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Study of Human Dimensions and Ergonomics

(Case Study: Transforming Interior Fashion to Portable Architecture)

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ABSTRACT
The phenomenon of the connectedness of interior fashion and portable architecture requires practical studies to determine modules, dimensions, sizes that can unite fashion, interiors and architecture. A unifying effort concentrates on transforming different scientific fields to produce spatial hybrids. The separation of scientific field categories is often an issue, so fragmentation becomes a problem in unification. This research aims to unify the range of dimensions, structures and materials through a module system so that it becomes the basis of calculation in the transformation from interior fashion to portable architecture. The benefits are that a dimension module can be generated to be able to represent at least two scales: body and space. The research method is an experimental design using the Cartesian quadrant on Autodesk to find modules. The human and ergonomic dimensions are becoming standard looking for modules, while architectural theory underpins hybridization of design. Research steps; 1) putting the human body as a base; 2) crossing dimensions with a product, fashion, interior and architectural modules; 3) establishing cross modules; 4) hybridization variation opportunities. The novelty of the research is a module that can unite interior fashion into a portable architecture so that a total hybrid can be produced.
Keywords: *architecture, hybrids, modules, portable, human dimensions and ergonomics*

1. INTRODUCTION

The connection between fashion and architecture is challenging for laypeople to understand, according to the general perspective, the two fields appear to be separate and not integrated. However, through in-depth investigation, the two are very closely connected, even growing together [1]. It is evidenced by the theory of interior fashion and interior architecture that bridges the two the phenomenon of fashion architecture trends has indeed begun to lift an integration and a hybrid between the two fields. The body becomes a parameter forming space and volume, while the material is one of the dimensions that often gives perception on the surface [2]. However, this is not impossible that the material associated with the two fields can be exchanged. This perception needs to be questioned by presenting new ideas [3] that can unite the two fields. Still, they will lead to hybridization of interior fashion to portable architecture.

In the phenomenon of architectural fashion, we often find interpretations banal. Fashion designers often claim that their designs are inspired by great or iconic forms, both inspired by one or several buildings. Much research concentrates on physical patterns and focuses investigations on the connection to the similarity of material, structure, fabrication and imitation to architectural fashion design, while function and flexibility are ignored. This study actually questions the investigation of a surface nature, learning to take the potential of architectural fashion as a shaper and divider [4] because of the potential for flexibility its elasticity and complexity in offering liquid programs [3]. The ability of the body that can move provides inspiration to give birth to architectural fashion as a portable architecture that is complementary to today's life.

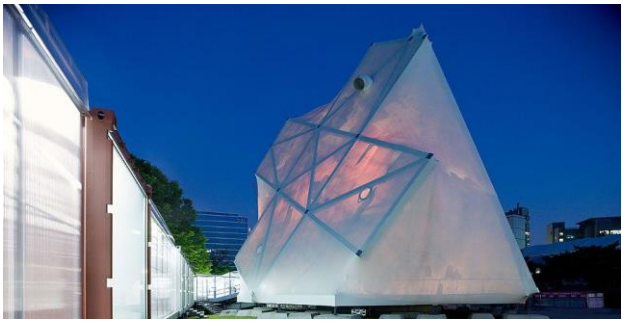

Figure 1 Prada Transformer
Source:
https://i.pinimg.com/originals/63/da/c7/63dac7dadde991a6e2b36070325d1839.jpg

Figure 2 OMA Transformative Space
Source: https://www.archdaily.com/500362/5-years-later-a-look-back-on-oma-s-prada-transformer

Urbanization does not only encourage the perpetrators to survive but to live a lifestyle. Clothing and architecture are not merely coatings and protectors but also spatial intellectual works [5]. If in traditional thinking, the connection between clothes and space is not felt to be significant [6]. The global trend has raised a concept and theory of hybrid fashion architecture as a unity of art, science, construction, structure in shaping the space and volume to be questioned [7]. Through new understanding, clothes and space are not only needed to protect the body from the weather, but also become an identity, and increase the productivity of the lives of its users.

The development of digital technology and the ability to produce machines have pushed conventional boundaries to integrate the isolation and fragmentation of scientific fields [8]. Buildings are becoming more flexible, while clothing is becoming more structural. At the same time, fashion designers insert structures, working at a tectonic level in constructing new fabrications on clothing [9]. at the same time, clothes are becoming more structural. To achieve contrasting new capabilities, architects fold, hang, open, wrap and weave the spatial they create. At the same time, fashion designers insert structures, working at a tectonic level in constructing new fabrications on clothing [9].

In contrast, clothes are becoming more structural. It achieves for different new capabilities. At the same time, fashion designers insert structures, working at a tectonic level in constructing new fabrications on clothing [9].

Figure 3 Private Air Bubble Architecture
Source: https://architecturenow.co.nz/articles/private-air-bubble-architectures-ominous-return-1/

This research uses Autodesk to map size so that it can support a precision transformation of clothing into more complex spaces. The goal is that the resulting module can produce a more compact architecture, easy to carry, interactive, dynamic and easy to move [6]; so that it can compensate for the industry's demands for flexible space from fashion, interiors to architecture [5]. This research offers a novelty in the form of creative modules that have the opportunity to give birth to integrated programs, systems and structures that can provide aesthetic, economic and spatial additional functions as today's lifestyle.

2. MATERIAL AND METHODS

Research describes explanations, interpretations and predictions of the simulation so that it can present the direction of understanding that will be supported by theory. The researcher directly measured the development of objects as the main basis as an effort to interpret the concepts and standards of comfort in fashion, interior and portable architecture. Development is carried out by considering the smallest unit sample to a larger scale. Data from the simulation results are matched with the results of interpretation. To perfect the data and information, it is then developed into precision measurement layers. The formulation of the interpretation and direction of the design will then be tested for compatibility with theories, so that it can be used as an applied design application in the form of a prototype to produce a design that suits the needs of space development. A design directive is formulated to be ready to implement hybridization of fashion, interior and portable architecture.

The steps in searching for this method are; 1) Laying body size as a base; 2) Crossing product modules, fashion, interior and architecture; 3) Setting cross modules; 4) Variation of hybridization. Autodesk is used to unite modules: products, fashion, interior and architecture. With the digital depiction of the three layers of different product modules, it can be superimposed or overlapped so that all three product dimensions can be united in a module direction. With Autodesk, both photos, manual images, and templates can be

converted into vertices that are useful for producing digital images. Thus, folds and connections can occur and provide opportunities for the creation of space that can be folded, bent and carried.

3. LITERATURE REVIEW

3.1 Fashion Architecture

Fashion architecture has offered a new hybrid in both the fields of architecture and fashion. Fashion architecture allows dual perception when we see an object either in an area or in several scientific fields. Fashion as a physical composition does add value to the appearance as the meaning of the word *façon, fachon, fazon* which emphasizes face, style, ethics and character [10]. Therefore to fashion means giving shape, style, character, pieces of a system that can be used, while architecture can be interpreted as the act of building with art and science with structure and construction [11, 12].

3.2 Interior Architecture

Understanding of interior architecture no longer presents the interior as merely decoration and finishing in architecture. Further, it gives meaning to the interior space that is integrated with architecture as its scope. Interior architecture should have a style according to its architecture, or even architecture itself. Therefore, interior architecture has the potential to stand alone as a design object if it can position the body as a reference, build a hybrid, and give birth to the idea of nomadic architecture again. Architectural interiors as protectors or scopes can meet the basic needs of any specific user, either as a protection or shelter. Through the ranges that make up deep space, spatial produces activity, provides ideas and inspiration while presenting the personal space, expression and personality of the user [13].

3.3 Portable Architecture

Portable architecture is one type of construction that allows humans to rebuild their homes to new locations; because, during nomadic life periods, displacement means finding better living conditions at certain times or seasons [14]. Portable architecture is an architecture with a construction connection system that can be reassembled. Examples of portable architecture are tents, shelter, huts, caravans and other spatial structures that can be moved and moved [15]. From mobile architecture, portable architecture has evolved to be compact, able to transform, be worn [16] and can even monitor conditions [17] and reduce the carbon footprint because it is temporary.

3.4 Body Dimensions

Scientific exchanges in practical cases have given birth to many successes, for example, Balmain (1914-1982) and Gianfranco Ferre (1944-2007) who incidentally have enjoyed architectural education [18], many people in the fashion world use structural approaches related to the body as a parameter. In this study, the body was reappointed, using science as a benchmark in developing interiors and architecture, to not only bridge fashion but also more complex spaces. Fashion, in this case, is believed to be architecture in other forms, while architecture can also be fashionable [5]. Like Coco Chanel who once mentioned differences in fashion and architecture in different proportions and scale.

Process hybrids from products, fashion, interiors to architecture; a view of fashion that is temporary, soft and liquid that will be crossed with the ability of architecture to produce permanent works that are monumental and iconic [19]. A temporary interpretation is repeated, through a compromise of architectural space through differences in size, scale and material [20].

3.5 Ergonomics

Ergonomics in this study is used as a science to bridge the systems, processes and dynamics of interior fashion hybrids to portable architecture [2]. Therefore, ergonomics will become a standard in the search for mathematical modules that are simulated using Autodesk to study human interactions in spatial elements. By raising ergonomics, the hybridization process can be predicted precisely. Possible types of relationships can be put together so that it is more compact, light and solid. Ergonomics needs to be able to meet the needs of the body, accommodate the formation of furniture, forming spatial based on human interaction..

If previous research tends to show relationships through physical form, this research connects differences or in other words, unifies the spatial body, fashion, interior and architecture through a measuring system. Modules become a common thread of different sizes and scales; therefore, a simulation needs to be planned to pay attention to the proportions, composition and transformation of objects to be made. By enabling change, dynamics and interactions between subjects and objects can be generated more, so that spatial can be used for travelling, moving, carrying and elastic, plastic, and dynamic. Thus a hybrid does not merely represent one field but can function to cross other fields.

So the research method is an experimental design using the Cartesian quadrant in Autodesk to find the module by describing the discussion steps in order. It starts with discussing hybrids, then continues with integration, and finally, the module is located.

4. DISCUSSION

4.1 Hybrid

A scientific hybrid can search for a middle ground. The aim is to enrich, open up new opportunities and fill research gaps and market needs. Both fashion architecture, interior architecture and portable architecture in the context of contemporary science are the results of crossing, mixing and developing at least two different types put together. A hybrid mixture means it contains both fields at once foreign when viewed in a contradictory manner. Through these two contrasting perspectives, a perspective can be offered to stimulate contradictions. Therefore hybrids have the opportunity to provide renewal of the development of an object, in this context, namely architecture itself.

Fashion is one of the design products whose primary purpose is to protect the body. Like a second skin, fashion is in direct contact with the body by forming a deep room. This inner space forms the interior of a person, while the outer part becomes an enclosure. Textile is the main material of fashion, has an elastic and plastic charactec. Because of this character, fashion has the potential to be a compact, flexible and portable room. However, while architecture is rigid and limited; fashion is flexible and temporary. Therefore fashion requires structure if you want to be transformed into an architectural space. However, hybrid criteria cannot be achieved simply by adding structure. At least some knowledge needs to be crossed so that an object can have a wealth of forms, functions, programs, interpretations and perceptions to reach the opposite poles to encourage a new paradigm.

4.2 Integration

Bringing together products, fashion, interior, and architecture is not easy; even though hybrid science, has united two knowledge in an object. Thus, a method of uniting measures needs to be done so that products can be developed through specific modules. Fashion products usually pay attention to the size of the whole body with the main concentration generally on the upper and lower body. Measurements in fashion frequently use centimetres and general use categories by differentiating gender, standard sizes (S, M, L, XL), age, which largely determines the fashion product module. The interior generally uses two types of sizes: millimetres and centimetres are used for overall room size. The size used can vary depending on country, location, and standardization, however, to determine the module that unites product variations in this study will prioritize the spatial architecture so that it uses centimetres.

4.3 Module

To build an integration with the spatial system must be developed, taking into account product variations, fashion, interior and architecture. The size system must be able to accommodate the transformation of objects into different varieties, and therefore must be united with a standard size so that it can unite differences. To increase productivity and efficiency need the sizing system to find the right module so that structure, folds and details can be positioned at strategic locations. Chronologically the size system is built based on the following steps:

4.3.1 Placing Body Size as a Base

The body that is used as a parameter in doing modules is an Asian human body with an average height of about 155 cm - 165 cm, weight 45-55 kg. Body depiction as a parameter considers the average value of international anthropometric, both men and women. While the organism of the body is redrawn based on consideration of product design directives which heed the Asian human body.

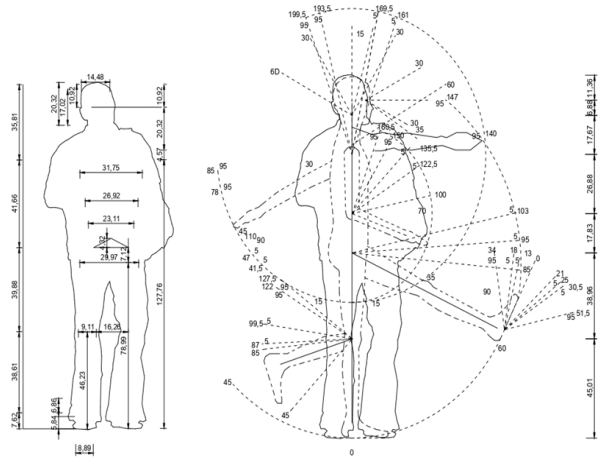

Figure 4 Body Size as a Module Base
Source: Redrawn by measurement of an Asian model of adaptation from Anthropometric Data and Ergonomic Products downloaded from http://www.learneasy.info/MDME/MEMmods/MEM30008A-EcoErgo/Ergonomics/Ergonomics.html and https://id.pinterest.com/pin / 403564816578961806 /?Nic_v1 = 1ahekrNLpXimO14Vo6su2%2F9MLH4tLfjUb91tVKnejneYZU96MOryM4k8jpQO%2FV2ViO downloaded March 19, 2020

4.3.2 Crossing Product, Fashion, Interior and Architecture Modules

Crossing modules on different products is done by dividing the size of the Asian human body based on certain heights, widths, areas and movements. The height distribution is regulated based on the lever of the human organ, width based on the static body scope, field based on the area of the body formed by the body. Therefore, it can be said that the module has the potential to produce geometric shapes produced from the human body. By redrawing the layers that heed the product, fashion, interior and architecture, the body as a parameter determines the module in the product including the scope of only certain organs such as head, hands, feet, etc. Fashion takes into account the overall composition of the body and focuses on the scope. The interior divides the position of the body for vertical relations and gestures for horizontal relations, architecture in the body refers to virtual bubbles as an imaginary description of personal space.

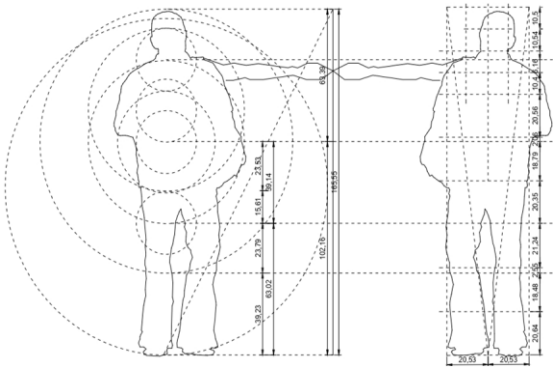

Figure 5 Crossing of Product Modules, Fashion, Interior and Architecture
Source: Redrawn with measurements of the Asian model of extraction from the human form and human dimension downloaded from https://www.quora.com/What-is-the-importance-of-anthropometrics-in-architecture downloaded March 19, 2020

4.3.3 Establish the Cross Module

By re-describing the layers that occur in products, fashion, interior and architecture. The architectural module in hybrid products needs to consider personal space as part of architectural considerations. Personal space is divided according to a height which can be categorized as follows: base zone for sleeping position, a lower zone for sitting position, a middle zone for resting position, and eye-level zone for standing position while the ceiling limits the top zone. While based on a horizontal scope is categorized into intimate zones, personal zones and social zones. The determine cross-module, rounding and simplification is determined based on the module used in the proportion of fashion and products, namely the multiple of the head and the proportion of the finishing and spatial module, the 30 cm module.

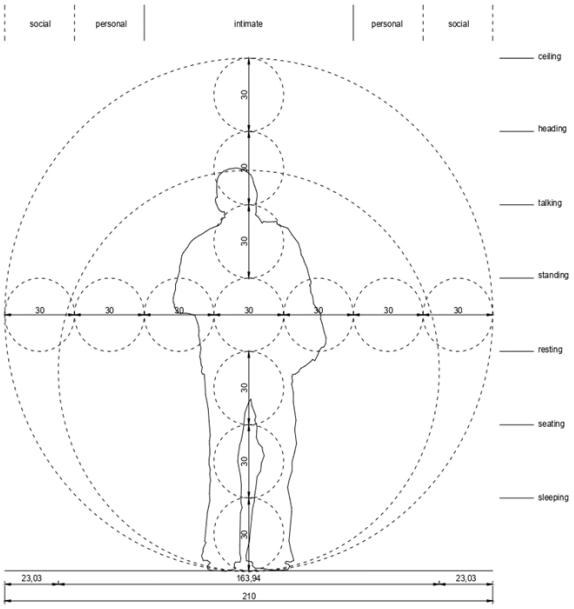

Figure 6 Cross Module
Source: Authors, 2020

4.3.4 Hybridization variations

Implementation variation module 30 cm, new modules can be produced by reducing the main module to smaller, e.g. 2.5 cm, 5 cm, 7.5 cm and so on as the size used in the design depiction. Still, they can also be multiplied to be larger, for example, 60 cm, 90 cm, 120 cm and so on are commonly used in standard room sizes. Each of them needs to refer to the totality of the space scale as a whole gesture.

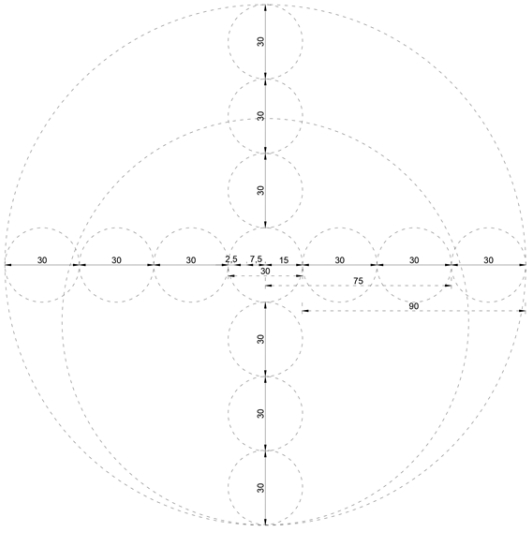

Figure 7 Module Variations
Source: Authors, 2020

5. CONCLUSION

This research fills in the gaps in the research findings of the first phase of DIKI grants namely dualism as two poles contrasting perspectives between fashion and architecture while bridging the findings of the first phase DIK grant research, namely differences in fashion and architecture. The module system is a counting system that unites contrast and variation so that the transformation of products, fashion, interior and architecture can be merged into an object, using the body as a parameter and the spatial module architecture as a virtue. As a formula, the module system is formed based on different scientific hybrid considerations namely product, fashion, interior and architecture to heed anthropometry, standard body dimensions, ergonomics and body shape to meet product standards from diverse fields.

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