

## Modular Interior Design under Urbanization: an Alternative Solution

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**Abstract:** The purpose of the research is to find a way which can deal with the housing shortage problems Modular design may be an effective solution for the current period. Different from the traditional modular design products on the market, which discussed in this study should have the characteristics of meeting the basic needs of consumers, comfort and personalization. The imminent problems fo demanders are lack in space, narrow and high pressure for living space in urban area. The modular design gives the “made for assembly” nature of design, individual customization involves and catalyzes the shift for handing the “product differentiation” individual customers. It also allows consumers to share functionality in limited space, it can greatly ease the problem from shrinking living space and the lack of proposed solution for constant overlapping functional areas with a large family. This research is focused on how the modular design can help current contemporary urban living people to deal with their living problems. The modular design can help those people who have limited living space to save area with a more effective and reasonable arrange by the innovative modular design. As the special kinds of design spread around the world, the average variable cost and marginal cost of producing the furniture will greatly decrease. As the result, the current problems above around the world will be solved efficiently.

### 1. Introduction

The meaning of a module is that a module is a measurement unit or standard in architecture, which is a size unit produced in order to mediate the structure, size and proportion relationship between various parts of a building. A unit consisting of a series of individuals that can be variously combined, detachable, and replaceable prefabricated products. With the development of modularization application, modularization theory has gradually become a new methodology. "Modularity is the top-down, layer-by-layer process of solving a complex problem," says Masahiko Aoki [1]. Based on the duplication and overlap of modern urban development, young groups are increasingly worried about the housing problem. The living environment of urban young people will mainly show the characteristics of insufficient living space, narrow and excessive pressure of space function: usually in a space of about ten square meters, the space function should include kitchen, bedroom, toilet, living room and other scenes [2]. At the same time, with the increase of living time, the debris and other items deposited in the living environment will also increase, which will make the whole space appear messy and environmental deterioration and other problems. Therefore, the purpose of this paper is to improve the happiness of urban residents through modular design strategies.

The main forms of housing problems are small living space, unclear layout, resulting in low utilization rate of space function; Unstable living quarters; Furniture on the market is expensive and bulky. At the same time, modern interior design is also top-heavy, which means that design is no longer focused on people's livelihood, but tends to serve more . In order to solve these urban living problems, modular design concept is gradually popularized in the world. Modular design is an emerging

methodology in the field of design, which tries to solve the housing problems of urban residents. However, it faces the problem of how to put the modular design concept into practice and benefit from human beings. On the basis of this, this paper summarizes the application of modular design concept in interior design and its function to improve the living happiness of urban residents.

## 2. Type Style and Fonts

Modular design, simply speaking, is to combine some elements of the product together to form a subsystem with specific functions. This subsystem, as a universal module, is combined with other product elements to form a new system and produce a variety of different functions or series of products with the same function and different performance. Modular design refers to the design method of dividing and designing a series of functional modules based on the functional analysis of different functions or products with different performance and specifications of the same function within a certain range. Different products can be formed through the selection and combination of modules to meet the different needs of the market. Its use principle is mainly 1. Strive to a small number of modules to form as many products as possible, and on the basis of meeting the requirements to make products with high precision, stable performance, simple structure, low cost, the connection between modules as simple as possible; 2. Module serialization, its purpose is to use limited product varieties and specifications to maximize and economically and reasonably meet user requirements [3]

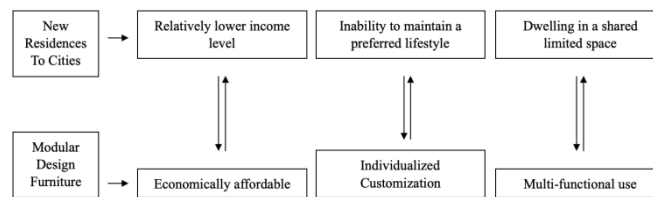


Figure 1. Modular design furniture in application

## 3. Modular Interior Design for Urban Living

### 3.1 Mix-function use

To the majority of the new-comers, city living means dwelling in less space with more people in an interior which can be utterly unfit for their expected living standard—the compromise of city living yet to be tackled. The majority of complaints come with shrinking living space and the lack of a yet-to-be proposed solution for constant overlapping functional areas with family members [4]. Traditional items of furniture in a confined interior space—walled by either interior or exterior walls, makes the statement and marks the designated functionality of space. A wardrobe, for instance, claims the space of clothing storage, which shall be placed in a sleeping area and is different from a cabinet or cupboard—furniture for non-clothing storage. Whereas in a limited space, there is always this juxtaposition of furniture bearing contrasting statements, and that is when the line has been crossed—a clashing inharmonious existence of multiple functionalities [5].

The idea of a place maker is communicated by reestablishing the functionality of a space by reducing the significance of both interior or exterior walls and elevating that of furniture. Take the Maison Dom-Ino as an example: this architecture structure was established in 1914 in response to the housing shortage in 1914—with its similarity being self-explanatory compared to the housing shortage due to urbanization. The concept behind Maison Dom-Ino is to showcase the elevated importance of prefabrication and construction by removing both interior and exterior walls. By displaying the ultimate form of open floor-plan, the structure's functionality is no longer defined by the walls but rather by the furniture [6][7]. Yet due to the space-specificity of traditional furnitures—either marketed by the furnitures for selling furnitures designated for each functionality or restrained by the architecture of the space, an alternated form of furniture is required. With the flexibility inherent to modular furnitures, the wall-placing importance of place making is plausible.

Design Studio Lina Ghotmeh proposed the idea of carbon-neutral hotel room under their project titled “a room for imagination” for the display of the exhibition “hotel metropolis – since 1818”. In the 24 m<sup>2</sup> living space, the studio envisions their concept of ultimate customization by giving visitors the freedom to custom their interior space down to the finest detail—including the thickness of the wall. Their modular furniture comes in by carving into the interior wall and concealing what was traditionally considered to be a space divider. The projects displayed a flow of functionalities along the wall, including storage, bath and sleeping, integrated into this single unibody of wooden furniture [8].

### **3.2 Economically affordable**

Behind what is promised with new jobs and higher income, urbanization brought higher unemployment rates in modern Chinese cities. The majority of new residents to the cities are farmers who rely on selling farming products as their primary income. Upon their arrival in the cities, their primary source of income is cut off, with having little to no access to farmable lands. Moreover, around 15% of the new residences are limited by having no adequate skill set for job transformation with promising income. More than 60% of them have indicated dissatisfaction in applying for jobs with adequate income [9]. Annual disposable for such population comes to less than 2900 dollars with almost two-thirds being stripped away of having limited access to farmland. More than 60% of their income is spent on necessities and utilities, leaving a mere annual budget of 330 dollars on their elastic demands—demands to pursue a higher living standard [10].

Modular design comes in by altering the production procedure with a larger economy of scale, thus creating a lower price for furniture which performs the same functionalities. Traditional furniture production is achieved by producing parts specific to the furniture itself. Yet with modular design, production can be broken down to producing sub-modulars computable to a series of furniture. Instead of producing different pieces at a lower quantity, manufacturers are able to produce the sub-modulars at a larger quantity at a lower unit cost with the economy of scale [11]. Moreover, the lower price can also be achieved by decreasing transportation expenses. The notion of “prefabricated”, assemble-on-site furniture can be dated back to the nineteenth century with Lambert Hitchcock’s creation of interchangeable parts of mass-produced furniture [12]. The idea is later perfected by Gerbrüder Thonet with his laminated wood furniture, packed in flat stripes and shipped across global destinations [13]. With a unified product portfolio, manufactures are able to order larger quantities of material in larger batches, rather than ordering materials with larger variants with small batches [14]. As aforementioned, the cost-effective benefit of modular design is also reflected in buying what you need instead of buying what retailers market. What is custom fit to the space ensures customers do not overspend on what the price they pay for traditional furniture.

An example can be found with the Copenhagen design studio Moebe. The idea of modular shelving components is also adopted by this design studio, but rather than having furniture as an attachment, Moebe’s modular shelf only includes the shelf itself—with wood boards and supporting iron rods. Their goal of achieving a “variety of configurations” is accomplished by enabling the rods to be attached with whatever wood boards are based on the customer's needs. Therefore, rather than purchasing pre-made shelves, customers are able to purchase wood boards and rods down to the exact number they need [15].

### **3.3 Individual customization**

The idea of individual customization comes in by tailoring users living space with their living style. And it can be achieved with modular furniture. The level of customization comes in when customers are given the opportunity to purchase based on their liking to ensure a maximized use and fully personalized space. And if alteration is needed after the assembly, customers are only required to purchase the subunits—for which are designed to custom fit the modular system rather than replacing it with new furniture. Further, the assembly of modular furniture incorporates choosing furniture fit for the interior rather than buying what is marked by furniture makers—thanks to the “made for assembly” nature of the modular design. Individual customization involves and catalyzes the shift for

handing the “product differentiation” from furniture makers to the end-users, the customers [16]. This can be particularly vital for two main reasons. First, customization with traditional furniture is seldom considered as a cost-effective option and, therefore, being relatively exclusive for the masses; and b) the ability to maintain their own lifestyle has been viewed critically for the new city residences [17].

According to the 2021 residential consumption survey report, an individual’s living space in a major Chinese city comes down to 25.1 square meters—a figure which is still seeing its rapid downsize in the foreseeable years [18]. 57.4% of the new residents have shown their dissatisfaction with their new lifestyle—with almost 20% of them being “utterly disappointed” when compared to their old ones. Urbanization brings new residences to cities with seemingly promising opportunities, yet it yields new challenges facing the newcomers: the city itself is rarely ready to accommodate its sudden spiking population. Among living standards, security and safety, sanitary, and other six categories of research, living standard is the one to receive the second lowest satisfaction [19].

Numerous global companies have tackled this problem with their innovative solutions with a modular design. British furniture maker ON&ON tackled the issue of personalized storage with its solution of the shelf, desk, cabinet and clothes hanger modular components in 2013. The system comes with a wall-mountable structure and custom-ordered furniture pieces that are directly compatible with the system. Upon changing customer needs, the shelf can be easily adjustable by replacing and rearranging the furniture attached to the structure [20].

Fix Coffee Table by Design Group IN proposed their solution of the modular table to meet user individualization. The table unit comes with open holes around the edge of its surface to allow users to attach its replicas. Based on users’ needs, the unit can be transformed into a workstation with shelvings and table or a shelf or table on its own [21].

#### 4. Conclusion

The main problem discussed in this paper is that the living environment of urban young people will mainly show the characteristics of insufficient living space, narrowness and excessive pressure on space functions: usually in a space of about ten square meters, the space functions include kitchens, bedrooms, toilets, living rooms and other scenes. At the same time, with the increase of living time, the debris and other items deposited in the living environment will also increase day by day, which will cause the entire space to present problems such as messy and environmental degradation. Modular design is the best resolution. According to modular design’s unique characteristics, the product can fit every individual consumer. The biggest advantage of modular design is individual customization, in order to fit every consumer and their special problems, designer can connect and touch the core of everyone’s personal problem. It will make the whole process of design more productive and targeted. Another reason of chose our solution is economically affordable. Modular design comes in by altering the production procedure with a larger economy of scale, thus creating a lower price for furniture which performs the same functionalities. In the near future, as the module design spread all around the world, the cost of producing will become lower and lower so people’s lives will be much better.

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