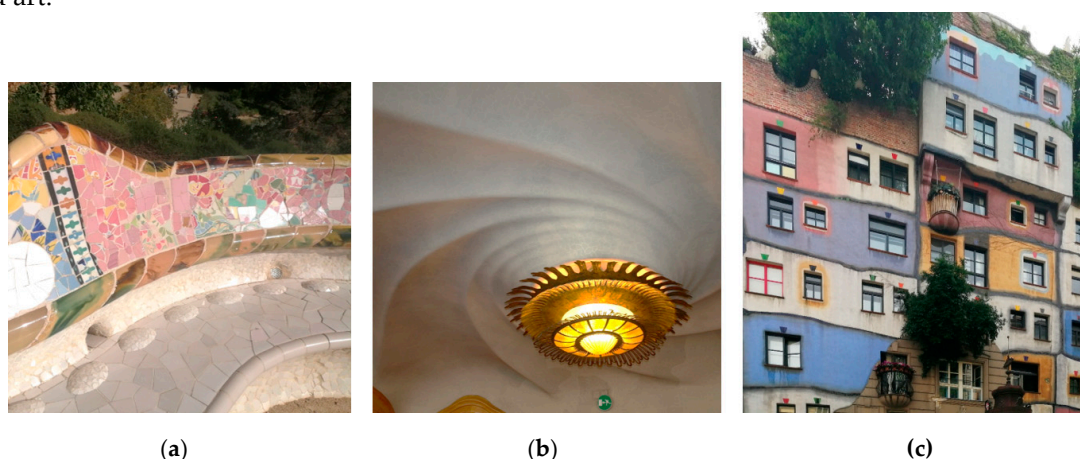
Beauty in nature is noticed by various living organisms. For example, mating suits of animals cause specific reactions in other members of the species. Humans have special properties of perception, distinguished by the ability to think abstractly. The beauty of nature is a value that people value. Interference with this well-being is usually destructive. The creative activity of people and



their ability to transform the world can be seen in intangible achievements (e.g. poetry, music, philosophy) and material works, technical products.

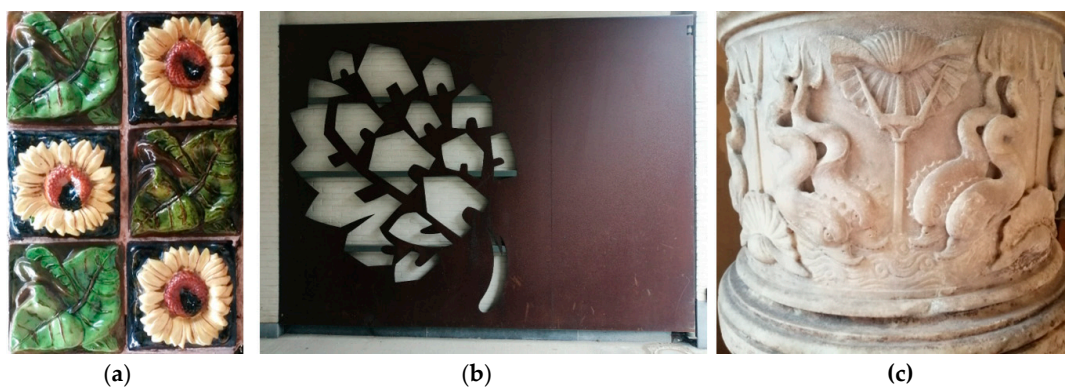
The creation of the built environment was initially derived from the transformation of the natural environment. Currently, developed urbanization concentrates people in an artificial, technological environment. Industrialization in space and consumerism in various spheres of social life have disturbed the balance in the natural environment. The goal of sustainable development is to restore this balance. Not only nature can be associated with beauty. This category also includes activities aimed at restoring and maintaining the well-being of the broadly understood human living environment.

Observing the surrounding world has always been an inspiration for technical and aesthetic creativity. The concepts and shapes of various technical objects are often modelled on natural forms (Figure 3). They fall into the trend of organic architecture. For centuries, various decorations with real and abstract forms have been part of the canon of beauty in visual arts, especially architecture. Decorating spaces was often synonymous with high social status (e.g. decorative details, jewellery), had symbolic or religious meaning (e.g. sculptures, images of deities and saints), and sometimes practical (e.g. masking and camouflage against attackers, illusion of grandeur). It was commonly used as a means to fill a void in the technical environment. The latter process became particularly visible in the 20th century, with the rejection of historical decorative forms in modern architecture and art.



**Figure 3.** Natural forms in architecture and interiors: (a) fluid shapes of benches (A. Gaudí, Parc Güell in Barcelona); (b) swirling ceiling profiles (A. Gaudí, Casa Batlló in Barcelona); (c) irregular divisions of the flat façade (F. Hundertwasser, Hundertwasser House, Vienna).

The building elements, interiors, and furniture were often decorated with various images and motifs seen in the surrounding space. The most popular were details and ornaments with plant and animal themes (Figure 4). The representations were realistic, more simplified, and sometimes fantastic and symbolic (sphinxes, dragons, griffins, etc.). The human body played a special role. Anthropomorphic representations covered building structures, elevations, interiors, and applied art products. The human figure was a decorative form (as a synonym for beauty), but also contained social, philosophical, religious, and existential content (Figure 5). The façades and furniture fronts were complemented by painted or carved genre scenes and symbolic allegories (Figure 6). The human body had a particularly practical significance in construction technology. It was a spatial model to shape the built environment. Selected parts of the human body were also the basis for imperial measures of length, still used in many countries (inch, foot, yard).

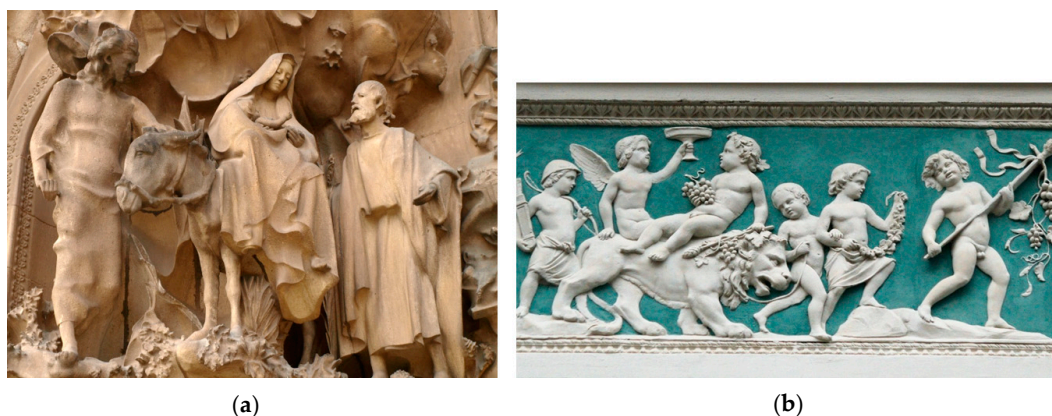


**Figure 4.** Three-dimensional and flat decorations with plant and animal motifs: (a) leaves and flowers on ceramic tiles (A. Gaudi, Casa Vicens in Barcelona); (b) openwork pine cone in an iron gate (Bruges); (c) dolphins as mythical creatures based on an alabaster column (Venice).



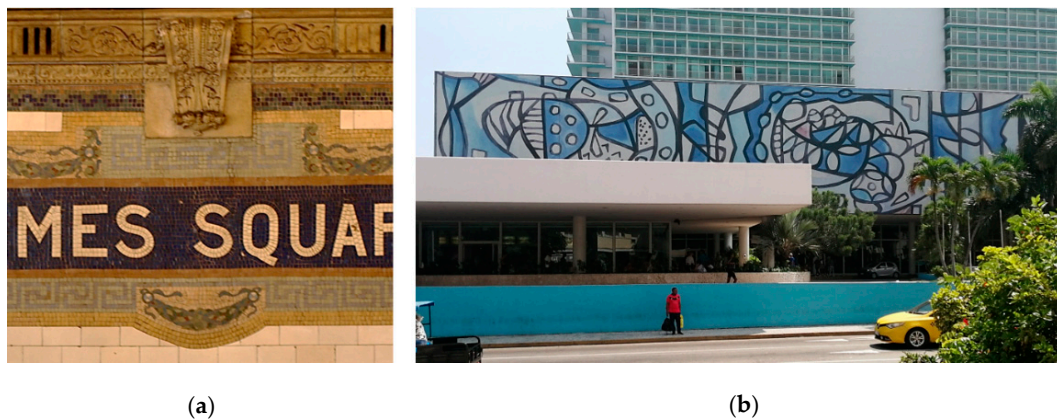
**Figure 5.** Anthropomorphic decorations as human beauty and its symbolic representation: (a) three-dimensional portrait of a beautiful woman from ancient Egypt (Vatican Museum); (b) human skeleton with an hourglass as the passage of time and Death on a Rococo epitaph (church in Wroclaw); (c) *Iustitia* as law and justice (court building in Wroclaw).

The ability of man to analyze and synthesize the surrounding space allows him to create abstract visual forms. They were often the result of mathematical calculations and operations, especially geometric ones (planimetry and stereometry). In architecture and interiors, flat and spatial decorative geometric forms were used: orthogonal, polygonal, diagonal, oval, and irregular (Figure 7). Abstract modernist shapes from the 20th century resulted from the utility and functional features of many products.





**Figure 6.** The human figure as an artistic vision: (a) genre scene (A. Gaudi, Sagrada Familia church in Barcelona); (b) symbolic allegory (tenement house in Wroclaw).



**Figure 7.** Geometric decorative elements in architecture and interiors: (a) geometric forms, Greek meander (signboard at a subway station in New York); (b) abstract, irregular forms (mural by A. Palamez, Habana Libre Hotel, Havana).

The lighting and colors used are also important to the sense of beauty in the built environment. The influence of different colors on the environment and humans has been known for a long time [21], [22]. The lack of color causes monotony and boredom in the perception of space. The color compositions of buildings are often an expression of the individual preferences and aesthetic tastes of architects or investors. They can also be analyzed in a rational way. When designing, it is recommended to take into account the physical and psychological impact of colors on humans. Designers usually look for order, balance, and harmony in color combinations [19].

In the trend of sustainable development, decorative art gives way to values related to the protection of the environment and natural resources. Increasingly, the beauty of architecture is associated with pro-ecological initiatives in investment processes. The simple form of the items attracts users' attention. This is primarily about material, energy, and economic savings. For example, modern systems and installations that reduce energy consumption or use renewable resources are often invisible to human eyes. However, they contribute to the high functional quality of buildings and the sense of beauty in the relationships between people, the material surroundings, and the natural environment. In aesthetic terms, the finishing and interior furnishings are also assessed as being as neutral as possible for the natural environment during operational processes and susceptible to recycling and even biodegradation when completely worn out.

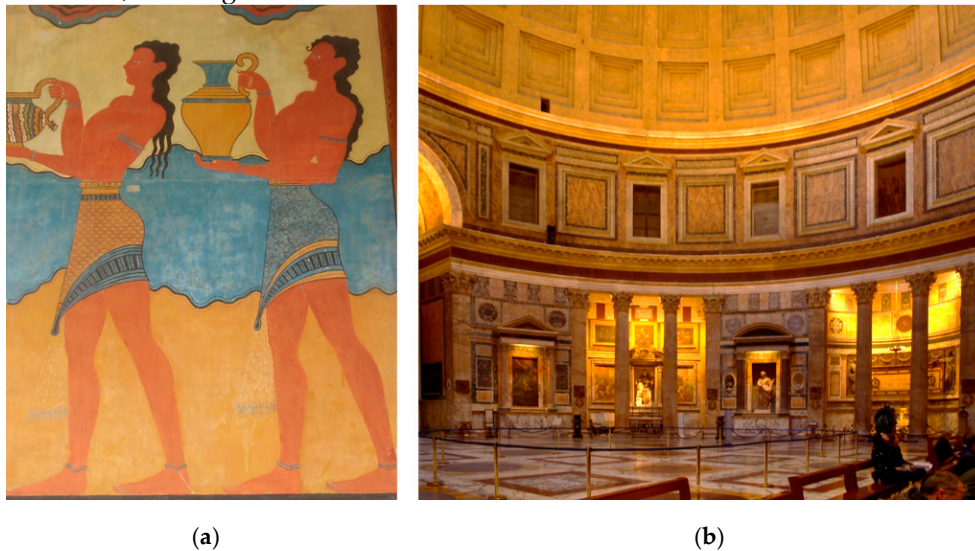
## 5. Beauty and utility in the design of buildings and interiors in history and today

The sense of beauty and utility in architecture, interiors, and everyday objects is a derivative of the cultural and civilizational development of societies. Beauty is usually associated with decorative architectural details. It is less common to find aesthetic values in simple forms, which are only the result of industrial production. For centuries, aesthetics and beauty have been the domain of artists. Architecture and design are also considered artistic crafts, not only technical ones. The canon of beauty and the sense of usefulness have changed throughout history. They were a stimulus for cultural and technical progress.

In ancient Greece, temple, public, and palace architecture stood out aesthetically. The most important buildings had carefully designed elevations and functional layouts of the rooms. The architectural details developed then were unified and very universal. These included the classical orders of columns (Doric, Ionic, and Corinthian), tympanum, ornament (meander), acroterion, and sima. They were used equally in different geographical areas. The proportions of the plans and elevations were shaped according to mathematical divisions. The leading module was the diameter of the column at the base [23]. The shapes of building bodies and finer divisions of façades were

determined mathematically, e.g. using the canon of the "golden section". Buildings divided in the golden ratio were considered ideal [24]. The surviving buildings still captivate with their beauty. Mathematical proportions were also used in classic modern buildings (e.g. Renaissance) as well as modernist buildings (e.g. designed by Le Corbusier).

The ancient buildings known to this day were built mainly of stone [25]. The rhythm and proportions of columns, coffered ceilings, tympanums, cornices, friezes, bas-reliefs, and complex patterns of mosaic floors are evidence of the aesthetic experience of Greek builders [26]. The buildings and interiors were colorful, painted in expressive colors (Figure 8a). Currently, they are known rather as monochromatic, in a beige stone color.



**Figure 8.** Interior decorations in ancient times: (a) realistic scene painted with expressive colors (palace in Knossos, Crete); (b) multicolored stone tectonic divisions and architectural details (Pantheon, Rome).

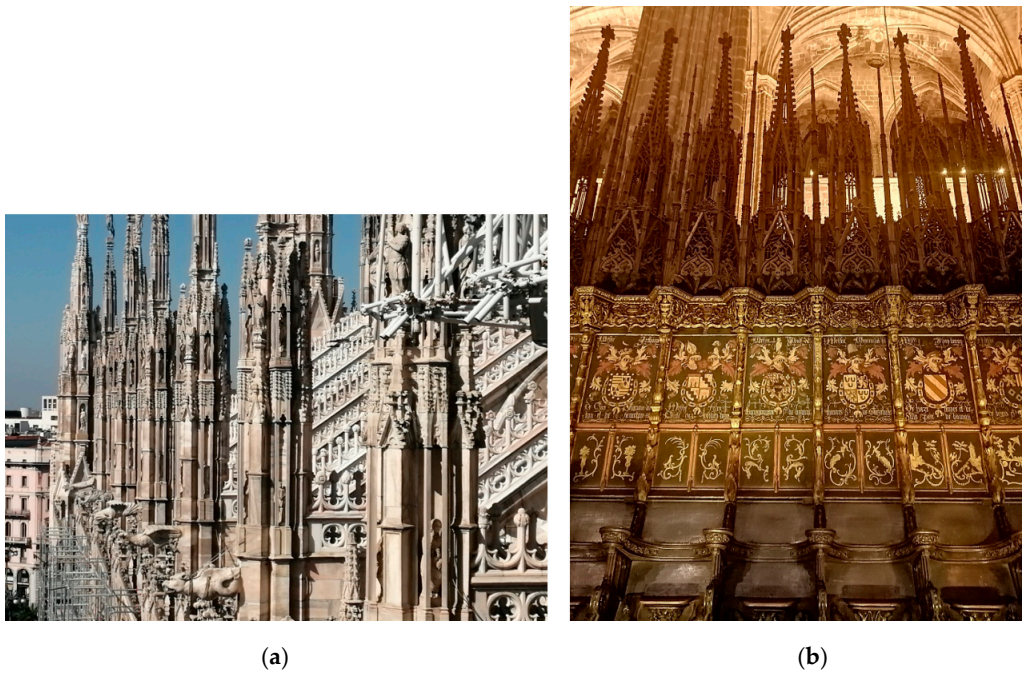
Greek canons and architectural orders were copied over the following centuries in ancient Rome. In brick structures, fire bricks with volcanic ash mortar were used more frequently. Innovative structures were used, semicircular vaults and domes. They made it possible to create interiors with a large area and volume. Colored marbles, painted plaster surfaces, and architectural stone details were frequently used on façades and interiors (Figure 8b). The beauty of Roman architecture is associated with decorative splendour in the form of flat and spatial ornaments, genre scenes, and intense colors. The aesthetics of architecture, especially the residential interiors of wealthy patricians, was known mainly after the archaeological discovery of the ruins of Pompeii and Herculaneum. In turn, the varied usability of interiors can be recognized by analyzing the everyday customs of the Greeks and Romans, including the way they ate meals while lying on special *kline* beds [27], [28].

The fall of the Roman Empire marked the beginning of the Middle Ages and the development of new states, especially in Northern and Eastern Europe. Construction and decoration techniques were rediscovered. The most beautiful buildings come from the Gothic period (13-15th centuries). They were made of stone (in the south of Europe) or brick (in the north of Europe).

The most famous are the medieval cathedrals, especially the French, English, and German. The pointed arch and buttress structures allowed the construction of tall churches with large windows (Figure 9a). The windows were often filled with stained glass with religious and secular themes. Richly decorated scenes were presented in the context of everyday life at that time. Gothic cathedrals are still considered the most beautiful temples in the Western world.

Characteristic aesthetic means were used in architecture, e.g., soaring elements of façades and furniture fronts, ogival architraves in door portals and tracery of lancet window openings. Typical were column capitals, supports, pinnacles, tracery, rosettes, flower crowns, crockets, geometric, plant, and animal ornaments [25]. The interiors were covered with decorated beam ceilings or vaults with various geometric arrangements. The Gothic furniture had architectural forms (Figure 9b) [28].





**Figure 9.** Gothic decorations: (a) decorated elements of buttress structures strengthening the walls and vaults of buildings (Milan Cathedral); (b) characteristic painted and carved decorations of clergy chairs with armrests to support a person in a stationary standing position during a long prayer (Barcelona Cathedral).

Beauty and utility were the same in the Middle Ages. They had symbolic and practical meaning. The priorities were to praise God and create the most comfortable living conditions at home [29], [30]. There was little furniture and everyday items in the interior. They were produced by craftsmen and were expensive.

The development of science and trade, new philosophical trends, and geographical discoveries caused significant social changes in the 16th century. The dissemination of humanistic ideas aroused interest in the cultural achievements of antiquity. In architecture, the concepts and canons of the classical Greeks and Romans were returned. The new buildings were modelled on ancient structures. Their details and decorative elements had classical forms (Figure 10). In the modern period, it was recommended to create uniform coherence in interiors (area, height, proportions of rooms) and arrange rooms on compositional axes according to the orderly division of elevations. The spatial divisions of the façades and interiors of the buildings resulted from the use of classical architectural elements (cornices, pilasters, columns, arcades, domes, rustications, arrangement, and rhythm of windows).



**Figure 10.** Renaissance in architecture and interiors: (a) façade details and (b) interior decorative elements had classical forms modeled on ancient Greek and Roman orders (Renaissance bourgeois house in Bruges, detail of doors and wooden paneling in Doge's Palace in Venice).

The interior was also in a classic style. The beauty of the rooms included the rich decoration of the door portals, the wooden paneling on the walls, the beam and coffered ceilings, the vaults, the stoves and the fireplaces. The forms of furniture were still derivative of the state of craftsman carpentry techniques. The furniture for seating and storage had more diverse shapes and purposes. They were placed quite freely inside, depending on the needs. The trend of humanism preferred the practical use of interior design in everyday life.

In the 17th century, the continuation of the classical Renaissance in architecture was Baroque. Flatter Renaissance decorations and classical tectonic divisions became more heavy, prominent and spatially plastic in the Baroque [25]. The novelties were ribbed cornices (broken out), spiral columns, and great order (columns on the elevation were several stories high). The arrangement of the façades and interiors was rigorously symmetrical.

Architectural divisions were supplemented and even covered with decorative sculptures, bas-reliefs, and painted paintings (Figure 11). Vegetable forms (e.g. fruit and leaf garlands), spirals, rocailles, obelisks, and wall hangings were used. Sculptures of saints and the most important people of the era, as well as cupids and putti, created spatial decorations. Allegorical scenes in the form of illusions were painted on the ceilings and vaults of representative interiors, including a distant aerial perspective of the open sky. The interior plastic casings and furniture furnishings were combined, ordered, and strictly arranged according to the axis of symmetry. This principle changed in the Rococo style in the 18th century. Initially, asymmetric decorative forms were preferred.



**Figure 11.** Baroque decorations: (a) a sculpture in a room placed between large windows (the hall of the monastery in Lubiąż); (b) illusion of a dome and open sky painted on the vault (monastery church in Henryków).

Over time, stiff and monumental interior arrangements were considered non-functional. The practical importance of rooms, their good heating, and comfort of use have become more important. The large-scale Baroque and representative palace decorations began to give way to the coziness of Rococo interiors. The rooms became smaller and more modestly decorated. Rococo interiors had greater functional freedom (light and movable furniture) and aesthetic freedom (wall and ceiling casings and decorations had forms that were less related to the functional layout of the rooms).

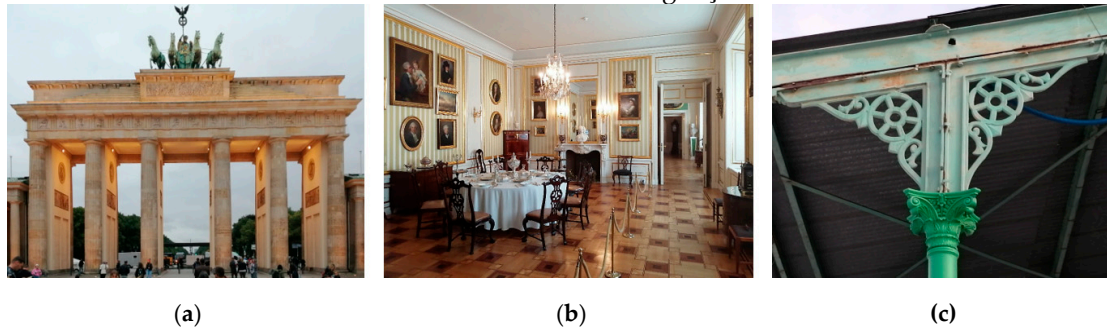
The canon of beauty applicable in the Baroque period focused on creating richly decorated interior architecture of monumental character. Such construction investments were very expensive. Expensive finishing materials were often replaced with substitutes. For example, instead of gold, bronze and marble, brass, zinc and polished Venetian stucco were often used on a base of wooden boards [25]. Such imitations created the illusion of rich splendour and luxury. They were often made carelessly and the stylistic interpretations loosely referred to ancient, classical orders. From a modern perspective, these saving activities can be considered as rational management of material resources. At that time, however, they were a compromise that combined current fashion and architectural styles, as well as the exorbitant tastes and ambitions of investors with access to raw materials and the potential of local construction craftsmen.

Already in the mid-18th century, the heavily decorated, spacious, and solid Baroque style began to lose the recognition of potential, wealthy investors. It was perceived as a style devoid of good taste and liking [25]. With the French Revolution and the Enlightenment, the lifestyle changed and the baroque forms represented by the secular and clerical aristocracy did not fit. The bourgeoisie, who still appreciated ancient aesthetic achievements, but in a more simplified form, gained greater importance. Enlightenment rationalism pointed to the importance of fixed rules of art, modelled on the laws of nature and logic. Classicist trends were inspired by ancient Greek and Roman art, which valued simplicity of forms and dignity. Ancient patterns were treated as an ideal of beauty [31].

In this trend, the classicist style of architecture appeared at the turn of the 18th and 19th centuries. It was modelled after Greek and Roman temples with a triangular tympanum and a columned portico. Architectural details on the façades were less decoratively important (Figure 12a, b). They were an aesthetic representation of the building's structure. Flatter elements were popular, such as pilasters, panels, garlands, rosettes, vases and urns, palmettes, Greek meanders, olives, acanthus, etc. The decorations were visible outside and inside the buildings. However, within residences and public buildings, new functional and spatial divisions were introduced, corresponding to the needs of owners, administration, and trade employees, etc. New types of furniture appeared, including vitrines, libraries, cabinets, chests of drawers, daybeds, desks,



secretaries, side tables, window stools, wardrobes, etc. [28]. Furniture had more geometric and rigid shapes (straight chair legs, flat and rectangular, or round backrest frames). The chairs and armchairs were less comfortable than the Rococo ones, but elegant and fashionable. The shape of the furniture still imitated the external architectural forms of the building façades with classical details.



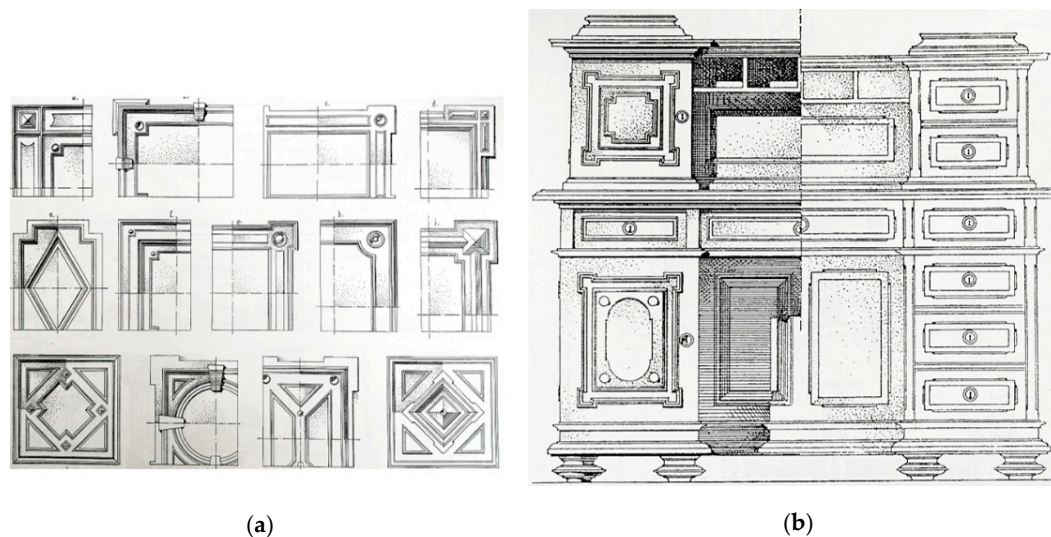
**Figure 12.** Classicism in architecture: (a) flat orders and classical decorations of façades (C.G. Langhans, Brandenburg Gate in Berlin); (b) delicate ornaments and decorations of the walls, ceiling and floor in the dining room (palace in Łańcut), (c) cast iron, classic and industrial decorative detail (train station in Wrocław).

The classic style combined with new utility needs was influenced by the use of new building and finishing materials. In the mid-19th century, iron structures (often still decorated) from cast iron or rolled steel were increasingly used (Figure 12c). The elements were already produced industrially. They were also packaged and used in various buildings. These construction methods were already the forerunner of 20th century unification and prefabrication in architecture and construction. Classicism, modelled on ancient architecture, was imitated in later eras, e.g. in Napoleonic empire style, Nazi and Stalinist architecture (socialist realism) [15].

In the second half of the 19th century, classical aesthetic canons continued to be replicated. The buildings, their interiors and furniture were decorated with forms and ornaments of various styles. Eclectic styles often combined various old patterns, e.g. Gothic and baroque. The splendour and multitude of decorative ornaments were desired among wealthy investors. The decorative elevations and interiors of the houses were an expression of wealth and social status. Many of them were built quickly. The decoration of the façades, interior walls, and ceilings was done most often using the stucco technique. They imitated architectural details made of noble materials (marble, bronze, etc.). Therefore, the perception of the beauty of classical decorative forms was an illusion, from a technical point of view.

Interior furnishings (including wood paneling, ceilings, and furniture) were already produced industrially. The rational and technically efficient production processes were combined with a tendency to decorative exaggeration [32]. Among other things, woodworking crafts were replaced by mass machine production (Figure 13). Due to this, the supply of furniture was large. The products were dedicated to anonymous users. Much furniture was placed in bourgeois interiors. They were cheaper and available also to less wealthy users. Typical urban equipment found its place even in cottages in the countryside.





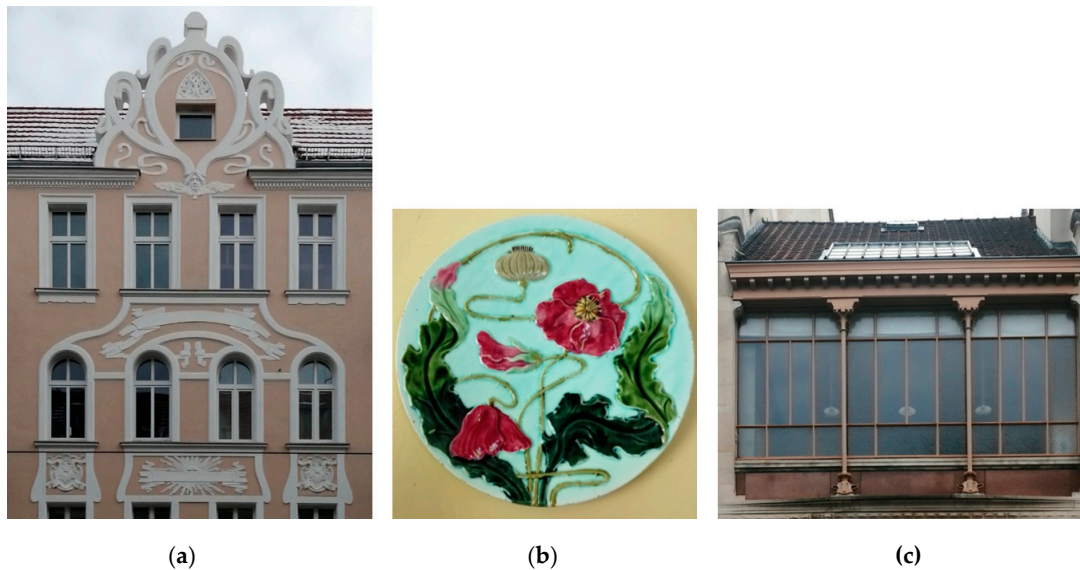
**Figure 13.** Cataloged products for apartments, mass-produced by machines: (a) various forms of door fronts; (b) all unified wooden furniture [9] (Table 6, 84).

In the first decades of the 20th century, the "gluing" of stylized, artificial ornaments to buildings and furniture and the lack of concern for the functional values of everyday objects were criticized. They were assessed as pretentious in proportions and ornamentation, excessively „stylish“, or with a strange shape [32]. On the other hand, solid wood furniture that has survived to this day is considered beautiful and solidly made. They stand out among mass-produced, unified contemporary products of low technical quality. They are also highly valued by art collectors.

The trend of historicism led to the need for a new style. At the turn of the 19th and 20th centuries, the aesthetics of earlier classical styles were abandoned. This process was revealed in the name of the new artistic trend in fine arts, literature, architecture, and design. In different countries, the names of style were used: Secession, Jugendstil, Art Nouveau, and Liberty. The role of artistic crafts was appreciated. In the built environment, efforts have been made to apply all the achievements of art. These activities were to cover all areas of life (Ger. *Gesamtkunstwerke*) [25] (p. 275). In this trend, the *Arts and Crafts* artistic movement was founded in England in 1888, bringing together artists, architects, and craftsmen creating applied art that serves the entire society. They postulated careful, manual, artisanal production of products. Their activities were not widespread. The items were produced individually and were expensive. Only the richest users bought them. On the other hand, more and more products were mass-produced. Despite industrial technology, rich decorations were still used on products, including plant ornaments and genre scenes.

Most of the buildings were constructed using traditional methods. Their beauty was determined by the rich decorations of the façades and interiors (Figure 14a). The traditional orderly arrangement of windows, doors, cornices, etc. was supplemented with characteristic, dynamic curves, smooth divisions, and decorations. Plant, anthropomorphic, and geometric motifs were used.

The everyday items were also decorated. Ornaments often contained an ideological message [33]. Visual work often showed respect for the forces of nature and man's place in the natural world. It was shown, that is, naturalistic motifs: the beauty of nature, dynamic natural phenomena (storms, sunsets, etc.), the nature of the human body (especially the female body), the development and transience of life (Figure 14b). These concepts can be considered precursors of the organic and ecological trend in architecture from the second half of the 20th century.

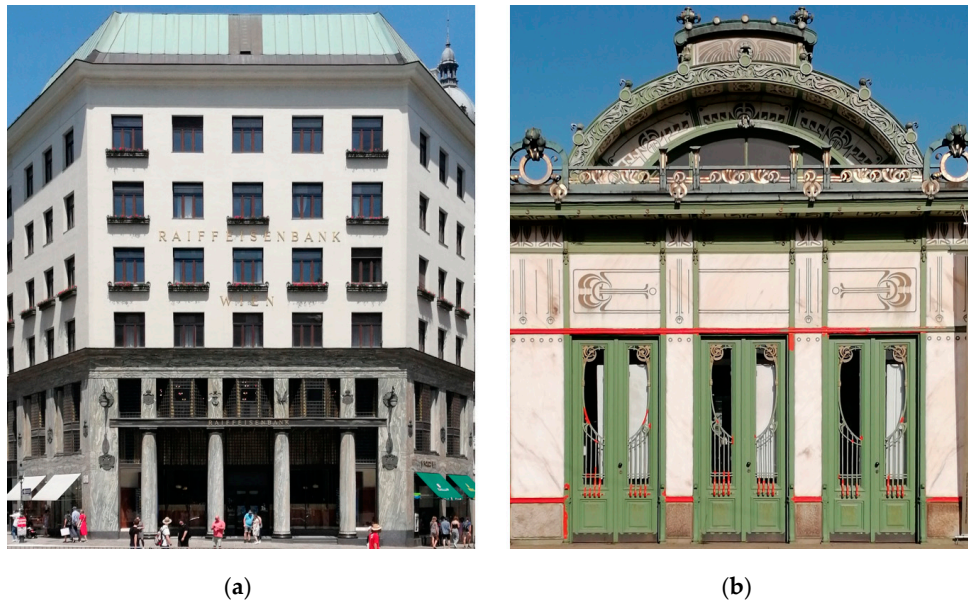


**Figure 14.** Secession decorations: (a) characteristic curved forms (tenement house in Wroclaw); (b) a faience plate with poppies symbolizing the flowering, maturation and transience of life; (c) steel structure and glazed façade of part of the building (V. Horta, tenement house in Brussel).

In some buildings, in addition to expressive ornaments, there are exposed structures, for example, made of industrially produced steel profiles (Figure 14c). The larger buildings had a slab or frame structure made of steel or reinforced concrete, sometimes with glass curtain walls. Modular typing and prefabrication were increasingly used in construction technologies.

The Secession style was also criticized for excessive ornamentation, which was incompatible with the specificity of industrial production. Together with eclectic styles, it was considered synonymous with passing technical and social order. In this case, the breakthrough was the development of mass culture, consumerism, and World War I [32], [34].

The slow abandonment of ornamental applications was a consequence of the technological limitations of mass industrial production. Already at the turn of the 19th and 20th centuries, products with more geometric forms were produced. Hermann Muthesius wrote then that "ornament and artistic craftsmanship are not identical, that it is about forms (Ger. *Bildungen*), not applications, and that a form does not cease to belong to artistic craftsmanship just because it is not decorated." [35] (p. 164). He also postulated the principle of "naked form" in opposition to decorative Secession forms. He was a supporter of "factual" sobriety (Ger. *Sachlichkeit*) and goal-orientated forms (Ger. *Zweckform*). The Austrian architect Adolf Loos also demonstrated that "ornament is a crime" [36] (p. 133-143), [37] (p. 200). These postulates were slowly implemented in the production of everyday products. These ideas can be seen, i.e., in the appearance of bentwood furniture from the (*Gebrüder*) Thonet brothers. Furniture was already produced in the 1860s [32]. "Chair no. 14" from 1859 was rationally designed furniture, comfortable, solid, and inexpensive. The concept of bending turned wood was used again in the 1930s, including by Marcel Breuer in the production of chairs from bent steel pipes ("S32", "S33" chair). The mentioned wooden and metal chairs are still produced today [38]. A little later, aesthetic concepts almost devoid of ornaments were used in architecture. An example would be the projects of Viennese architects, including Adolf Loos himself. The beauty of his designs was the search for good proportions of the building and its parts and the harmonious rhythmic grouping of door and window openings. The use of various finishing materials with carefully selected colors and delicate structure was of great importance (Figure 15). A similar geometric trend was also represented by other designers of architecture, interiors, furniture, and everyday objects. Viennese artists were inspired by the designs of the Scottish architect Charles Rennie Macintosh. Macintosh owed its fame mainly to innovative interior and furniture designs with strict geometric shapes, slender and elongated proportions, and a small number of Secession decorations [39]. The Viennese geometric trend in the Secession style from the turn of the century can be considered a forerunner of modernism in architecture and art of the 1920s and 1930s.



**Figure 15.** Geometric trend in the Secession style: (a) Looshaus without ornamental decorations (A. Loos, tenement house, Vienna), (b) simple steel structure and geometric ornaments on the façade (O. Wagner, former *Stadtbahn* station, Vienna).

After the end of World War I, major social and economic changes occurred. They were caused by economic crises, high unemployment, and the loss of a privileged position by the aristocracy and bourgeoisie. In the first years of the 1920s, the trend of functionalism emerged. The aesthetic and artistic value was then given to an ordinary technical, visually neutral, and abstract form. The activity of artists in shaping machine-made objects was related to functionality, durability, beauty of the bare form, and profitability of production [32], (p. 51). The fascination with the machine and its products was visible in the nomenclature of many objects: a house as a "machine for living" (Le Corbusier), a book as a "machine for reading" (Paul Valéry), etc. Repeatability of production processes promoted the popularization of the concept of unification and standardization in architecture and industrial production [32].

Also, the great demand for cheap apartments perpetuated the trend of building without decorations. Usage and functional requirements have become more important. In large cities, houses and apartments were proposed with a better standard of space and hygiene. More attention has been paid to equipping buildings with water, sewage, gas and even central heating installations [40]. The concept of a "machine for living" characterized the living space as a place where only utilitarian needs are met [41]. It also resulted from the popularization of new unified construction techniques using prefabricated building elements. In his manifesto, Sigfried Giedion proposed opening functional residential architecture to light, the sun and fresh air and freeing it from unnecessary things [42].

The new trends took into account the need to meet the quantitative and qualitative housing needs of societies. Industrial construction technologies made of steel and reinforced concrete were implemented (including frame structures with walls filled with light materials with appropriate (at that time) thermal insulation properties and large glass surfaces. The model of continuous edge development along the streets and richly decorated tenement houses, developed in the 19th century, was abandoned. Preference was given to buildings scattered among greenery, with maximum access to sunlight. Workers' houses and housing estates were built, intended for the poorest social groups. Self-help cooperatives and building societies were established throughout Europe [43]. These initiatives can be considered as the beginning of the development of local activities and participatory construction.

Modernist trends in architecture, interior design and applied art were promoted, i.e., by participants from schools and groups such as De Stijl, Werkbund, and Bauhaus [13]. Their main goal was to design objects intended for mass production, which also had artistic value [44]. Designers declared that they would give up artificial decoration and styling as an element of the beauty of



façades, interiors, and furniture. They considered them functionally and aesthetically unnecessary. It was a reaction to the canons of beauty of decorative forms that had been in force for centuries. It was mainly about bourgeois, eclectic neo-styles from the second half of the 19th century. Ludwig Mies van der Rohe's phrase: "less is more" became popular [45]. The functional and practical architecture with simple forms was supposed to be beautiful. The basis of the building's aesthetics are: its purpose, function and structure in accordance with the artistic composition, durability and impact on human health.

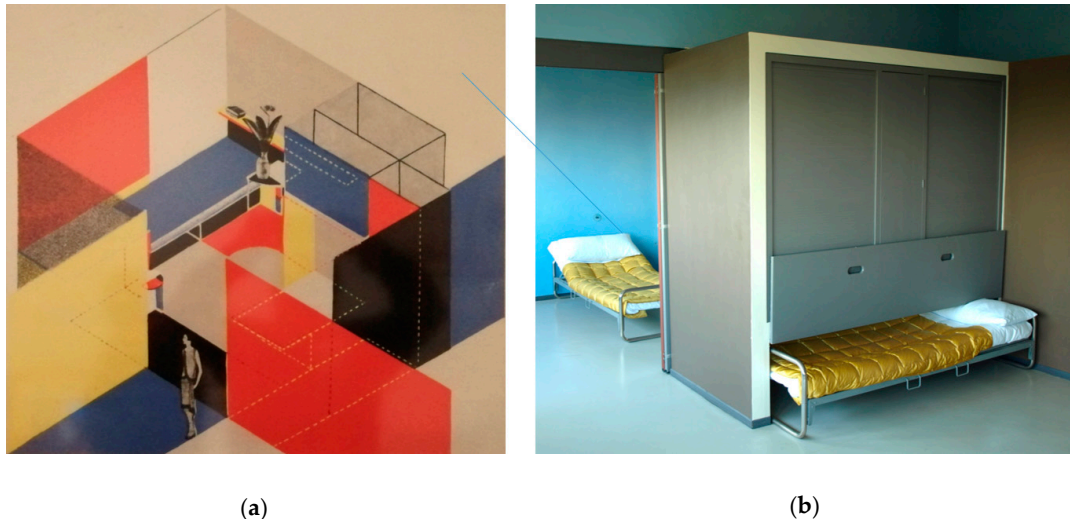
Cubist forms of buildings with flat roofs tightly encompassed rooms and functional spaces. Flat shapes and façades became the preferred canon of beauty in the mechanized world of the interwar period. Architectural means such as the dynamic shape of a long or tall building, rhythmically arranged windows and doors, balconies and terraces with accentuated balustrades, and large glazing combined with plastered walls were used as decorative elements with beauty values (Figure 16). Frame structures made it possible to use wide windows and create new forms of elevations, especially effective penetration of daylight and sunlight into the interiors.



**Figure 16.** Modernism in architecture: (a) flat façade, rhythmically arranged, elongated windows and balconies with accentuated balustrades (L. Mies van der Rohe, *Wohnblock, Weissenhofsiedlung*, Stuttgart); (b) simple form of cubist façade (tenement house in Wroclaw).

In relatively empty rooms, little furniture was placed, often built in. They were intended to meet only basic needs of life (Figure 17). Mechanical household appliances were of great functional importance. An innovative approach was promoted to the function and aesthetics of everyday objects. For example, the German architect and designer Ferdinand Kramer defined the assumptions regarding furniture in the apartment. He formulated them in the Bauhaus trend. The seating furniture had to be, above all, comfortable and tailored to general functional requirements. Individual, personal preferences of users no longer mattered. The table was supposed to be multifunctional, light, and mobile (foldable and hidden on the wall). The bed should be folded and hidden in a furniture recess or an alcove separate from the room. The wardrobe was supposed to be built into the wall. Only its functional interior with hangers, drawers, and chests was important [40]. The beauty of the furniture resulted from its practical function, proportions of forms adapted to the interior, simplicity of industrial workmanship, use of appropriate materials (combination of steel, chrome-plated structure, and wooden bodies), as well as textures and colors (upholstery fabrics, wood structure).

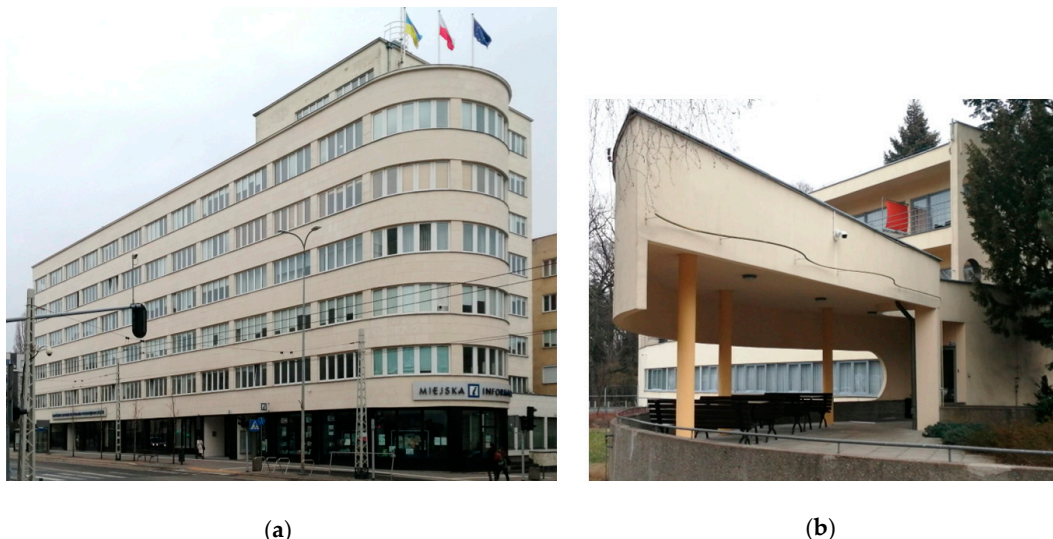




**Figure 17.** Modernism in interior design: (a) apartment design without decorations and unnecessary things (W. Strzeminski, 1930); (b) built-in, multifunctional furniture (Le Corbusier, *Doppelhaus*, *Weissenhofsiedlung*, Stuttgart).

Under the slogan "new building", unified forms and functions in architecture were proposed. Furthermore, interior furnishings were not supposed to be a manifestation of luxury, but aimed at a wide group of the population.

Modernist concepts were often criticized by many users (house residents), as well as architects and art experts. Excessive unification and egalitarianism of architecture (Ger. *Gleichmacherei*) and formulaic willfulness of design (Ger. *Schablonieserte Willkür*) were criticized. Attention was also drawn to the empty formalism in the appearance of the buildings and the too small areas of the living rooms, which were compared to prison cells [40] (pp. 250, 266). The universal simplicity of architectural forms made buildings detached from their surroundings and often associated with ships in the middle of the sea. The forms of some houses were actually modelled on ships, sea machines (Figure 18). Such a design was an expression of fascination with the beauty of machines, the means of transport at that time.



**Figure 18.** Simple, dynamic architectural forms. Building shapes inspired by ships: (a) corner of the building in the form of a cylinder (R. Piotrowski, office building in Gdynia); (b) vertically and horizontally rounded arcade (H. Scharoun, *Ledigenheim*, WuWa exhibition in Wroclaw).

In the interwar period, in parallel with modernism and functionalism, a characteristic Art Deco style was developed. It was a mixture of several earlier styles. It referred, i.e., to the geometric

Viennese Secession. Precisely made of rare and luxurious materials, the products were dedicated to the social elite. But various items were also mass-produced from cheap raw materials for the large consumer market [46].

The buildings, interiors, and everyday objects were covered with naturalistic and geometric decorations. The forms themselves, devoid of decorative details, were also considered decorative. In addition to decorative ornaments, modern steel and concrete structures and large surfaces of smooth walls and windows were eagerly shown. A novelty was the design of artificial lighting at night for building façades. Especially in interiors, lamps were hidden in decorative corners of walls and ceilings. Light was visible as reflected from various surfaces. The Art Deco style is represented by two aesthetic trends, "ZigZag Moderne" and "Streamline Moderne" [46]. The first used tectonic divisions and decorations in diagonal, trapezoidal, and triangular forms (Figure 19). They were inspired by traditional folk decorations. They were in opposition to the cuboidal modernist forms. The second trend was characterized by the use of streamlined forms in architecture and industrial design. It was inspired by the aerodynamic shapes of modern means of transport, steam locomotives and airplanes. The beauty of products with streamlined shapes was associated with speed in technology. The Art Deco style was popularized thanks to the development of consumerism and the accompanying advertising. The combination of modernity, technology, and the use of decorative elements was associated with a sense of individualism and elitism. Local motifs of flora, fauna and everyday life in various cultures were used. The style gained recognition in Europe, the USA, Latin America, Japan, India, and South Africa. It did not raise as much controversy as "formally empty" modernism, detached from historical and local traditions [46]. The Art Deco style can be considered the first international style that simultaneously represents contemporary art and native architecture.



(a)

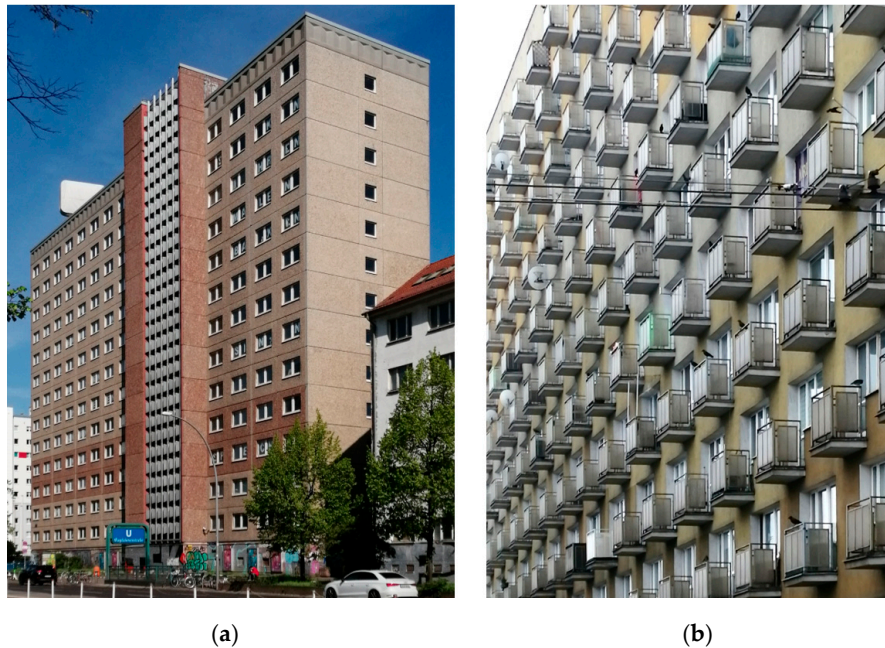


(b)

**Figure 19.** Art Deco style in architecture: (a) decorations with diagonal and trapezoidal forms in the "ZigZag Moderne" style; (b) rounded shape of the building in the "Streamline Moderne" style (Miami Beach Architectural District).

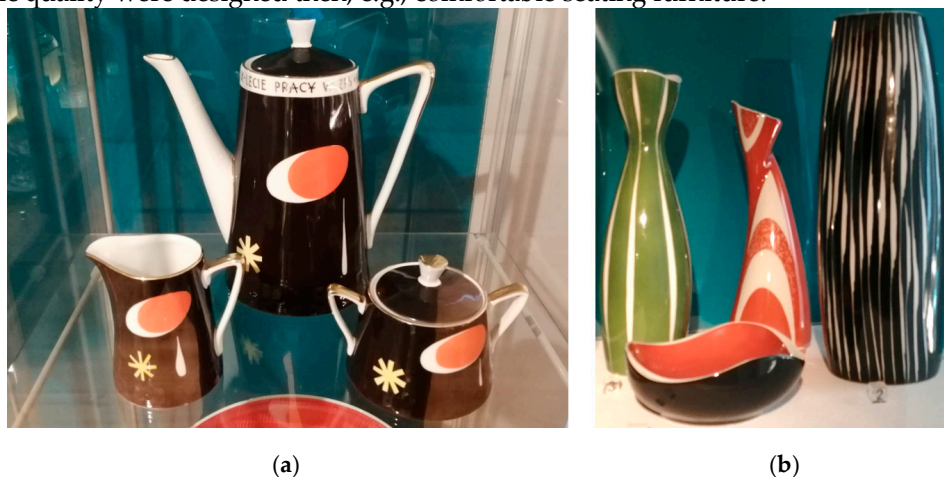
The destruction after World War II, but also the dynamic economic growth in the US in the 1940s and 1950s, favoured the reproduction of modernist concepts. In most countries, new buildings were built with simple forms and no decorations. The beauty and aesthetics of the new architecture were visible in the asymmetry of the plan and cross section of the building, tectonic shapes (mass form), rhythm of windows, balconies, etc. This was a reflection of the internal structural and functional division in the building. The structure and textures of building and finishing materials have also become more important. For example, in the Brutalism trend, plastically formed concrete surfaces were eager to be shown. Mass construction using industrialized technologies (large-panel houses) caused urban monotony and anonymity in the residential environment (Figure 20). They contributed to social disintegration, loss of identity with the place, and lack of interpersonal bonds.





**Figure 20.** Mass construction and industrialized technologies: (a) tall large-panel prefabricated house (apartment block in Berlin); (b) aesthetics of tectonic shapes on a rhythmic, anonymous façade with balconies (apartment block in Gdynia).

Many architecture and industrial designers have experimented with forms with functional features but less cuboid shapes. Inspiration was often the fascination with new nuclear and space technology. It manifested itself in the "atomic space" or "space age" style and the use of streamlined, aerodynamic forms. Modern (and even then avant-garde) shapes were used mainly in the automotive industry, furniture, home mechanical appliances, and applied art (Figure 21). Many products of high ergonomic quality were designed then, e.g., comfortable seating furniture.



**Figure 21.** Products in the "space age" style with streamlined, aerodynamic forms: (a) coffee service; (b) ashtray and flower vases (Porcelain Museum in Walbrzych).

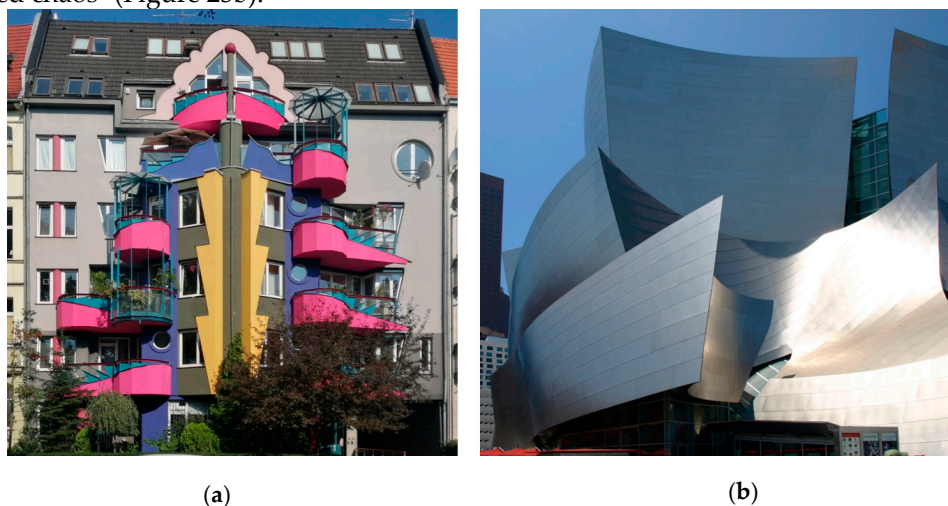
In the late 1960s, western Europe and the United States experienced rapid social and cultural changes. Protesting currents emerged, negating the established social order. They also found their expression in architecture. The contestants rejected the prevailing style of building in the mainstream of international modernism. Traditional achievements of vernacular architecture were used more willingly. Craftsmanship construction techniques were preferred. They were the most diverse in the United States, for landscape and climatic reasons. Houses were built, that is, from packed earth or clay, in pile construction, mobile modules, silos, pneumatic shells. Local raw materials as well as recycled materials (e.g., wood or windows and doors, sea containers) were used in the construction

processes. Caravans, campers, railway wagons, boats, and barges were used eagerly for housing purposes [47]. Alternative architecture was largely a form of protest against the established lifestyle and the growing consumption. It was an announcement of sustainable development, green and ecological architecture (Figure 22).



**Figure 22.** Green and ecological architecture: (a) vegetation as an integral part of the building (R. Piano, The California Academy of Sciences, San Francisco); (b) recycled materials (including sea containers) as the basis for building houses (Plug-in-City, Eindhoven).

In the 1970s and 1980s, there was a fairly widespread rejection of modernist aesthetics. At the same time, the formal emptiness of architecture and industrial design was pointed out. New styles have appeared in the architecture of buildings, their interiors, and industrial design. They were based on old and traditional concepts of bourgeois classical art and rural folk art. It was a reaction to the boredom with the perception of boxy architecture, implemented in the same way in the style of international modernism in various, even distant, countries. Since then, buildings have been erected, and products of very diverse styles have been industrially produced. The beauty of postmodern architecture was perceived in a functionally and artistically free interpretation of the tectonics and order of classical buildings, but in a new form (Figure 23a). In opposition to L. Mies van der Rohe, Robert Venturi decided that "less is bore" [48] (p. 17). It was again decided that aesthetic values and beautiful form were to be of equal importance to practical utility value. In turn, the deconstructivist trend was often characterized by the separation of functional divisions from the grid of the building's structural system. The disruption of conventional forms was achieved by dividing and deforming the shapes of the building or any object. As a result, the architecture often gave the impression of "controlled chaos" (Figure 23b).





**Figure 23.** Architecture at the turn of the 20th and 21st centuries: (a) colorful balcony decorations in the trend of postmodernism loosely referring to classical styles (W. Jarzabek, tenement house in Wroclaw); (b) dynamic, irregular deconstructivist forms (F. Gehry, Walt Disney Concert Hall, Los Angeles).

Since the end of the 20th century, there has been a dynamic development of various media (especially television and the Internet). It led to the almost complete disappearance of the elite arts. Artistic achievements have become more accessible, egalitarian, „democratic,” and cosmopolitan. In the conditions of industrial production, digital transformation, and the development of consumerism, the market for popular "mass culture" products dominates. It also includes architecture and applied art. The technical achievements in this area create an artificial living environment for all people, determining the equal quality of everyday life. At that time, the ecological trend in architecture gained importance. It includes, i.e., materials and energy-saving construction technologies, the use of renewable energy sources, and broadly understood sustainable development. Construction management takes into account the protection of the natural environment and Earth's resources. The contemporary canon of beauty includes such design decisions as: compact shape of the building, technically and economically rational construction, installation and finishing solutions, thermal insulation of building partitions (walls, roof and windows), access of daylight and sunlight to the interior, arrangement of rooms. The play of color contrasts and material textures is intended to counteract boredom with the simplicity of the composition.

Striving for sustainable development and reducing consumption in investment processes requires creating a built environment that is timeless, harmonious, and functional. The construction of new buildings (including energy-efficient houses, e.g. passive ones) requires limiting energy losses. Savings measures include, i.e., the use of simple, compact forms in architecture. Aesthetic trends established in interwar and international modernism of the 1960s are reproduced again. Formal simplicity is also preferred in mass housing construction (Figure 24). In this case, reducing investment costs is of great importance. Similarly, minimalist and industrial styles are popular in interior design, focussing mainly on simple forms without excess details. They also refer to modernist concepts. However, historical, classic, and eclectic styles are again popular (Figure 25). The diversity of styles allows one to create original and personalized interiors, dedicated to specific individual users (e.g., apartments) or target groups (e.g., commercial and gastronomy facilities). In addition, there is a growing trend for vintage style and reusing previously used products, including furniture and decorative art.



**Figure 24.** Modernist aesthetic concepts from the interwar period replicated: (a) contemporary architecture adapted to the historic part of the city (multifamily houses in Gdansk); (b) simple formalism, white and gray box form in mass housing construction (multifamily house in Wroclaw).



(a)



(b)

**Figure 25.** Varied design of commercial interiors: (a) selling clothes in a modern environment with flat glass, light and expressive color (fashion shop in Venice); (b) classic styling and modern interior accents (cosmetic store in Barcelona).

In the design of modern architecture and everyday objects, one strives for a logical and even mathematical combination of artistic forms, structures, and technology. Their impact on the human subconscious is continuous. They shape not only the so-called artistic taste, but also positive relationships with the material environment. Therefore, the aesthetic and functional quality of the built environment is a measure of the level of material culture in societies. For centuries, technical progress and the development of people's material needs have significantly influenced architecture. Today, it usually takes place in isolation from ancient and local traditions. The built environment is being transformed, creating the physical and social framework for people's lives. The formal and artistic structure of architectural works is closely related to utility functions, construction systems, building and finishing materials, and especially to the needs and way of life of people. Preferring artistic forms in isolation from functional and construction requirements seems to be contrary to the idea of humanocentrism, where human well-being is the main goal of architects. Today, the ancient triad of Vitruvius is no longer sufficient to create a human-friendly environment. The need to restore the balance between the built environment (for humans) and the natural environment is gaining importance. The natural environment is already perceived on a global scale.

## 6. The beauty and utility of sustainable architecture and interiors in the concepts of (New European) Bauhaus

Modernism between the wars defined the basic principles of shaping contemporary architecture and urban planning. The "Charter of Athens", adopted in 1933, proposed, i.e., locating residential districts of attractive areas in the city, taking advantage of topography, climatic conditions, surrounding greenery, exposure to sunlight (including determining the permissible minimum amount of sunlight for apartments), designing extensive, loosely arranged, and high residential buildings, acquiring urban land to establish extensive green areas (parks) [49]. The recommendations were in line with the development of modernism. In this spirit, various initiatives were created in which artists, architects, writers, various social activists, and art and craft universities were involved.

The Bauhaus art and crafts school was founded in 1919 in Weimar by Walter Gropius and other designers. Later it operated in Dessau and Berlin. It was a place of discussion and clashing of opinions. There was an art-based education proposal. The ideas also inspired architects in various countries. Its leading goal was to create modern functional architecture, integrally related to other fields of art, and to strive for aesthetic and technical unity of the work. It was postulated to combine the experience of artists, architects, craftsmen, and industrialists in investment processes. Bauhaus influenced the development of the concept of functional modernist architecture, the promotion of abstract forms in art and design, and the reform of curricula in art schools [14].

Pre-war modernism in architecture responded to the social relations of the time. What was new in the activity of Bauhaus and other schools was the attention to the functional values of the product, based not only on technological limitations in industrial production. The human factor was also taken into account in the design, including human body dimensions, psychological, and emotional needs. These factors were as important as basic existential needs. It was believed that an architect was a designer not only of buildings, but also of social life and interpersonal relations. These activities can be considered a harbinger of future scientific ergonomics and human-orientated technology.

Various items are produced for people. Their large supply changes the preferences of today's consumers, creates new needs, often giving rise to previously unknown desires. New needs include, for example, the need to protect the natural environment. The New European Bauhaus (NEB) recommends the creation of new forms of the built environment, including work and leisure environments. At the same time, the conditions for sustainable development and the well-being of Earth's natural resources are also noticed.

Pro-ecological activities complement aesthetic preferences. The vision of the Earth's resources being depleted prompts architects, i.e., to search for sustainable technical and aesthetic solutions. Its goal is to use new resources more economically and reuse existing products. However, many cheaply produced items have a short shelf life. After a short time, they break down and must be replaced with new ones. The low durability of the products and rapid changes in fashion trends create a huge demand for new goods. The law of supply and demand and the desire for profit limit the ability to deliver the solid products that technology offers. A product that wears out quickly loses not only its functional properties. It is also accompanied by a loss of aesthetic values.

Mass industrial production affects numerous spheres of human life. Regional social values and native traditions increasingly require special care to preserve cultural heritage. They are under the protection of individual countries. These activities are partly initiated and coordinated by the institutions of the European Union [50]. The NEB initiative also recognizes the importance of the traditional, aesthetic and functional values of architecture and applied art of past eras. Old social ideas, functional, and decorative implementations can be an inspiration for the sustainable development of an environment built in harmony with nature.

The New European Bauhaus is an interdisciplinary initiative of the European Commission institutions within the EU structures, which is intended to connect the "European Green Deal" with the everyday life and broadly understood living environment of citizens of member states. It must be implemented in an attractive and innovative way, placing human needs first [51]. It advocates uniting Europeans to build a sustainable, inclusive society in an aesthetic and beautiful future environment. It is a project dedicated to the nations of Europe in the field of the natural environment, economy, and broadly understood culture. In turn, the goal of the "European Green Deal" by 2030 is a significant reduction in CO<sub>2</sub> emissions and raw material consumption, the use of renewable energy sources, the energy efficiency of products and alternative fuel infrastructure [52]. The aim of both initiatives is, i.e., to change the building parameters to improve the well-being of the natural environment and to implement a circular economy model [53]. In architecture, it can be visible, for example, through the use of natural and renewable raw materials (wood), artificial products that are neutral to health and the environment, and the repair and recovery of old resources (Figure 26).





**Figure 26.** Ecological design of commercial interiors: (a) natural wood and fabrics (cosmetics store in San Diego); (b) reused raw wood and refurbished equipment (grocery store in Barcelona).

The NEB initiative aims to connect art and science, policy and technology with the natural environment and societies. EU innovation and research projects aim to achieve three values: beauty, sustainability, and integration. Beauty is supposed to be the quality of sensations and style combined with functionality. Sustainability defines climate goals (including circularity, zero pollution, and biodiversity). Integration (together) means recognition of diversity, social accessibility and security, and affordability on the market of goods and services. At the same time, it is postulated to create harmony between the contemporary needs of societies and the natural environment. The initiative is intended to be a place of contact for discussions and exchange of ideas between citizens, a space for the development of arts and culture, and a meeting place for experts. Its members will include architects and other designers, artists, scientists and engineers, and students [51].

According to NEB, the sustainable development of the built environment and the restoration of historic areas are intended to prevent climate change and the accompanying extreme weather phenomena. It is proposed, that is, to support innovation and entrepreneurship for the protection of historic urban areas and the sustainable revitalization of social housing estates. However, the success of pro-ecological initiatives requires a wide range of activities, far beyond the EU, on a global scale.

The initiative also addresses the issues of aesthetic education and the sense of beauty. The role of open education is emphasized in cooperation with local communities, industry, crafts, and professionals. Education outside school is intended to develop young people's interests in the surrounding space, science, and technology. Visual arts are seen as "social sculpture". Their potential is indicated, that is, to solve social problems [54]. These ideas are associated with the old initiatives of the Arts and Crafts schools, the Werkbund, and the Bauhaus of the interwar period in relation to the beauty of products made by craftsmen at that time.

Analysis of NEB's operating methods and goals shows the possibility of combining sustainable development in architecture with the usability and beauty of the designed built environment.

## 7. The beauty and utility of interior design: An attempt at a rational assessment

Designers have been using various tools for decades to verify the quality of ergonomic work organization and individual workstations. They include: design guidelines, specialized industry recommendations, and more universal checklists. Research is conducted primarily in the field of safety, body burdens, and work organization. The main goal of potential changes is to achieve better economic results in enterprises.

The ideas of sustainable development assume the possibility of using similar methods to assess functional (ergonomic), social, and aesthetic quality in the built environment. Assessments and the

resulting design or corrective actions are no longer limited to individual factories. They are carried out taking into account the latest social (e.g. equal opportunities), economic (e.g. resource management), technical (e.g. means of using renewable energy sources) and ecological (e.g. low CO<sub>2</sub> emissions) trends. The higher-level needs of individuals and integrated communities are becoming increasingly important. They are difficult, for example, to evaluate economically. Almost all general design parameters with the mentioned external factors are covered by the universal and easily accessible "Davos Baukultur Quality System" checklist. It consists of eight main design criteria. Each of them contains a dozen or so more detailed questions. The following criteria were distinguished:

- management (rational planning, participation of experts, social participation);
- functionality (human health, safety, economic and social accessibility);
- environment (biodiversity, sustainable activities in the natural environment, limiting climate change);
- economics (investment profitability, long life cycle of the facility, construction, and operating costs);
- diversity (multifunctionality, social integration in space, prevention of isolation);
- context (cultural heritage, local specificity, connection with the landscape);
- identity of the place (attachment or belonging to a place and natural surroundings);
- beauty (aesthetics, positive reception, friendly atmosphere) [55].

Criteria can be used to check the quality of the project implementation or existing buildings and spaces. They are intended to functionally, aesthetically, and socially respond to the contemporary needs of users.

The article conducts experimental research using a survey. First, fragments of the Davos checklist from the "Functionality" and "Beauty" groups are analyzed. It is considered that the structure of some questions is too extensive. Long sentences cover several issues at once. This makes it difficult to give a clear answer. Therefore, the questions are divided, simplified, and shortened to simple phrases. Linguistically, the list has its own structure. However, all substantive criteria of the Davos survey, regarding the interiors directly assessed, are maintained. It is possible to give a short and clear answer: "Yes" (Y) or "No" (N). The presented study is an individual, expert assessment. It takes the form of a picture survey with a list of text questions (Table 1). Five contemporary shop interiors were evaluated. The stores had been completed earlier and had been used for a long time. Therefore, analysis can be considered a systemic examination that falls within the Post Occupancy Evaluation (POE) procedures [56].




### *7.1. Interpretation of the Survey Results*

Interior 1: This is a single-discipline clothing store. Inside, the range of goods is clearly defined. The furniture is very modest. These are simple metal hangers. The appearance of the interior corresponds to the specificity of the store and the target group of customers. The goods are well displayed on mannequins, but are only partially visible on hangers. The facility is monofunctional. The equipment is susceptible to functional changes depending on the needs of the customer. Changes to the functional arrangement are possible. The hangers themselves cannot be converted to functional changes. The finishing materials and furniture used are durable and can be reused. The store does not reflect the local specificity of the place. The interior is universal, including: thanks to the use of slightly different finishing materials and wallpapers. The appearance does not suggest the use of experimental (innovative) functional and aesthetic concepts. The interior does not have a high technical standard, but a simple aesthetic expression. There are no details in the interior. Metal hangers are very simple and do not need to be carefully refined. They do not have a high artistic value. This is the value of geometric wallpaper patterns. The interior does not affect the customers. Their attention is focused on the goods on display. Functional order and material accents and textures give users a sense of freedom. The finishing materials (metal, paper) are sustainable with the natural and built environment.



Interior 2: This is a single-discipline shoe store. Inside, the range of goods is clearly defined. The products are well displayed. The furniture equipment does not correspond to the specificity of the

shop. Irregular and streamlined forms are modelled on futuristic „space-age” concepts. Therefore, the equipment is not susceptible to functional changes. They are characterized by monofunctionality. Strongly defined shapes do not allow for flexible ways of displaying and changing the functional arrangement. Finishing materials and furniture are durable. The furniture has characteristic forms and cannot be reused elsewhere. The interior design does not reflect the local specificity of the place (it can be anywhere). The store is dedicated to a specific group of customers thanks to the use of characteristic spatial forms and finishing materials. The appearance suggests the use of experimental (innovative) functional and aesthetic concepts. The interior is characterized by a high technical and aesthetic standard. The details of the equipment are carefully refined. In terms of visual perception, the interior has a positive effect on avant-garde customers. The forms of the furniture are original, of high aesthetic and artistic value. Their scale and arrangement make it difficult to move freely. The finishing materials (plastic) do not fit into the mainstream of techniques that are sustainable with the natural environment. the contemporary needs of users.

**Table 1.** The survey for assessing and verifying of quality of more sustainable interiors.

Case study	Project functionality	Beauty of the project	
	functionality and specific application	Y	N
	adaptation to users' needs	Y	Y
	adapting to changing needs	Y	N
	flexibility and susceptibility to transformation	Y	Y
	multifunctionality, use for many purposes	Y	N
	ability to retain value over time reusability	N	N
	reflecting regional and local specificity	N	Y
	use of local materials	N	Y
	technical operations are well tested	N	Y
	inclusion of experimental activities	Y	Y
	supporting well-being and a healthy lifestyle	N	N
		Y	
		N	Y
	functionality and specific application	Y	Y
	adaptation to users' needs	N	Y
	adapting to changing needs	N	Y
	flexibility and susceptibility to transformation	N	Y
	multifunctionality, use for many purposes	Y	Y
	ability to retain value over time reusability	N	Y
	reflecting regional and local specificity	N	Y
	use of local materials	N	N
	technical operations are well tested	Y	N
	inclusion of experimental activities	Y	N
	supporting well-being and a healthy lifestyle	Y	N
		Y	
		N	N
	functionality and specific application	N	N
	adaptation to users' needs	N	Y
	adapting to changing needs	Y	N
	flexibility and susceptibility to transformation	Y	N
	multifunctionality, use for many purposes	N	Y
	ability to retain value over time reusability	Y	Y
	reflecting regional and local specificity	Y	N
	use of local materials	Y	Y
	technical operations are well tested	Y	Y
	inclusion of experimental activities	Y	Y
	supporting well-being and a healthy lifestyle	N	Y
		Y	
		N	N



	functionality and specific application	Y		
	adaptation to users' needs	Y	high technical quality of the interiors	Y
	adapting to changing needs	N	knowledge of finishing materials	Y
	flexibility and susceptibility to transformation	N	attention to detail in the interior	Y
	multifunctionality, use for many purposes	Y	the concept has an artistic dimension	Y
	ability to retain value over time reusability	Y	positive impact (aesthetics, atmosphere)	Y
	reflecting regional and local specificity	Y	sensory perception (sight, hearing, touch)	Y
	use of local materials	Y	aesthetic value of the place (composition)	Y
	technical operations are well tested	Y	users' sense of freedom	Y
	inclusion of experimental activities	Y	applying sustainable concepts	N
	supporting well-being and a healthy lifestyle	N	relationships between place and people	N
		N		N
	functionality and specific application	Y	high technical quality of the interiors	N
	adaptation to users' needs	N	knowledge of finishing materials	N
	adapting to changing needs	Y	attention to detail in the interior	N
	flexibility and susceptibility to transformation	Y	the concept has an artistic dimension	N
	multifunctionality, use for many purposes	Y	positive impact (aesthetics, atmosphere)	N
	ability to retain value over time reusability	N	sensory perception (sight, hearing, touch)	N
	reflecting regional and local specificity	Y	aesthetic value of the place (composition)	N
	use of local materials	Y	users' sense of freedom	N
	technical operations are well tested	N	applying sustainable concepts	Y
	inclusion of experimental activities	Y	relationships between place and people	N
	supporting well-being and a healthy lifestyle	N		N
		N		

Interior 3: This is a general store with home accessories, books, and toys. The range of goods is not defined inside. The furniture equipment is very simple and corresponds to the specificity of the shop. However, it does not meet the excessive customer needs. The goods are crowded and not well displayed. The store and its equipment are susceptible to functional changes, depending on changing needs. They are characterized by multifunctionality (flexible ways of displaying and changing the functional arrangement). The equipment is very worn (recycled). Simple furniture can be flexibly adapted to functional changes. They reflect the local specificity of the place, including thanks to their reuse. The appearance of the store equipment and the displayed goods suggest the use of traditional functional and aesthetic concepts. They have a rather low technical standard (degree of wear). The details of the equipment are not carefully refined. The interior design and chaotic composition of the exhibition have low artistic and aesthetic value. The atmosphere of a vintage store has a positive effect on customers in terms of visual perception. The finishing materials are sustainable with the natural and built environment (circulation of the used resources).

Interior 4: This is a general store. Clothing and accessories are sold. The range of goods is clearly defined and sorted inside. The built-in furniture equipment in a classic style corresponds to the specificity of the shop and the target group of customers. The products are well displayed. The facility and its equipment are not susceptible to functional changes. The furniture equipment is monofunctional. Individual pieces of furniture allow for various ways of displaying goods. The finishing materials and furniture are durable and can be reused. They reflect the local specificity of the place, including the use of wood to finish and equip the store. Its appearance suggests the use of traditional functional and aesthetic concepts. The interior has a high technical and aesthetic standard. The details of the equipment are carefully refined. They have a high aesthetic and artistic value. Classic forms have a positive impact on customers in terms of visual perception. The store requires large amounts of materials to achieve a historical style. This trend does not fit into the mainstream of techniques that are sustainable with the natural and built environment.

Interior 5: This is a multi-sector department store (clothing, accessories, footwear). The range of goods in the interior is not spatially defined. Furniture equipment corresponds to the specificity of the store. However, it does not meet the excessive customer needs. The goods on the hangers are only partially visible. The store and its equipment are susceptible to functional changes depending on changing needs. They are characterized by multifunctionality (flexible ways of displaying and changing the arrangement of equipment). The finishing materials, furniture, and hangers are durable and can be reused. They are very simple and universal. They do not reflect the local specificity of the

place (they can be placed anywhere). The appearance of the interior is anonymous and does not suggest the use of traditional or experimental (innovative) functional and aesthetic concepts. The interior has a low technical and aesthetic standard. There are no architectural or orientation details. The equipment is functional, but not aesthetically refined. It does not have a high artistic value. The room has a large area, but is low. It does not have a positive impact on customers in terms of visual perception. It gives an overwhelming effect. The material concepts (e.g. plastics and chrome-plated metals) do not fit into the mainstream of techniques that are sustainable with the natural environment.

## 8. Results

The article addresses the issues of beauty and usability in the design of architecture and building interiors. They were carried out in a historical and social context. They were justified by the literature and iconographic material. Modern research tools were also used to assess the aesthetic and functional values of historical and material cultural heritage, as well as contemporary resources in the built environment.

### 8.1. *The result of original theoretical research*

Theoretical considerations were supported by the analysis of old and contemporary treatises or books, which are the result of the design experiences of their authors. These works come from different periods of technical and cultural development of societies. Chronological canons of beauty were also analyzed. Beauty in architecture and interiors is usually associated with various decorations with a style adapted to changing fashion and technical possibilities. The well-being of the natural environment is associated with the usefulness of products themselves, instead of decorated shapes. Analyses may contribute to expanding the knowledge of designers of the built environment, especially architects and designers. The acquired knowledge and professional experience can be used in rational technical design for satisfied users.

### 8.2. *The result of expert survey research*

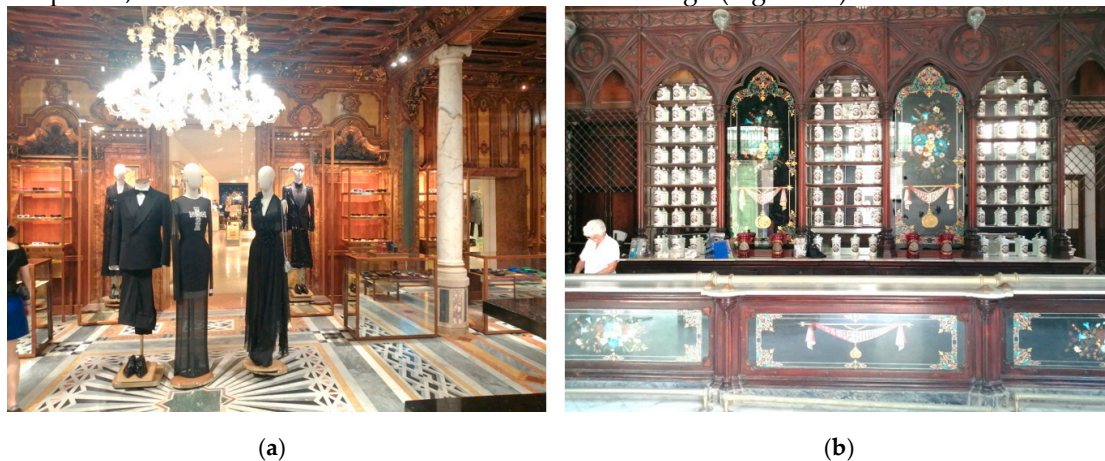
The survey method may have practical applications for assessing and verifying the ergonomic, aesthetic, and pro-ecological quality of buildings and their interiors. It can be used in the design stage as well as during the exploiting of the facility.

Commercial interiors were selected for evaluation. The leading industries are the sale of clothing and various accessories. The stores offer a variety of goods. They are dedicated to various target groups of customers: from the less affluent, to the very affluent or those with specific preferences. The economic factor is also related to social diversity and the type of people's needs. The desire to buy is usually not the only reason to visit shops. The spatial organization of commercial exhibitions and the method of sales determine the functionality of the interior of the store. Free access to goods (self-service) and safety of use (protection against accidents and theft) are of great importance. Attracting and encouraging potential customers to make purchases is a difficult task for the owners of the stores surveyed. The products most essential for life, such as food, are not offered there. Increasing sales is influenced not only by low prices and advertising, but also by positive visual stimuli addressed to customers. In this context, the individual atmosphere in the interior, the beauty of the rooms, and the items well displayed for sale are important. Interior aesthetics are gaining importance in marketing [57]. Modernist forms, devoid of decorative details, are often used in contemporary stores. They refer to the aesthetic image of product quality (Table 1, case 1). Sometimes very original, controversial, and even futuristic interior design concepts are implemented (Table 1, case 2). They are addressed to people who are more avant-garde or who have specialized needs and passions. These are usually small and very wealthy groups of clients. The situation is somewhat similar to the offer of used items, displayed in a vintage atmosphere (Table 1, case 3). This trade sector has been very popular for years. Consumers make their decisions looking for the values of old functional and aesthetic quality. More and more people also see it as an opportunity for rational,

sustainable management of material resources (circulation and recycling of everyday products). In contemporary stores (as well as apartments), historical stylings still work well as a background, for example, for classic, always fashionable clothing (Table 1, case 4). The offer is targeted at customers who are more mature in age and style. Although individual recipients change with age, the target group remains constant. Fashion, too. Finally, many salespeople do not attach importance to the original aesthetics and the traditionally understood beauty of the interior (Table 1, case 5). They are only interested in intensive sales, almost in wholesale quantities. Similarly, their customers are willing to give up aesthetic experiences and a more individual atmosphere of the store interiors. The most important thing for them is the ability to choose from a very large assortment and purchase the cheapest products. In this case, the organization and appearance of the exhibition and sales are subordinated to functional considerations. They are associated with the concepts of interwar functionalism.

## 9. Discussion

The emotional, aesthetic and practical perception of buildings, interiors and applied art changes over time. The functions of a specific item lose importance when compared to more modern products. Over time, it also loses its aesthetic value, along with changing fashion. After a period of rejection and moral ageing, many objects become attractive again. The formal structure and shape of the artistic vision are appreciated. In the past, respecting certain traditions and styles meant rejecting others. For example, classicism drew on ancient and Renaissance traditions while rejecting the values of medieval and baroque art. Nowadays, different artistic styles in art and architecture are perceived more universally and are equally appreciated. However, in a built environment, functional features are the most important. They determine the utility and practical use to meet the needs of users. Therefore, contemporary architecture and design are often devoid of decorative elements and styling that are not related to technical and functional features. On the other hand, the appearance of many products refers to old decorative traditions. In this case, form does not have to adversely affect function. For example, decorated wallpapers, quilted upholstery, gold-plated tableware, etc. are used in modern functional interiors. Often it is old, original equipment. This trend, in sustainable development, can be considered a circulation in interior design (Figure 27).



**Figure 27.** Old aesthetic styles and contemporary functions: (a) modern shop equipment in a historic, well decorated interior (fashion store in Venice); (b) antique, original shop equipment (pharmacy in Havana).

Before the Industrial Revolution, craft production combined beauty and utility. The mass production of various goods may lack aesthetic or even functional value. This may be determined mainly by economic considerations, but sometimes by technological, cultural, etc. Vitruvius already spoke of the unity of beauty and utility in ancient times, formulating his triad: function, structure, and form. Buildings with a specific function and at the same time giving a feeling of beauty are identified with good architecture. Therefore, their design should be seen as the implementation of a



certain aesthetic ideal. Architecture should be perceived as a higher stage of functional construction, taking into account the conscious pursuit of a beautiful and harmonious shape as well as functional and structural order.

In the conditions of mass production, not only the usability, but also the durability and profitability of technical products have become more important. These factors contribute to their aesthetics. Beauty is no longer just a decoration and an object of luxury for a few social groups, but a means of improving the standard of living of entire societies. Technical progress enables the penetration of artistic culture and noble ideas into societies and the expansion of aesthetic impact. This trend was described in detail in the New European Bauhaus initiative.

People have different tastes. In the past, they were attached to specific shapes and colors, which they usually interacted with for a very long time. These characteristics were most often naturally related to the logic of construction, material and purpose of the object. They were a measure of the technical and material possibilities of a given era and the prevailing fashion. When studying the shapes of old decorations in the built environment, one notices their strong connections with natural forms taken from nature. Only practical experiences, longer observations, and the formulation of objective regularities and rules became the source of a sense of the beauty of objects as artistic forms, sometimes abstract. The shapes resulting from functional needs, material and construction possibilities gained style, aesthetic value, and beauty. The feeling of order, harmony of shapes and proportions in the whole composition allows to notice its beauty. They do not have to deny the usefulness of buildings and their interiors.

Aesthetic universalism in world architecture, originating from the pre-war Bauhaus, based on the function and structure of buildings, became boring to society after about thirty years. It was a reaction to architectural monotony and mass-built box-shaped houses. Therefore, more ornate style trends developed again. The aesthetics of contemporary architecture draws on the experience of earlier designers and often combines decorative architectural details with functional and structural values. In turn, saving and pro-ecological initiatives are modelled on the achievements of modernist architecture.

The NEB initiative promotes beauty and utility in architecture and design. It is dedicated to projects and users of the built environment. It takes into account the well-being of the natural environment. In product design and its exploiting process, it is possible to use various tools to rationalize the activities of participants in these processes. The "Davos Baukultur Quality System" list formulates helpful criteria for a wide range of activities of designers and users. The study in Table 1 shows that the built environment quality assessment system can be applied to the functionality and beauty of interior spaces. Universal criteria and clear results ensure an objective, transparent, and complete qualitative analysis. They can also be used to perform a group or individual critical assessment of projects and already completed facilities. The results can be used for better and more sustainable shaping of buildings and their interiors in the future.

## 10. Conclusions

The appearance of architecture in ancient times was determined by slowly changing canons of beauty. The beautiful, most valuable, and best-known buildings and their interiors were built individually for the social and financial elites of that time. As part of the initiatives of the Werkbund and Bauhaus, i.e. in the 1920s, designers proposed concepts of mass construction for numerous, less wealthy groups of the population. Useful architecture has become more common and egalitarian. At the same time, there has been a slow and general democratization of life in the built environment, with new social relations. Functional and aesthetic values were also important in interior design. The appearance and equipment of the rooms were supposed to give a sense of comfort and aesthetic satisfaction. Their scarcity was a stimulus for technical progress, social changes, and perception of beauty.

Since the second half of the 20th century, very different construction and style concepts have been used simultaneously. Changing social and cultural attitudes on a global scale contribute to this. Architects are responsible for creating order in space. It is identical to the function, structure, and

beauty of buildings. Similar criteria apply in interiors. Contemporary design processes take into account the broader social and spatial context. Increasingly, the high quality of the built environment is associated with the protection of natural resources and the environment.

The aesthetic value and cultural significance of the built environment change over time. The sense of beauty should be one of the goals of human creation, planning, and building. For products to be perceived and assessed as "beautiful", artists, designers, and other experts should be involved in the design processes. The discussion could cover various social groups and spheres of life. It is important to all people. This task is difficult to accomplish. The methods and goals of action for the cultural heritage of societies should be universal, valid now and in the future. Beauty is not an exclusive niche or an expensive concept. It is a universal value in life. In turn, the usability of technical products of different spatial scale and impact is the basic selection criterion for meeting the diverse needs of people.

Analysis of NEB's methods and goals shows the possibility of combining sustainable development in architecture with the usability and beauty of the built environment. The rational implementation of the indicated goals can be supported by tools to assess the quality of design or repair activities. The "Davos Baukultur Quality System" checklist is readily available. It can be the basis for creating other technical design criteria in a socially, ecologically, economically and spatially sustainable human living environment.

**Funding:** This research received no external funding.

**Data Availability Statement:** No applicable.

**Conflicts of Interest:** The author declares no conflicts of interest.

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