Transformations in Fashion and Architecture (Causes and Mechanisms)

التـــحـــولات فــي الازيـــــــاء والـــعـــمـــارة (اســــبابــها وآلــيـــاتــهـا)

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A B S T R A C T

Transformation is one of the common characteristics between fashion and architecture, as the transformation is linked to contemporary intellectual trends that call for change and renewal. The research was based on the study of changes in fashion and architecture, and the research problem was identified with (cognitive deficiency about the causes and mechanisms of transformations in fashion and architecture). Accordingly, the aim of the research was determined by studying the indicators of the causes of transformation in both fashion and architecture and the mechanisms of this transformation. On the practical and symbolic uses of clothing, while exploring the role of these transformations in the performance of internal identities, architecture shares this point with fashion through the role of architectural transformations and their impact on identity, as well as the adoption by both fashion designers and architects the same technical mechanisms for transformation.

الملخص

يعتبر التحول من السمات المشتركة بين الموضة والعمارة، حيث يرتبط التحول بالاتجاهات الفكرية المعاصرة التي تدعو إلى التغيير والتجديد. اعتمد البحث على دراسة التغيرات في الموضة والهندسة المعمارية، وتم تحديد مشكلة البحث بـ (القصور المعرفي حول أسباب وآليات التحولات في الموضة والعمارة). وعليه، تم تحديد الهدف من البحث من خلال دراسة مؤشرات أسباب التحول في كل من الموضة والعمارة وآليات هذا التحول. حول الاستخدامات العملية والرمزية للملابس أثناء استكشاف دور هذه التحولات في أداء الهويات الداخلية، تشترك الهندسة المعمارية في هذه النقطة مع الموضة من خلال دور التحولات المعمارية وتأثيرها على الهوية، فضلًا عن تبنيها من قبل مصممي الأزياء. والمهندسين المعماريين نفس الآليات التقنية للتحول.

1. Introduction:

The reality of the development of nations and societies depends mainly on their ability to adapt to the changes necessary to develop the quality of their response to external and internal variables in many images and shapes. Fashion shares the same primary mission of architecture, that they both meet the limits and requirements of the human body and share the same aspects of the creative exploration of space, size and movement. Throughout history, fashion and buildings have echoed each other in look and feel, and thinking of architecture as clothing can re-embody and feel a place in architectural Design (Özsavaş Akçay and Alothman, 2018).

Transformation is changing the situation to find a new job or improve an existing one. The transformation in architecture and fashion stems from promoting and empowering creativity. The transformations aim at communication and preservation of the reference to the original, and because the research topic requires knowledge of the types of transformations in fashion and architecture and the study of its causes, mechanisms and extent, The similarity and difference in both, as they mainly depend on the design process in the production process. Therefore, it has been shown through discussion of the topic that there is a participatory relationship between fashion and architecture in transformations, whether in terms of their types or the technologies used for transformation. And transport or by changing its geometry and shape to respond to the evolving functions and aesthetic requirements.

2. The Conceptual Framework:

2.1. The Concept of Transformation in Language:

The transformation in Arabic is derived from the verb (transfer, to turn), meaning moved from one place to another. (And solely) to another place, transformation (Al-Razi, 1950, p. 136). Philosophical lexicon – Arabic defines transformation as a change that affects people or things, and it is two parts a transformation in essence and a transformation in symptoms. The transformation, in essence, is the occurrence of a new fundamental image, following the old fundamental image, such as the transformation of the living after death into a corpse, and the water is changed after the fundamental analysis to oxygen and hydrogen. A transformation in symptoms is a change in quantity (such as an increase in the dimensions of the developing body), in quality (such as heating water), and inaction (such as moving a person from one place to another) (Salbia, 1982, p. 259). In the Al-Mawred dictionary, Al-Baalbaki explained that transform means transform, a transformed linguistic construct, a transformation, a wig, especially a female wig, a transformation (Al-Baalbaki, 1967, p. 1248).

Transformation in the English language (transformation) is an expression of the source (transform), which is a word consisting of two parts (trans-form) which means changing the form, and it means the radical change through review and the events of qualitative transformations (Elias, 1972). The Merriam-webster dictionary defines the concept of (transformation) as an action, a process, or a state of transformation, a process that transforms (by insertion, deletion, or switching) a syntactic string (such as a sentence) to another (Noah Webster, 2002). From the previous definitions, it is clear that the concept of transformation is related to the following aspects: mobility, mutation, change, and distortion.

2.2. The Concept of Transformation in Terminology:

The transformation in psychology refers to the change that leads to the emergence of thought processes of different natures. And in sociology, the change leads to new social conditions (Salbia, 1982, p. 259).

In French-Arabic Dictionary, the concept of transformation comes in the sense of change and change from one state to another, and transformation from something means turning away from it to something else (Idris, 1988, p. 809). It is a complete change in the appearance or characteristics of a thing for the better, as shown in Table (1).

Table (1): Illustrates the concept of transformation language and convention (Source: Authors).

The Concept of Language Transformation		The Concept of Transformation Convention	
Arabic language	It is derived from the verb (transform), meaning moved from one place to another.	**Psychology**	The change that leads to the emergence of intellectual processes of different natures

English language	A word consisting of two parts (trans-form) which means changing shape	Sociology	The change that leads to the emergence of new social conditions
Al-Mawred dictionary	Transform means transform, transform syntax construct, transform,	Philosophical lexicon – Arabic	It comes in the sense of changing and changing from one state to another, and evolving from something means distancing itself from it to something else.
Conclusion	Conclude that the concept of transformation is related to the following aspects: mobility, metamorphosis, change, transformation, and distortion .		

3. Theoretical Framework: The Transformation in Fashion and Architecture.

3.1. The Transformation in Fashion:

Convertible clothing is the de facto collection of contemporary clothing, providing ample possibilities for multifunctional styles. The culture of clothing, identity and transformations because, above all, the physical form of things has always been a starting point for looking at the nature of humanity, its sorrows and joys, the strength and quality of its relationships, the transformation in clothing has become a timeless silhouette, wearable, and can be adapted for wearing in any season, the change makes the clothes A versatile piece, lending itself to a wide variety of fabrics and accessories (Koo et al., 2014, p. 10).

Fashion-driven transformations reveal practical and symbolic uses of clothing while exploring the role of these transformations in the performance of internal identities concerning the relationship between cultural perceptions surrounding clothing and transformations of identities related to gender, class, profession, race and religion. In 2000, Renaissance clothing and memory materials pioneered by Anne Rosalind Jones and Peter Stallybrass (Jones & Stallybrass) sparked the start of a serious debate about the influence of clothing and textiles on one's own personal experience and expressions of status, gender, and religion in the Renaissance (Krumrie, 2020, p. 20).

The transformation in the unfamiliar parts of the fashion structure takes place through the wide-ranging positive change whose internal values appear and are apparent in the physical formulas of the productions of fashion designs، and which enhance the extreme cases of development in design and implementation, one of the parts of the costume structure or any linking relationship to its parts, it is transformed from one state to another developed state while preserving some of the basic shape properties (Ibrahim, 2013, p. 9).

3.1.1. Clothing and Fashion Transformations:

Clothing possessed the power to transform; Ulinka Rublack argues that "nearly all members of society have been involved in changing things in some way - whether through daily work, their interests, or everyday practices." And because the elements, including the clothes, cannot be bought ready-made, the clothes themselves necessitate transformation just because of their appearance; every decision in the construction process, too, reveals how a piece of clothing works within its culture. The clothes themselves have undergone changes and transformations to serve individual purposes best, and some of these changes allowed how clothes function in the performance of an individual's identity. Moreover, some fashion has emerged from transforming materials from one object to another (Krumrie, 2020, p. 21).

3.1.2. Female Clothes Turned into Male:

The widespread practice of women adopting men's fashion has become a controversial topic for discussion; Philip Stubbs has been one of the most outspoken writers against cross-dressing women in England. Among the women who wear memory-coded clothing, the speaker (Stubbes) suggests in his book "The Anatomie of Abuses: "Women there also have Doublets and Ierkins", like a man's clothing in all respects, and although this is a type of clothing, just for a man, and yet they don't wear them: And if they could change their gender, wear the type of man. They'd become men. Stubbes continues to focus not only on the outward appearance of these women but also on their psychological states and attributes to them the desire to transform entirely into men (Stubbes, 2002), as shown in Figure (1).

Figure (1): Illustrates female clothes turned into male, Source: (Stubbes, 2002).

3.2. Fashion and Identity Transformations:

Identity and fashion are intimate due to the nature of personal expression and social expectations. Personal expression is given in the form of freedom to express what we feel is our true identity or who we want to be, and our style is a tool for instantly distinguishing us or integrating with others (Bovone, 2006). Practising physical clothing is an important factor in building one's identity. Dressing takes place on the body, and thus fashion is an important way of performing identity in its many aspects.

Have to take into account the illogical idea that it is possible to change from one person to another through changes in his clothes. These articles appear to be about the concern that there is no such thing as a stable identity, despite protests that other critics have often identified. No one seems to have any inherent identity, and everyone can mutate into another person. The primary concern, Levine suggests, was that identity cannot be completely stable in practice. Instead, individuals are forced to face that rather than the settled sense of self, one's identity is constantly changing. Of course, such ideas of an altered sense of self-raised particular concerns regarding gender dress; If a man wore feminine clothes, for example, he would open the possibility that he would become less of a man. These transformations reveal the inherent fluctuations of the self that allow further consideration of the function of clothing - and thus, fashion - in the creation, transformation and identification of the performer's identities. Whether the change is related to class, gender, religion, or moral conformity, the transformations driven by fashion help reveal how these transformations in identity reflect contemporary concerns surrounding subjectivity, external expression, and cultural norms (Levine, 1994, pp. 9–10). Fashion transformations provide a unique example of identity in using fashion to transform themselves into other identities. To the same end, these transformations may represent a real threat to established social structures in that they reveal how fashion and clothing can work to change one's identity.

3.3. Convertible Clothing:

Convertible clothing is developed to meet the demands of a dynamic lifestyle, determined by the rapid change in functional processes and the intense rhythm of events. The technique of morphological transformation plays an important role in the process of creating the spatial shape of contemporary clothing (Koo and Ma, 2019).

- The products are made of two different types of fabrics with different textures, colours and structures and can be worn from one side or the other according to the occasion.
- Products contain attachable or detachable elements that allow multiple modification variables to be obtained for the same product type.
- The products have a separate structure (integrated structure with minimal welds, a frenzy of flexible materials) that allows for fastening, coiling or connecting elements to obtain various shapes.
- Products with variable shapes (length, degree of stretch, etc.) using different accessories (zippers, buttons, screws, casing, etc.)
- Elements of a multifunctional product (Tutunaru et al., 2013).

3.4. Classification of Methods and Principles of Garment Transformation:

Some constructive technological solutions and composition techniques for the morphological transformation of clothing and its elements have been developed over many centuries. A morphological transformation is a tool used to confer the universal functionality of a product. Leading specialists in transformable clothing have worked on twelve prototypes of morphological transformation that adhere to nine basic principles which are (Tutunaru et al., 2013):

- Replace parts or components of a product with other parts or components.
- Disengagement from parts or elements.
- Modify the fixation size and shapes of product parts. Dilation is the compression of parts or elements.
- Rewinding - disassembling into parts or components disappearance - the appearance of the entire product size.
- Combination - insertion of parts.
- Orientation.
- Re-installing parts or components of the products.

3.5. Conversion Techniques in Garments:

Designing new models of clothes is a complex solution to shaping the image; It is a process that combines the solution of technical and technical tasks, ergonomic, technological and economic. When designing new clothing models, it is important to improve and expand the assortment based on developing and enhancing transformation technologies (Irovan et al., 2004, p. 77).

- **Substitution:**

The "replacement" conversion type depends on replacing some of the constructive elements or units with others while preserving the basic elements, not all of the units used simultaneously. The harmonic analysis theory and the principle of different resistance levels of the parts used are used for this type of transformation. The location and variants of substituted items may vary. Therefore, one of the many variants of this type of conversion may be a piece of cloth with different types of belts or add-ons and is replaced by others of different colours, textures or compositions (Irovan et al., 2004, p. 77), As shown in Figure (2).

- **Detachment-Attachment:**

This type of transformation is based on the separation or connection of constructive or decorative elements of a multifunctional wardrobe. It allows us to improve the aesthetic properties of products and adjust their external appearance, which makes the wardrobe more versatile at minimal cost. In this case, one would use the principles of the theory of construct decomposition, decomposition into details, and subdivision into component elements. Elements of detachable products can be made of various materials. Attaching detachable items to the main product at the base location may vary and use buttons, zippers, etc… (Irovan et al., 2004, p. 78), as shown in Figure (3).

- **Adjustment-Fixation:**

A "modification fixation" transformation is performed by changing a product's or building element's size, shape and other characteristics. The conversion uses special features: zippers, ties and casing. Variants of constructive solutions for waist clothing in this type of transformation are inelastic constructive decorative inserts in the seams of intersecting elements with the possibility of volume adjustment, design of the main component with the ability to adjust the size, and Free adjustable assembly. The customisable free collector site may be different. It may be located at the top of the product over the entire perimeter; Only on the front of the product; Only in the area of the side seams, or at the bottom over the whole perimeter. One can use a tape inserted into superimposed collies to reduce the sound. Alternatively, one can thread a strap or lace through the eyelets (Irovan et al., 2004, p. 79), Figure (4). Conclude that there are three techniques for the morphological transformation of clothes, namely, substitution, attachment, separation and fixation of modification, as shown in Figure (5).

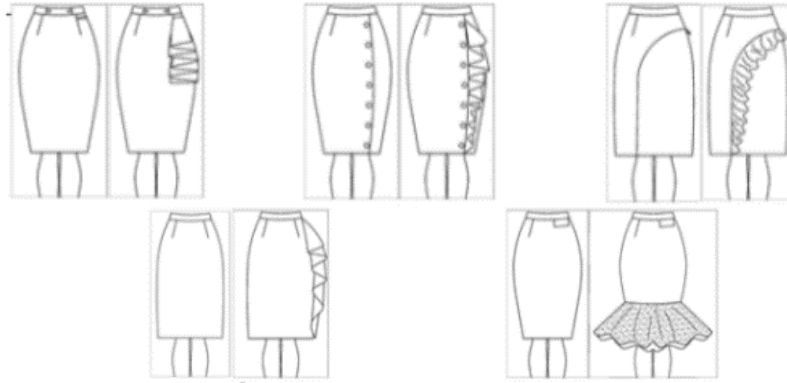**Figure (2): Illustrates the " Substitution " morph transfer technique, Source: (Irovan et al., 2004, p. 77).**

Figure (3): Illustrates the technique of detachment and attachment, Source: (Irovan et al., 2004, p. 78).
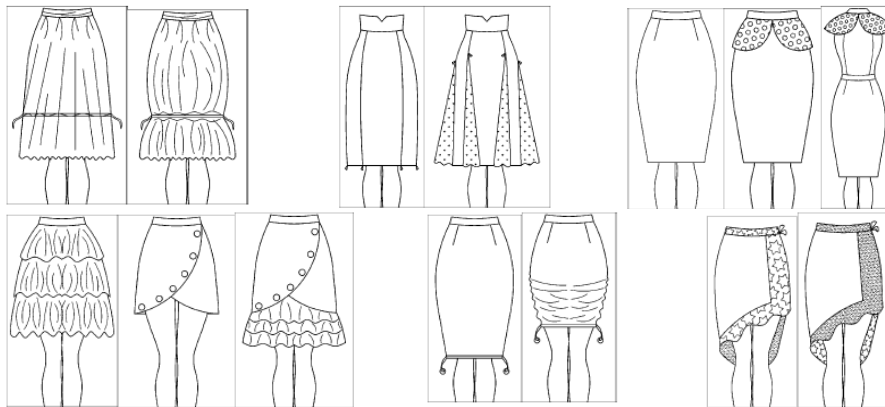
Figure (4): Illustrates the morphological transformation technique "modification fixation" and the "recombination" technique, Source: (Irovan et al., 2004, p. 79).
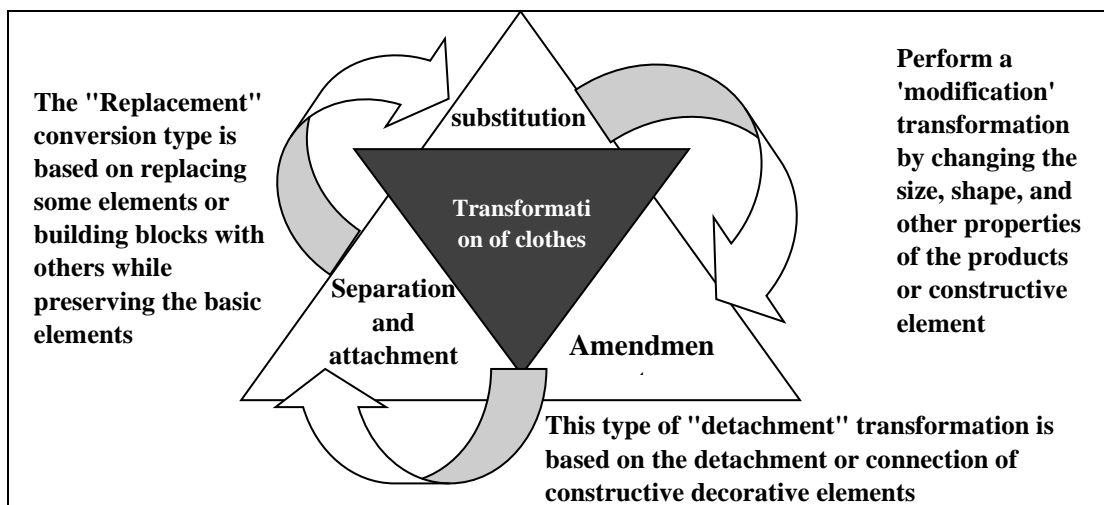
The "Replacement" conversion type is based on replacing some elements or building blocks with others while preserving the basic elements

substitution

Transformation of clothes

Perform a 'modification' transformation by changing the size, shape, and other properties of the products or constructive element

Separation and attachment

Amendmen

This type of "detachment" transformation is based on the detachment or connection of constructive decorative elements

**Figure (5): Illustrates the biological transformation mechanisms of clothing (Source: Authors).**

3.6. The Transformation in Architecture:

The concept of transformation takes up a wide space in architectural propositions, as this concept may be considered a tool that describes the shapes and configurations produced by the reality of form and

the rules of composition or derivation. Lefaivre and Tzonis introduces transformations within the concepts that represent concrete channels of creativity in architecture. The creative act in transformations comes theoretically in the role of fluctuating reality and its continuation when trying to create or introduce new meanings where the act of transformation has the task of preserving the origin of the structure (Lefaivre and Tzonis, 1986).

Eisenman defined it as a set of processes taking place at the deeper levels of architecture to transform it into surface levels, and whose reading and interpretation represent the beginning of a series of continuous and continuous readings that take depth gradually to clarify the transformation processes that generated them (Arnold, 2002, p. 209).

Architecture is a direct reflection of social, political and economic factors, and to constantly change these factors - whatever the degree of this change - the transformation in architecture reflects these multi-level transformations and shapes. If the transformation is taken in this sense within the vast geographical spread of Islamic architecture with its multitude of colours and contradictions, then the transformation becomes more than just a historical indication of this architecture; It becomes an essential factor in its formation, as shown in figure (6).
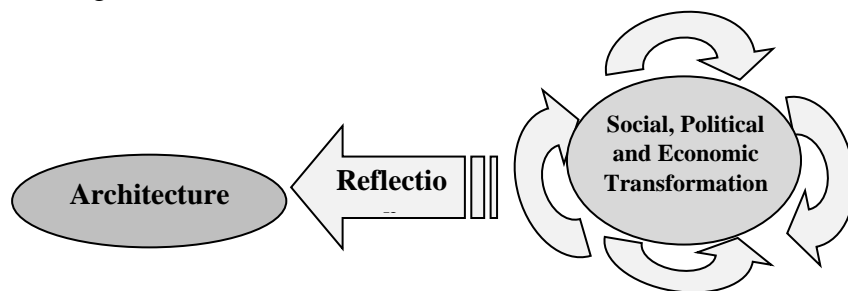
Figure (6): Shows the reasons for the transformation in architecture (Source: Authors).

Humans have used convertible devices, objects, and architecture for various purposes since ancient times, as one of the basic needs of architecture in a changing world is to respond to the changing requirements of its users and allow them to experience their architectural ambition in reality by participating in the architectural design process, for the aspirations of the building user (Asefi, 2012). Convertible architecture is a suitable strategy for buildings and structures that need to be reconfigured, either by folding them into a compact form for ease of installation and transportation or by changing their geometry and shape, to respond to functional change and aesthetic requirements.

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There is also a general trend towards designing buildings that interact with the environment to save energy and reduce operating costs. Convertible architecture can create an innovative and dynamic space where users have more opportunities to take advantage of the changes in their surrounding environment effectively. The idea of transformation can redefine the identity of the existing architecture in a way that makes it more efficient in adapting to the requirements of the new user, meaning that a new identity can be achieved through transformation. Extensibility, multiple functions, portability, flexibility, environmental control and remote control in architecture are the opportunities that convertible architecture can offer its users. The degree of success of this type of building depends greatly on the ability of the structure to deal with dynamic loading conditions and the transformation into a stable configuration that meets architectural and construction requirements (Asefi, 2012). , The metamorphic principle allows the architect or designer to choose a typical architectural model whose formal structure and arrangement of elements may be appropriate and reasonable and transformed through discrete manipulations to respond to the specific circumstances and design context.

The repetition of the form shows the transformation of shapes in architecture, if it looks a little different each time. Sometimes shapes are transformed by enlarging or reducing them, and they may rotate, stretch, or transform into another shape transformation (Preiser et al., 2018). Transformation refers to an object or structure that transforms itself on its own, an object that has an innate characteristic of

controlled change; a transform object may be collapsible, retractable, or form variable; these capabilities lead to functional benefits: portability, immediate unlocking, and intelligent response within the built environment (Klassen and Kronenburg, 2006, p. 70). Conclude that transformation is the chain of change from one state to a different state, which occurs to things and shapes as a result of the act of removal, addition, or changes in the relationships between the elements and is a transformation in size, shape, pattern, function, structure and other intentional and unintentional transformations.

4. Criticising Previous Studies and Extracting the Research Problem:
This axis reviews a set of architectural proposals that dealt with the concept of transformation to extract the research problem.

4.1. Lefaivre and Tzonis (1986): Poetics of Architecture.
The study dealt with transformation strategies in architecture and its analogy with other sciences, and the study clarified three types of transformation strategies (traditional, metaphor, and deconstruction). Indicating the existence of two types of transformations (qualitative and quantitative), the study showed ways to enhance communication in the context, clarifying the basic idea at the whole and part level and focusing on the importance of materials and the use of what is in the area. Conclude from the previous study that transformations are a formula for generating architectural output and that there are two types of quantitative and qualitative transformations on the whole and part levels (Lefaivre and Tzonis, 1986).

4.2. Abel (1982): Architecture as Identity, I: The Essence of Architecture.
The study dealt with the concept of formal transformations in architecture. It included a set of concepts within the problem of communication and discontinuity and the transformation in shapes is from the aspect of adaptation within the merging of more than one form that has a relationship between them, which results in this relationship being a form that is not related to the two shapes Consequently, the result is complex. The study clarified that the complex architectural language includes the defining characteristics of the urban form, which include internal stability, differentiation in patterns of expression or practice, and having the foundations for development. And that transformations are imperative to the adaptation shown by the system due to several climatic, cultural or social factors. And that an architectural language can be generated through transformations containing certain civilised forms' essential characteristics and features. Conclude from the previous study that transformations are described as a strategy to extract certain elements in architecture to reach adaptation within the problem of communication and discontinuity (Abel, 1982).

4.3. Moloney (2011): State Change Designing Kinetics for Architectural Facades.
This study deals with engineering transformations that are a movement associated with time, as the geometric transformation represents a means in the design process to link movement and time in architecture. The study showed engineering transformations as one of the methods of design, technologies or moving methods, or transformations through the event. The study relied on engineering transformations in the design of static and mobile architecture. The design methods focused on the output to know movement. It includes the mechanisms of reaching production through three geometric transformations (displacement, rotation, physical distortion in scale and motion). The previous study concluded that time is the basic element for the production of colleges, and the mechanisms of displacement, rotation, scale and deformation resulting from the movement were classified. That time is one of the design methods using transformations (Moloney, 2011).

Based on what was proposed by previous architectural studies on transformations, the research problem was defined as (the lack of a clear vision about the causes and effects of the transformations in fashion and architecture and whether the transformations between them are similar or different).

4.4. Transformation Theory:
When we press something, it may respond by bending, breaking, squashing, or resisting idle; however, many other responses are also possible. Specific behaviours can be designed in an object, and behaviours such as stretching, contracting, controlled folding, and changing shape. That is, it is an approach inspired by nature, not from a visual point of view but rather from a functional perspective.

There are many practical reasons for transforming things, for example, portability and compression, and for making versatile products possible. Some examples are camping tents, balloons, and parasols. Each of these products has its way of altering the composition, whether through grouping, inflation or disclosure. While the designs shown are functional and even elegant, their transformative ability is a kind of "addition" to their basic Design (Klassen and Kronenburg, 2006, p. 70), as shown in Figure (7).

Figure (7): Shows expanding the geodesic dome, Source: (Klassen and Kronenburg, 2006, p. 70).

4.5. Characteristics of The Transformation Process:

After years of exploration and experimentation, it was found that qualities are critical design criteria, leading to specific functional benefits of products such as ease of use, responsiveness and adaptability. These standards lead to an integrated design approach that provides the ability to build transformational structures at scale (Klassen and Kronenburg, 2006, p. 70). The transformed thing has certain unique properties. These traits do not relate to their appearance or even their physical characteristics, but rather their behaviour: Full and fully three-dimensional −Smooth and continuous − Reversible and repeatable.

4.6. Transformation Strategy:

Antoniades proposed three strategies for transformations (The traditional strategy) represented by a process of sequential development according to internal and external requirements. Parts and reassembly in new ways to gain access to new capabilities and systems based on different configuration and installation strategies (Lefaivre and Tzonis, 1986).

4.7. Principles of Transformation in Design:

That a designed object can transform in the way a natural object transforms, the design of such transformed objects is based on several basic principles, namely (Klassen and Kronenburg, 2006, p. 70):
- It consists of many parts that work as an integrated unit.
- Dual nature - semi-structural and semi-automatic.
- It consists of bonds that have unique properties (kinematic blocks).
- Has a behaviour based on its basic geometry.

4.8. Mechanisms of Transformation in The Architectural Product:

The transformation mechanism renders the original with several transformations and actions stemming according to the transformation mechanisms to produce a new shape that is different from the previous form, carrying the characteristics and features of the original. Therefore, the transformation mechanism includes the following types (Gheshlaghi and Bemanian, 2022):
- On the elemental level: rotation around the original, moving or deviation from the original, reflection of the original, addition of the original, duplication of the original, composition, merging and melting, and splitting the original.
- At the level of relationships: cross-fertilisation, crossbreeding, mixing, metaphor, accumulation

4.9. Transformation of Form:

The partial transformations that occur to the shape lead to the displacement of the shape from its first reference, from which it was transformed as a result of the accumulation of transformations over time (Ching, 2014).

- Dimensional Transformation: Modify one or more dimensions - Preserve the identity of the asset.
- Subtractive Forms: - Subtracting part of its size - Maintaining the initial identity or transferring it to another family (depends on the extent of the subtraction).
- Additive Forms: - Adding elements to their size - the identity of the prototypes is preserved or changed (depending on the nature of the addition process).
- Movement Transformation: This type of transformation includes the movement of the elementary elements to generate the basic shapes, as this type of transformation changes the visual properties that the first element alone possesses towards another shape that has other characteristics.

5. Presenting Previous Studies and Extracting Vocabulary from The Theoretical Framework:

This theme includes a set of studies that dealt with the concept of transformation in both fashion and architecture.

5.1. Irovan et al. (2004): Using the Principles of Transformation in The Development of New Design Clothes Making for Women.

The study deals with the use of transformation principles in developing new design clothes for women by analysing the possibilities of developing modern collections of clothes using morphological transformation techniques. Convertible products include a group of clothes designed with various techniques and methods, traditional and unconventional. Morphological transformation techniques are based on the principles of reconstitution and transformation, making it easy to transform one product form into another and transform the elements in the inner part of the same shape.

The study identified several development trends for convertible products in the actual wardrobe represented by "products made of two different textures, colour and face structure; products with separable elements; products with a separate structure that allows various shapes to be obtained according to location, packaging or delivery.

Experimental studies aimed to develop various collections of women's clothing by applying morphological transformation procedures with the development and manufacture of models of convertible skirts for women. Convertible models demonstrate the universality of products, their functional capabilities, and their ability to change their external appearance and aesthetic properties. When designing women's skirts, all types of transformation can be used, and several types of transformation can be used in one product simultaneously (Irovan et al., 2004, p. 75). the previous study showed that the use of transformation techniques and methods in designing women's clothing is an exercise in solving a series of actual problems, such as expanding the product range. And increase the number of products without significant additional costs; Extend product utilisation periods; Raise the universality, functionality and aesthetic properties of garments. One can use all major types of transformation, and several types of transformation can be used in a single product allowing one to achieve a whole series of goals.

5.2. Koo et al. (2014): Design Functions in Transformable Garments for Sustainability.

The study examined understanding the types of changing jobs consumers want in convertible clothing, and the study aims to produce results that will help fashion designers develop clothes that will naturally lead consumers to adopt sustainable behaviours by transforming their clothes. However, the Design of Convertible clothing allows changing the fashion flow model to be more sustainable. However, there is a lack of understanding of the values that consumers have regarding the diversity in their clothing and the design functions needed for the garment to be successfully convertible or dynamic. as shown in Figure (8).

This study aimed to determine the variable design functions that people want to have in convertible garments. It will be important to understand consumers' functional, social, and convertible clothing expectations. This study broadens designers 'understanding of mutable design by analysing the aesthetic

features of garments that can be effectively altered by understanding consumers' wardrobe contents and their expectations of convertible garments.

It explained that the functions (fit, mobility, comfort, protection, wear, and take off), expressive (value, roles, status, and self-esteem), and aesthetic (elements of art, design principles, and body-relationship clothes) represent criteria to guide the development of clothing that meets the needs of the consumer, as shown in figure (9).

The study showed that participants had three expectations for convertible garments: functional (ease of matching, ease of styling, comfort, ease of use, ease of care, and durability), pleasure (pleasure and the ability to try different styles), and social (contextual relevance and modesty). Four types of convertible clothing are classified:

- The first type is reversible and foldable / linked designs. Some of these interior surfaces can also be exterior surfaces, such as sarees and Hawaiian newspapers. Folded / Restrained designs can be changed by folding or attaching clothing parts.
- The second type is modular designs, which feature small components that can be wearable independently, separated or replaced with other components, thus creating an infinite number of fittings. Examples of modular designs include John Takahashi's 2003 paper puppet set.
- The third type is smart clothing which integrates smart technologies or materials into clothes so that colours, patterns, silhouettes, sizes, fit, or design details can be changed. Smart clothes that change colours or patterns can use light-emitting diodes, electro-flashing, or optical fibres. Fabrics, organic light-emitting diodes, pigments, projector beams, or other display technologies. Silhouette, size, fit and design details can be transformed using motors, mechanical controls, shape memory alloys, or inflatable materials.
- The fourth type of transformable clothing is "do it yourself" and multi-life designs that can help consumers form stronger emotional attachments to their clothing and naturally engage values around sustainability. Conclude from the previous study showed that convertible clothing is one of the ways to encourage sustainability in the consumption of clothes by expanding the life cycle of clothes and satisfying consumers with fewer and more varied elements. The study showed four types of convertible clothes (reversible, modular, smart, and individual designs) and standards for transforming clothes represented (functional, aesthetic, and expressive).
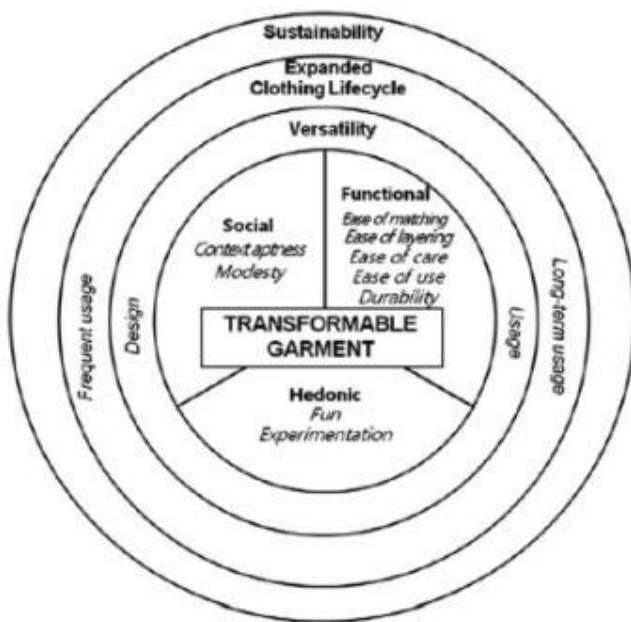

Figure (8): Showing desire of the convertible clothing, Source: (Koo et al., 2014).
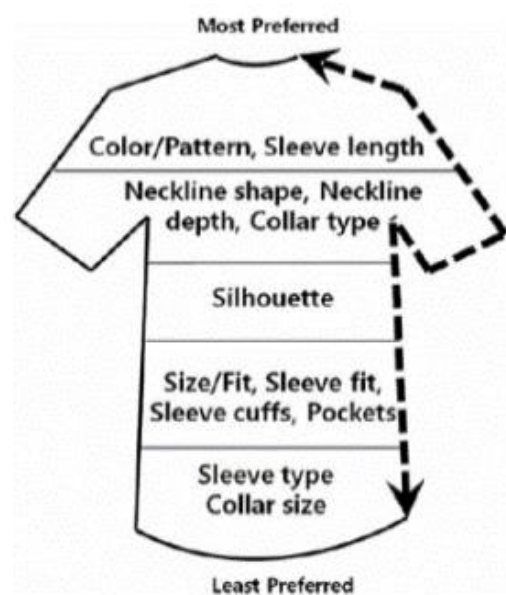

Figure (9): Shows the preferences in the changeable design functions of the Convertible Apparel, Source: (Koo et al., 2014).

5.3. Andjelkovic (2016): Transformation Principles in The Architectural Design of a Contemporary House.

The study dealt with the concept of transformation in residential architecture. It explained that the idea of transformation is related to the traditional concept of residential architecture and does not adapt to the conditions and needs of the contemporary resident. That is applied in the architectural design of contemporary residential buildings in the conceptual stage of the project. The study also aimed to note the basic transformation elements used in achieving the concept of transformation. It stated that visual and physical transformations depend on each other and cannot be separated. However, the physical transformation of something, which is related to the spatial-mechanical movement of the basic structural elements, is dominant. (Durmus Ozturk and Durmus, 2017)

5.4. Durmus Ozturk and Durmus (2017): Change and Transformation in Architecture: On the Concept of Zeitgeist.

The study defined the concept of metamorphosis as being conceptually related to change, which means "entering into a form different from its own, occupying another position, and changing form". The study dealt with the relationship between change and transformation in architecture as a tool of identity and meta-language, considering that the architect needs a tool for representation and that the architectural product proves itself through its representation, and the language spoken by the architectural product seeks to be mentioned in each case, whether it is local or global. In his study of the zeitgeist and architecture, he addressed what Roland Barthes (1964) referred to in his article on the Eiffel Tower, how the tower acquires different dimensions and how it is interpreted as an object-object. Barthes expects efforts of semantics and interpretation from his readers. It attempts to draw particular attention to how the meaning changes acquired as the identity of the person experiencing and the means of semantic change. And it dealt with architecture between tradition and the future, as the existing traditions with culture and enriched by architecture can also be a tool for expressing the future. Does the idea of a future without tradition or a tradition without a future make more sense? Neither of them might make sense. However, it would not be wrong to suggest that the role of the architect in anticipating the future has changed and that the architect has taken on an interpretive identity. as shown in Table (2).

Table (2): Show vocabulary of the theoretical framework (Source: Authors)

Main Vocabulary	Secondary Vocabulary	Possible Values
Reasons For Transformation	**The Nature of Influences**	Political
		Social
		Economic
		Other effects
	Effect Scale	Expected
		Unexpected
	Functional Reasons	Portability and compression
		Smart response in the built environment
		Multiple uses
Transformation Mechanisms	**At The Element Level**	Rotation around the origin
		Moving or deviating from the original
		Original reflection
		Add the original
		Repeat the original
		Assembly, merging and fusing.
		Original hash
		Cross-fertilisation
		Hybridisation
		Blending
		Metaphor
		Replacing

	At The Level of Relationships	Stretching
		Disengage
		Separation and attachment
		Edit
		Accumulation
Transformation Effects	Exploring inner identities	
	Show internal values	
	Transferring materials from one object to another	
	Achieving a series of functional and aesthetic goals	
	Adopting sustainable behaviours	
	Ability to try different styles	
	Variety (create an infinite number of combinations).	
	Form stronger emotional bonds.	

From the above, some of the vocabularies that the researcher will focus on in the measurement process will be identified as follows: First, transformation criteria with its three functional, aesthetic and expressive aspects, and secondly, the principles of transformation.

6. Practical Framework (Application):

Because the aim of the research was determined by studying the indicators of the causes of transformation in both fashion and architecture and the mechanisms of this transformation, contemporary architecture was adopted as being the most influential in the rapid and continuous transformations as a result of rapid development

In this paragraph, a set of samples will be selected, which were selected according to certain criteria represented by (the projects' affiliation with different societal environments to come up with a wider range of patterns adopted in the research, projects in which mechanisms of transformation were introduced in their design, diversity and multiplicity of functional styles in the selected projects) .

6.1. Definition Of Samples:

- **Kuwait Pavilion in Seville (A):**

The retractable roof designed by Calatrava reveals the potential of convertible structures to reflect the historical, cultural and territorial identity of nations. Seventeen sword-shaped convertible ribs covered an elevated surface of 525 square meters like palm tree branches. Each foldable element is 25 meters high and controlled by a separate electric motor to be converted into fifteen fixed positions. When the roof is in a fully open state, it symbolises the sail of the ship that shows the lives of Kuwaitis as merchants and explorers of the sea before the discovery of oil. The roof in the middle of the open road resembles a Bedouin tent that was used as a home to protect the Kuwaiti people from the storms of the desert. The roof arms are intertwined with other arms in a fully closed state to form a cover for the wing building, providing shade during the summer. The convertible arms in this suite have not only been implemented as functional architectural components that can provide shade during the hot summer days in Seville, but they can also be transformed separately so that the various stable spatial configurations can be achieved to represent the special cultural identity of the Kuwaiti people (Tarazona Vento, 2015), as shown in Figure (10).

Figure (10): Shows a retractable roof for the Kuwait Pavilion, Source: (Asefi, 2012).

- **The Tehran House That Turns with The Seasons (B):**

The building is a residential estate of seven floors, three floors of which have facades - depending on the season, either a closed wooden wall or partially open and leaning towards the street. Transformation is achieved at the touch of a button. The wooden chamber swivels at a ninety-degree angle, bringing either side to the street. On the first floor, the capsule houses a breakfast room; on the second, a guest room and above that, there is a home office. When the pods are closed during the cold winter months, the house still receives daylight from the big windows in a separate block behind, which is connected to the front block via bridges (Archdaily, 2014), as shown in Figure (11).

Figure (11): Shows the transformation in The Tehran house that turns with the seasons, Source: (Archdaily, 2014).

- **Benetton Group Headquarters in Tehran, Iran / AquiliAlberg (C):**

The project is a mixed-use development comprising apartments located on the upper floors, offices in the middle, and commercial areas on the ground level. The idea of the project is the integration and transformation of three identical volumes that rotate and expand to create a single entity, making this dynamic pattern of a morphological evolution over time, revealing its rotation as a design result of the interaction with the urban fabric, spatial experience and program (Evolo Admin, 2019), as shown in Figure (12).
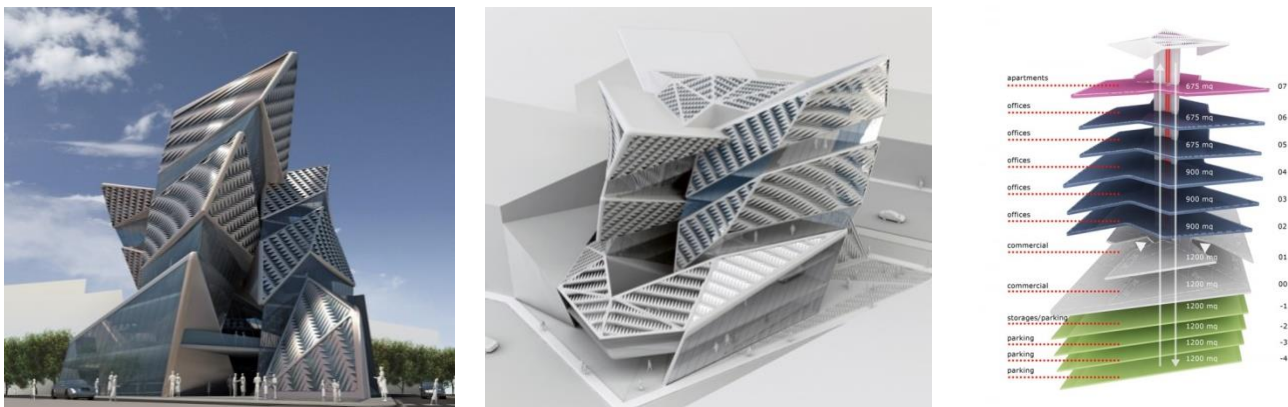

Figure (12): Shows the transformation of the Benetton Group Headquarters, Source: (Evolo,2010).

- **Transformable Fashion: The Biggest Sustainable Clothing Trend That Never Was (D):**

     Modular fashion refers to clothing items that have detachable pieces so that one can easily alter the clothing item to suit changing needs and tastes over time. Convertible fashion includes many strategies that fall under this term, with some designers incorporating zippers, hooks, eyes, and laces to allow users to add or remove sides of a garment or change its silhouette, as in the Husein Jalayan Fall (2013 collection), (Blanks, 2013). As shown in Figure (13).

Figure (13): Shows A sample of garments that can be assembled using Rahman and Gong's modular fashion prototype, Source: (Rahman and Gong, 2016).

- **The Aeroplane Dress by Hussein Chalayan (E):**

     The collection demonstrated Chalayan's interest in technology and the potential for innovation in fashion. The outfits were fitted with remote control panels that opened to reveal layers of organza. It was created in his spring/summer 2000 collection and was made of fibreglass, cotton, and tulle. The flaps open by remote control to reveal fluffy pink tulle. His "Remote Control" dress which incorporated the aerodynamics of aeroplane travel into its form, was the first wireless device to be presented as a fully functioning fashion garment (Parkes, 2022), As shown in Figure (14).

Figure (14): Shows Hussein Chalayan Spring Summer 2000, Source: (Sykes, 1999).

6.2. Samples analysis: As shown in Table (3).

Table (3): Show applying the vocabulary of the theoretical framework to the selected samples, (Source: Authors).

Main Vocabulary	Secondary Vocabulary	Possible Values	A	B	C	D	E
Reasons For Transformation	The Nature of Influences	Political	O	O	O	O	O
		Social	●	●	O	O	O
		Economic	●	●	O	●	O
		Other Effects	●	●	●	●	●
	Effect Scale	Expected	●	O	O	●	O
		Unexpected	O	●	●	●	●

			1	2	3	4	5
	Functional Reasons	Portability And Compressions	●	O	O	●	O
		Smart Response in The Built Environment	●	●	O	●	●
		Multiple Use	●	O	●	●	●
Transformation Mechanisms	At The Element Level	Rotation Around the Origin	●	●	●	●	●
		Moving Or Deviating from The Original	O	●	●	●	●
		Original Reflection	●	O	O	●	●
		Add The Original	●	●	O	●	●
		Repeat The Original	●	●	●	●	O
		Assembly, Merging and Fusing	●	●	●	●	●
		Original Hash	●	●	O	●	●
	At The Level of Relationships	Cross-Fertilisation	●	O	O	●	●
		Hybridization	O	O	O	●	O
		Blending	●	●	O	●	O
		Metaphor	●	O	O	O	O
		Replacing	●	O	O	●	●
		Stretching	●	●	●	O	●
		Disengage	O	O	O	●	●
		Separation And Attachment	O	O	O	●	●
		Edit	●	●	●	●	●
		Accumulation	O	O	O	O	●
Transformation Effects		Exploring Inner Identities	●	O	●	●	O
		Show Internal Values	●	O	●	●	O
		Transferring Materials from One Object to Another	●	O	O	●	●
		Achieving A Series of Functional and Aesthetic Goals	●	●	●	●	●
		Adopting Sustainable Behaviors	O	●	O	●	O
		Ability To Try Different Styles	O	●	●	●	●
		Variety (Create an Infinite Number of Combinations)	●	●	●	●	●
		Form Stronger Emotional Bonds	●	O	●	●	●

7. Conclusions and Recommendations:

7.1. Conclusions of the Theoretical Side:
- Fashion-driven transformations reveal practical and symbolic uses of clothing while also exploring the role of these transformations in the performance of internal identities. Architecture shares this point with fashion through the role of architectural transformations and their impact on identity.
- Fashion and architecture adapt according to a set of transformations that they respond to for functional and aesthetic purposes.
- The principles of transformation in fashion, represented by (replacement, disassembly, wrapping, recombination ... etc.) are the same in architecture, with some differences in the technical aspect of transformation.
- The principles of transformation (replacement, disassembly, reconfiguration ...) are often adopted to achieve the functional and aesthetic standards of the building.

7.2. Conclusions of the application side:

- The practical results showed that the reasons for the transformation in fashion and architecture are causes resulting from a group of influences (the most influential influences are economic and functional), as shown in Figure (15).
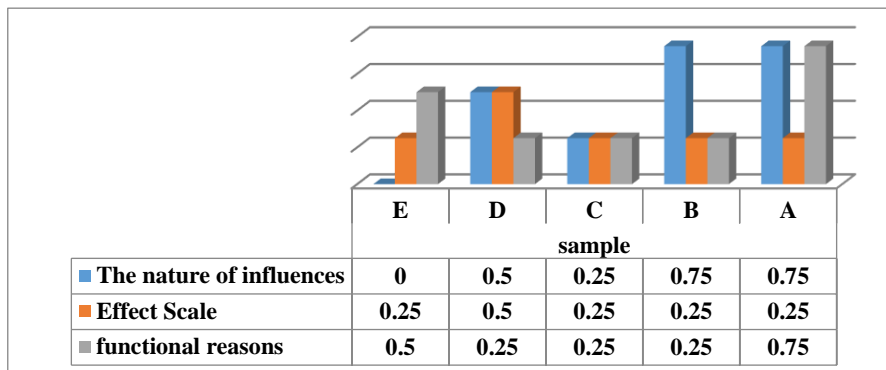

	E	D	C	B	A
			sample		
■ The nature of influences	0	0.5	0.25	0.75	0.75
■ Effect Scale	0.25	0.5	0.25	0.25	0.25
■ functional reasons	0.5	0.25	0.25	0.25	0.75

Figure (15): Show the reasons for the transformations in fashion and architecture in the selected samples (Source: Authors).

- The practical results showed that fashion and architecture share the mechanisms of transformation despite the different technical methods for their application, as shown in Figure (16).
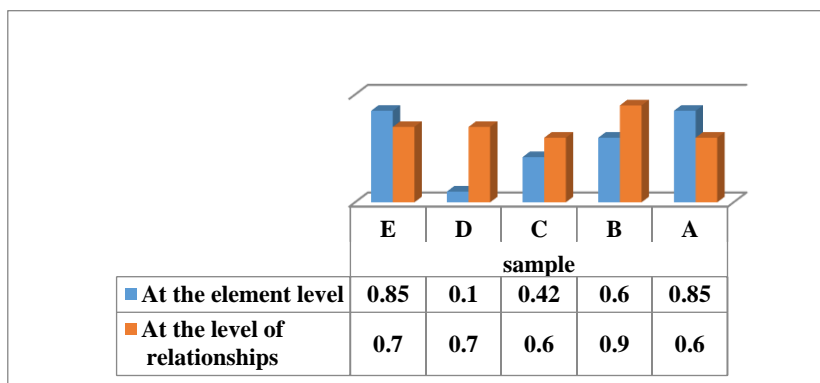

	E	D	C	B	A
			sample		
■ At the element level	0.85	0.1	0.42	0.6	0.85
■ At the level of relationships	0.7	0.7	0.6	0.9	0.6

Figure (16): Show transformation mechanisms in fashion and architecture (Source: Authors).

- The practical results showed that the diversity of creating an infinite number of combinations was the most widely used among the vocabulary of the transformation effects in fashion and architecture, as shown in Figure (17).
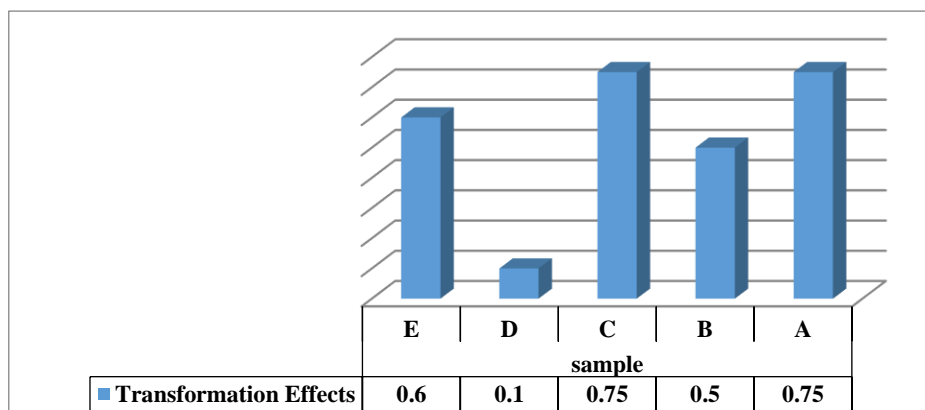

	E	D	C	B	A
			sample		
■ Transformation Effects	0.6	0.1	0.75	0.5	0.75

Figure (17): shows Transformational influences on fashion and architecture (Source: Authors).

7.3. Recommendations:

- The study recommends openness to the field of fashion because it provides rich knowledge and vocabulary that can be invested in architecture, especially concerning mechanisms and techniques in dealing with shapes and materials.
- The research recommends studying the possibility of the influence of fashion design principles on architecture.
- The study of hybrid fashion architecture is a more expressive architectural approach because it considers identities and culture.

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