“Minimalism technology in the recycling of materials used in interior design and its relationship to environmental sustainability “

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Abstract:

The desire to pursue formal and functional excellence, simplicity in content and form, originality and compatibility with environmental changes, it is one of the most important things that the designer in general and the interior designer in particular seek. This will study the trend of the new reductionism in design in terms of features and technology and the link between them on the one hand and environmental sustainability in the design formally and functionally. The various materials will be studied and how to deal with them technically to recycle them to design and implement various products used in the internal and external space, and a new vision will be presented for the elements of contemporary design. (Shape, space, function...) on the one hand and put forward a new vision for the development of the already existing traditional methods of recycling different raw materials, on the other hand, the impact of advanced technology and how to employ it to reach designs with new reductive features (precision) will be studied. Technological and engineering, purity, repetition, unity and simplicity) and environmental sustainability in terms of recycling. Where it was concluded that the use of recycling technology for various wastes is one of the most important ways to design an integrated interior space that is environmentally compatible with the surrounding environment, as it is very necessary to devise new and atypical rational solutions to existing problems and needs in order to preserve the environment and reduce pollution rates to maintain human health and safety and reduce the depletion of resources and energy from the natural environment by reducing carbon emissions and reducing the impact of climate change and the importance of studying the relationship between the designs of recycled products on the one hand and between lighting and colors in the interior space on the other hand to add a new dimension with psychological effects in it.

Keywords:

technology, minimalism, materials, sustainability

ملخص:

تعد الرغبة في السعي وراء التميز تشكيليا ووظيفيا والبساطة في المحتوى والشكل والأصالة والتوافق مع التغيرات البيئية من أهم الأشياء التي يسعى المصمم بشكل عام والمصمم الداخلي بشكل خاص اليها، لذلك اتجهت الدراسات فى بداية القرن الحادي والعشرين إلى تطوير وسائل تقنية متطورة لإعادة تدوير المواد المختلفة ، ولتفعيل ذلك سيتم دراسة اتجاه الاختزالية الجديدة فى التصميم من حيث السمات والتقنية والارتباط بينها من جهة وبين الاستدامة البيئية فى التصميم تشكيليا ووظيفيا

وسيتم دراسة الخامات المتنوعة وكيفية التعامل معها تقنيا لاعادة تدويرها لتصميم وتنفيذ منتجات متنوعة تستخدم فى الفراغ الداخلى والخارجى ، وسيتم تقديم رؤية جديدة لعناصر التصميم المعاصر (الشكل ، الفضاء ، الوظيفة. .....) من ناحية وطرح رؤية جديدة لـ تطوير الأساليب التقليدية الموجودة بالفعل لإعادة تدوير المواد الخام المختلفة، من ناحية أخرى، وسيتم دراسة أثر التكنولوجيا المتقدمة وكيفية توظيفها للوصول إلى تصميمات تتسم بسمات الاختزالية الجديدة (الدقة التكنولوجية والهندسية، النقاء، التكرار، الوحدةوالبساطة) والاستدامة البيئية من حيث اعادة التدوير. حيث تم الاستنتاج أن استخدام تقنية إعادة التدوير للمخلفات المختلفة من أهم طرق تصميم مساحة داخلية متكاملة متوافقة بيئياً مع البيئة المحيطة ، حيث أنه من الضروري للغاية ابتكار حلول عقلانية جديدة وغير نمطية المشاكل والاحتياجات القائمة من أجل الحفاظ على البيئة وتقليل معدلات التلوث للحفاظ على صحة الإنسان والسلامة العامة وتقليل استنزاف الموارد والطاقة من البيئة الطبيعية عن طريق الحد من انبعاثات الكربون وتقليل تأثيرالتغير المناخى واهمية دراسة العلاقة بين تصميمات المنتجات المعاد تدويرها من جهة وبين الاضاءة والالوان فى الفراغ الداخلى من جهة اخرى لاضافة بعدا جديدا ذو تأثيرات نفسية به .

الكلمات المفتاحية:
الاختزالية، الاستدامة، تقنية، خامات

Introduction:

With the advent of the Industrial Revolution, many movements and design trends followed, based on the rejection of the dense decorations of the previous era, and the increasing interest of designers and architects regarding the establishment of new methods commensurate with modern life. In the meantime, the trend was towards simplicity and continuous purity and with the growth and development of the doctrine Reductionist and its relation to features and determinants of environmental sustainability. In this research, the concept of new minimalism and the concept of environmental sustainability will be addressed and the effect of each one on the other and the most important features of sustainable reductionist design and how to apply them to the recycling of various raw materials and finally an analytical study according to the determinants of sustainable reductionist design for projects and products resulting from recycling raw materials, Miscellaneous[٣]

However, reductionist thought can be intimidating, difficult to master, and aims to use less to achieve greater effect.

The phrase "less is more" is perhaps the most well-known phrase of the minimalist movement. It was popularized by architect Mies van der Rohe in describing the minimalist aesthetic. Through the research, ways to achieve the new environmental minimalism will be studied by reducing the design to the basic elements only with the use of recycled environmental materials.

Research problem

The research problem is to answer these questions:

What are the determinants of enriching the design thought of the interior space using the new reductionist thought through the recycling of raw materials with advanced technology?

- Is it possible to make some modifications to the current internal spaces, both structurally and functionally, by adding products from recycled environmental materials?

Research goals:

Highlight the following:

-The importance of recycling various materials and its connection to the new reductionist thinking in design.

-The importance of benefiting from the idea of recycling materials to create environmentally, socially and economically appropriate internal spaces.

Research Objectives:

The research aims to:

Enriching the new reductionist thinking in design using the recycling of different materials.

Taking advantage of the idea of recycling materials to create environmentally, socially and economically appropriate interior spaces.

Research Methodology

To achieve the research hypotheses, the following approaches are followed:

- A historical approach: through which the history of Minimalism technology in materials recycling and its relationship to sustainability.
- Analytical descriptive method: through an analytical study of the concepts of Minimalism technology in materials recycling and its relationship to sustainability.

The historical development of the emergence of minimalism in design:

With the end of the nineteenth century, designers and architects realized that the classic forms of the old styles were no longer suitable for the life form of all people politically, socially and environmentally, some examples like the following:[١]

1- Functional school:

Where it adopted the slogan "form follows function". Fig. (1), Fig. (2).

Fig. (2):Chair design by "Le Corbusier"

Fig. (1): The design of the "Savoy" ladder in Paris, where simplicity and the use of a unified material.

2- Distillate movement:

An artistic movement that originated in the Netherlands, where the severe reduction in the formation of the lines and colors used [٢] Fig. (3), Fig. (4).

Fig. (3): The chair (Great Rietveld) and the reduction in its design

Fig. (4): The interior space of the house (Schroeder), where transparency and the use of simple materials

3- The Bauhaus:

Where it adopted the slogan "less is more" by the architect (Mies van der Rohe), one of its pioneers. Fig. (5), Fig. (6).

Fig. (5): Walter Gropius' house in Dessau, where the use of white color, straight lines and simple materials with glass.

Fig. (6): Stool by Mies van der Rohe is simple and devoid of decoration.

4- Advanced Technology Architecture:

Where the use of modern manufactured materials such as plastic, glass, fiberglass and steel The characteristics of the reductionist doctrine continued in the postmodern movement through the designs of many designers and architects until we reached a new concept of environmental minimalism.

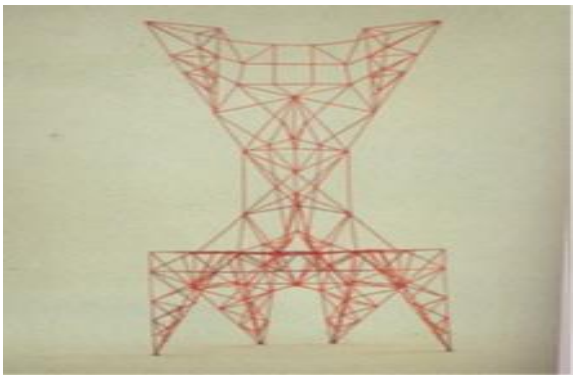

Fig. (7): The pylon seat for designer Tom Dixon, where he relied on a group of thin metal tubes.

New minimalism in design:

From the above, we can say that the new minimalism is:

"**It is the abstraction of any element of the interior design into its simplest forms, taking into account its integration and compatibility with the surrounding environment, both formally and functionally.**" **(4)**

This can be applied to any element ranging from art and interior design to architecture, and simple interior design is similar to ecological reductionist interior design in some elements as:

- Use the basics to design a simple space
- Simplicity
- Clear lines

Preference for the monochromatic scheme in the design.

- Integration and compatibility of the open floor plan and lots of light and functional furniture. Focus on the shape, color and texture of the basic interior design elements.[٩]

The concept of sustainability in design:

Sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their needs. It is based on three main pillars: economic, environmental and social, these three pillars, in other words, symbolize people, planet and profits.

The relationship between neo-minimalism and technology:

Minimalism means simplicity in getting more from less, so technology can often conflict with the concept of minimalism, but development with linking the principles of sustainability, minimalism and technology is to reach the use of simple new materials and perform their function completely, and therefore the application of the philosophy and thought of sustainability comes on top. The list of global concerns, forcing designers to re-evaluate and study what is known as "design with environmental standards", and therefore it was necessary for the interior designer to pay attention to studying the surrounding environmental standards, including the materials used in the design of the elements of the interior space, according to the possibilities of contemporary technology to reach a renewed design language based on the thought of Recycling various materials. **(12)**

The relationship between the new minimalism and recycling (sustainability):

Recycling reduces the need to grow, harvest, or extract new raw materials from the earth. This, in turn, reduces the harmful effects on the environment and reduces the pollution of the environment with all its elements, whether water, soil or air.

An applied example: a project to recycle and use empty containers

Fig. (8): Containers before and after being reused and used as a temporary facility

Plastically - The project consists of containers with dimensions of each unit as follows (12 length x 2.60 height x 2.45 width) they were assembled on the horizontal and vertical levels

together with the use of a vertical connection method of a light metal ladder. “Grinding and fixing the groove and treating it against rust.

Technically - Treating cracks, worn-out and weak parts in containers by welding, and treating the outer surfaces with epoxy paints to resist rust after sanding them. This was followed by painting the exterior facades in white to work on the opposite· (6)

- All door and window works made of Securit glass and aluminum sections treated against rust, with blackout blinds to control the daylight.

- The facade containing the entrance was completely emptied and replaced with glass to increase the efficiency of natural lighting for the internal space of the container, with the addition of a gabled upper roof inclined to the upper container to get rid of the accumulation of rain water and it was painted after treatment against rust, Fig. (9)

Fig. (9): Suggested solutions for interior design (two designs for the practice of administrative and office work and one design for the attached meeting room). As a result of the internal longitudinal spaces with specific dimensions that are narrow to some extent, the design suggestions were characterized by the linear character.

The concept and importance of the new environmental and reductive recycling materials:
Recyclable materials are materials that were made from crushing some of the waste materials used previously, after cleaning and recycling them again. The most recyclable materials in the field of interior design and furniture are the following:

No.	Environmental application	Material and importance of its use in environmental recycling
1		**-Glass recycling:** Reduces the need to use new raw materials such as sand. Example: Recycle empty bottles to produce Indoor and outdoor worktops as an alternative to marble - In the States "Vetrazzo" produced by the company in the United States
2		**-Recycle paper and wood** Save trees and forests

3		**-Plastic recycling** Less production of new plastic, especially when it's made from fossil-fueled hydrocarbons.- Example: the form company has recycled plastic waste and produced surfaces used as internal separators called Varia - https://m.made-in-china.cm/product/3-Form-Varia-Ecoresin-Modern-Clear-Transparent-Acrylic-Sheet-Price-Exhibition-Chanel
4		**-Metal recycling** Reduces the need to extract new, risky, expensive and destructive ores**.**

Table No. (1) shows some types of recyclable materials and their environmental importance

Principles for the design of an environmentally sustainable reductionist indoor space:

To design a wonderful, balanced and homogeneous interior space,[١٤] functionally and aesthetically, materials must be chosen to help achieve the following five principles:

1. Core cutting

Determining the necessary furniture is the basic principle of any designer when designing any functional, aesthetic and environmentally sustainable interior space.

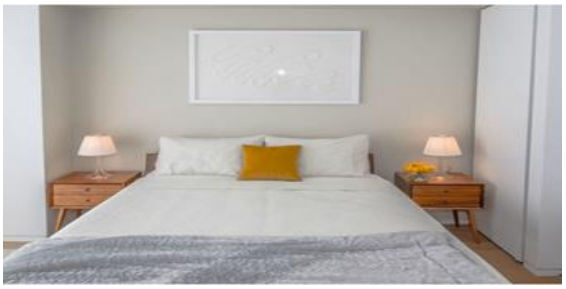

Fig. (10): A figure showing the design of a bedroom (functionally - aesthetically), which consists of a bed, two small tables, table lamps on each side, a vase of flowers on one table, and a simple white artwork on the wall.

2. High quality materials

Choosing the materials for the used elements and finishes so that they are of high quality and sustainable (functionally - aesthetically - environmentally - economically).

Fig. (11): An illustration of a dining room design with a quartz table top accentuates the space and creates visual interest especially with the technology of using much fewer pieces in a small space.

3. Ample space around each element

Where the elements of the interior space are chosen so that there is a large space around each element, even with the interior spaces of limited space, in order to achieve integration and compatibility functionally, aesthetically and morphologically (one of the principles of sustainable design).

Fig. (12): A figure illustrating the design of a living room characterized by saving spaces.

4. Contact point

It is important to determine a focal point when designing any interior space, whether small or spacious, provided that this point is functionally and aesthetically attractive to the eye (one of the principles of sustainable design).

Fig. (13): A figure showing the design of a bedroom, where the design of the wall behind the bed is the focal point in the design of a sustainable interior space.

5. Exploiting negative spaces

The minimalist design should make good use of negative spaces in a functional and aesthetic way (one of the principles of sustainable design).

Fig. (14): A figure that shows the design of a room characterized by simplicity and minimalism and giving breathing space around each of its elements, although the space is small

From the above, given the trend of design thought for the whole world towards awareness of the environment and sustainable thought, it is not surprising that the choice of materials plays an important role in reductionist design, as the thinking about materials after use and the possibility of recycling them, whether modern technological or environmental raw materials.

Characteristics of the new reductionist doctrine, which affected the choice of materials when recycled:

Reduction integrates and corresponds with recycling in a basic determinant, which is the desire to achieve the maximum possible with the least plastic means. Therefore, the reductionist doctrine is sometimes called "environmental art" where the design or the interior space forms a part and the viewer or user is an integral part of it and one of the most important characteristics of the new minimalism in the design when using recycled materials are the following: Fig. (15)

1- Technological accuracy: Materials were characterized by precision, both structurally and functionally.

2- Geometric precision: Which is the use of explicit geometric lines and shapes.

3- Pure existence

4- The principle of repetition

5- Unity and Simplicity

Fig. (15): Examples of using recycled materials

Steps to start using materials for recycling and examples of products used in all elements of the interior space:

1- Collecting and storing recyclable materials, including: (paper, corrugated board, glass, plastic, and metals.

2- Prepare raw materials for recycling and storage in advance. Examples of raw materials (Gypsum wall, Carpet, Parke floor, Gypsum ceiling, Internal wooden, door, Internal windows, Internal aluminum door ....)

In the next lines, we will analyze in detail the most important ideas of recycling raw materials according to the characteristics of the new minimalism

First: Furniture units made of recycled cardboard:

Fig. (16): Design and practical applications of products in the inner space of cardboard recycling that are characterized by the new reductionist features in recycling (formal and functional accuracy - geometric accuracy - repetition - unity and simplicity).

Second: Furniture units made from recycled wood waste:

Fig. (17): Design and practical applications of products from recycled wood waste characterized by the new reductive features in recycling (formal and functional accuracy - geometric accuracy - repetition - unity and simplicity).

Third: Lighting units from recycled various materials:

Fig. (18): Design and practical applications variety materials were used, including (glass - metals - wood residues - treated cardboard - pipes of all kinds) characterized by the new reductive features in recycling (formal and functional accuracy - geometric accuracy - repetition - unity and simplicity).

From the above, we conclude that the link in design between the three determinants (reduction, recycling and technology) leads to the following:

1- Contribute to treating youth unemployment by supporting deteriorating and polluting industries and investing in more green jobs.

2- Preserving the natural resources of the environment.

3. Reduce the demand for raw materials.

4- Energy saving: making products from recycled materials requires less energy than making them from new raw materials. Sometimes there is a big difference in power, for example:

A- Producing new aluminum from old products (including recycled cans and foil) uses 95% less energy than making it from scratch, as for steel, the energy is saved by 70%.

B- Making paper from recycled paper pulp uses 40% less energy than making it from virgin wood fibers.

C- The amount of energy saved from recycling one glass bottle can keep an old 100-watt light bulb running for 4 hours and a new low-power LED equivalent for even longer.

5. Reducing climate-changing carbon emissions: Since recycling means that you need to use less energy sourcing and processing new raw materials, it produces fewer carbon emissions. It also keeps potentially methane-releasing waste away from landfill sites.

Reducing carbon dioxide and other greenhouse gases released into the atmosphere is vital to halting catastrophic climate change.

6. It is cheaper than waste collection and disposal: It was found that “disposing of recycled waste is six times cheaper than the disposal of general waste”. Therefore, the more you recycle, and the less you put in the trash, the more money is saved, which should be good for families, businesses, and local public services.

Results:

-The reductionist sustainable design philosophy is not considered a new design style like the methods and trends of modernity, but it is a set of different and future principles and methods in design thought and an advanced philosophy of interior design.

-The reductionist thought in environmental design is summarized in the phrase "Mies van der Rohe" (less is more)، not the architect Robert Venturi's phrase (less is bore).

- The choice of materials plays an important role in the reductionist design, as he began to think about materials after their use and the possibility of recycling them, whether modern

technological materials or environmental materials to face multiple environmental, economic and social problems.

The designs resulting from the recycling of multiple materials are characterized by purity and simplicity in form and function.

- The importance of studying the relationship between the designs of recycled products on the one hand, and the lighting and colors in the interior space on the other hand, to add a new dimension that has psychological effects.

Recycling existing products is much better than searching for new raw materials.

Recommendations:

- The research recommends taking advantage of the characteristics and ideas of reductionist thought when developing designs for recycling various raw materials due to the variety of ideas it contains that are characterized by simplicity, effectiveness and flexibility in design.

-The interior designer must study modern technology to take advantage of it in solving any problem during the design and implementation phase of recycled environmental products.

- The importance of spreading the culture of recycling various materials in society in a design style characterized by simplicity and flexibility in form and aesthetics and helps to achieve multiple economic, environmental and social benefits.

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