

Research on the Environment Design of Smart Entrepreneurship Community Based on the Needs of Entrepreneurs

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This is an excellent paper selected from the papers presented at ICC 2019.

Abstract: Since 2014, the wave of "Mass entrepreneurship and innovation" has been set off in China, and various innovation and entrepreneurship communities have emerged and become gathering places for entrepreneurs. The purpose of this study is to consider the needs of entrepreneurs and combine the characteristics of entrepreneurial space to put forward effective environmental design and improvement strategies for the smart entrepreneurship community. This study was conducted through a literature review, online information survey, and field survey, and the research objects included high-quality entrepreneurs (refers to entrepreneurs with higher education background and certain technical advantages, mainly including master's degree and doctor, overseas returnees and university professors) and various entrepreneurial communities at home and abroad, (it includes cultural entrepreneurship community, science and technology entrepreneurship community, residential and office integration entrepreneurship community).

Keywords: Environmental design; Entrepreneurial community; Smart space

1. Introduction

As "Mass entrepreneurship and innovation" was formally put forward in 2014, entrepreneurs from all walks of life are emerging, the third time domestic start-ups reached its peak in 2015, become the biggest wave of entrepreneurship in the country. United in 2018, the China business report released Netease cloud (a Chinese Internet company, whose business is network information and data), according to data, within the scope of this year, there are already more than 100,000 start-ups in China.

At the same time, as the most common working and living mode used by traditional entrepreneurs, entrepreneurial communities have gradually changed. With the development of network and digital technology, national support policies, administrative management norms, user demand upgrading and other related factors, intelligent entrepreneurial communities are emerging one after another. Many of the entrepreneurial communities in China, which have been established for four or five years, have gradually lost touch with modern technology in terms of environmental design. At the same time, entrepreneurs' demands for entrepreneurial community environment have gradually become more diverse. Therefore, the environmental design of smart entrepreneurial community is becoming more and more important.

2. Materials and Methods

In the past year, the author has conducted research and interviews in Beijing, Shanghai and other places, and conducted questionnaire surveys and actual interviews with more than 100 entrepreneurs and practitioners, including Zhongguancun industrial park (China's largest science and technology park and entrepreneurship park, located in Beijing).

In 2019, in order to understand the actual needs of entrepreneurs for the environment of smart entrepreneurship community, the author conducted a questionnaire survey in Zhongguancun industrial park. A total of 163 respondents, including entrepreneurs and enterprise employees, were involved in 31 high-tech start-ups. The following table shows some main questions and survey data of the questionnaire. The Numbers after the option respectively represent the number and proportion of people who choose the option.

Table 1. Some of the main questions and survey data in the questionnaire






| |
|---|
| 1. Your industry: A Computer and information technology(73, 44.8%) B Creative industries such as text/design/art(12, 7.3%) C Science and technology/R&D and other high-tech industries(49, 30.1%) D Financial services(8, 4.9%) E Electronic commerce(4, 2.5%) F Education/training(3, 1.8%) G Other(14, 8.6) |
| 2. Type of office space your company needs at this stage: A Independent office(41, 25.2%) B Co-working area(122, 74.8%) |
| 3. The area of independent office space your company wishes to use: A 20-30 m ² (7, 4.3%) B 30-50 m ² (22, 13.5%) C 50-100 m ² (83, 50.9%) D 100-200 m ² (39, 23.9%) E 200 m ² 以上(12, 7.4%) |
| 4. In addition to office space, what kind of space do you want to set up in the industrial base (multiple choices are available) : A Public Display Centre(159, 97.5%) B Public leisure space(144, 88.3%) C Public meeting room/lecture hall(98, 60.1%) D Public reception room(133, 82.6%) E Dining space(71, 43.6%) F Other(23, 14.1%) |
| 5. What facilities would you like to have in the public space (optional) : A Gym(44, 27.0%) B Maternal and child room(37, 22.7%) C lounge(96, 58.9%) D Unmanned shopping equipment(142, 87.1%) E Other(41, 25.2%) |
| 6. Which of the following do you think will affect your work (optional) : A Non-work related sounds(146, 89.6%) B An unobstructed view(99, 60.7%) C The smell of food/drink(154, 94.5%) D Moving crowd(120, 73.6%) E Other(33, 20.2%) |
| 7. Your desired space intelligent design includes (optional) : A Constant temperature and humidity control(163, 100%) B Security alarm control(136, 83.4%) C Intelligent lighting(163, 100%) D Artificial speech control(69, 42.3%) E Intelligent air environment control(163, 100%) F Other(12, 7.4%) |
| 8. As for the design of independent office space, you wish: A The park is designed in detail to form a unified style(53, 32.5%) B The park is designed and planned simply, leaving plenty of space for enterprises to carry out secondary design according to their own needs(103, 63.2%) C Other(7, 4.3%) |
| 9. You want the space within the industrial base to be dominated by (). A Relatively independent enclosed space(59, 36.2%) B An open space that is relatively open(104, 63.8%) |
| 10. Do you think an open space with no visible partition will affect your work? A Yes(117, 71.8%) B No(46, 28.2%) |

According to the survey results, the needs of entrepreneurs for the entrepreneurial community are mainly concentrated in two aspects. The first is the physical needs for space and supporting facilities, including the needs for security, health and environmental protection, that is, the functional and experiential sense of space, which transforms the use of space into the enjoyment of space. The second is the need for interactive functions such as communication and display, that is, social needs.

Entrepreneurs put forward the need to set up inter-enterprise resources, communication space or corresponding facilities for inter-enterprise multi-platform cooperation. In the process of starting a business, enterprises need to constantly interact with the outside world, extensively absorb resources and information, and at the same time make use of the exhibition space in the entrepreneurial community for external display, publicity and display [1].

This physical demand is actually the embodiment of entrepreneurs' social and psychological needs on the material level, and the psychological demand for interpersonal communication is consistent with the enterprise's demand for cooperation and demonstration in the development (Table 2).

Table 2. Part of the office brand public space at home and abroad

| Place | Space | Introduce |
|-----------------|---|---|
| Beijing, China |  | <ul style="list-style-type: none"> • FUNWORK, Beijing. • The space is given priority to tonal with cheerful and lively yellow tone. • A large number of game facilities are set in the public space. |
| Shanghai, China |  | <ul style="list-style-type: none"> • Wujiaochang SOHO, Shanghai. • Relaxed tone and unique stair design. |
| Paris, France |  | <ul style="list-style-type: none"> • Nextdoor, Paris. • Modern and European style combined with the public leisure dining space. |
| New York, USA |  | <ul style="list-style-type: none"> • We Work, New York. • The picture shows the combination of public leisure space and retail space. • Enterprise exchange and external display combined space. |
| Tokyo, Japan |  | <ul style="list-style-type: none"> • Dongyun SOHO, Tokyo. • Small family space combining office space and living space. |

3. Smart Entrepreneurship Community Environment Design Promotion Strategy

3.1 Intelligent design

The intelligent design of space depends on the nature of space itself and the needs of users. Designers should not only specialize in the artistic design of space but also integrate modern technology into space design. At present, the intelligent design used in the development stage is generally conventional. Through modern technical information, the process of information collection, operation and processing, and device feedback is carried out to control the scientific and efficient operation of terminal equipment. In this questionnaire, interviewees have obvious demands for intelligent design, especially automatic environmental control systems such as constant temperature and humidity.






In the traditional office space, the lighting system, ventilation system, access control system, data network system and other terminal control systems are independent of each other, and the control process is complicated. It is impossible to achieve efficient and intelligent unified control, resulting in energy waste, higher operating costs and even discomfort for users.

The key point of the intelligent scheme design of modern office space lies in the integration of diversified control system for unified and efficient management. The intelligent design scheme takes the corresponding intelligent host as the core, as the integrated system controller within a certain space scope, to improve the expansibility, access a variety of protocol communication, control the intelligent equipment. In addition, as the switch and controller of the Internet of things, the intelligent host carries out natural environment induction control and manual control through the induction device, which includes voice control, controller control and more convenient and efficient real-time APP control. By the intelligent host to collect the natural environment data and artificial data for scientific calculation, control the terminal intelligent equipment operation. Intelligent design is embodied in the space. For example, intelligent lighting system can control artificial light source and intelligent curtain to stabilize the light and brightness in the space through the information calculation of natural light and personnel feedback. Through the sensor to the space temperature, moderate data collection, control the intelligent fresh air system, make the space to maintain constant temperature and humidity; Perception of personnel, automatic control of access control system, improve space security [2], etc (Table 3).

Another important application of intelligent design in office space is digital office service. The establishment of intelligent data network, with the enterprise private cloud as the platform, can provide enterprises with internal network system, network space storage system, communication system, independent office space personalized intelligent device control system and other digital services.

The essence of intelligent space design is to establish the Internet of things system, use the Internet of things edge computing system strategy and algorithm support, combined with the edge system, combined into a complete Internet of things core architecture and solutions. Users as the main terminal control center, combined with intelligent equipment automatic induction adjustment auxiliary control, to achieve building control mobility. Intelligent equipment and technology, combined with spatial design techniques and aesthetics, will be applied to the environment to create intelligent, green, energy-saving, safe, ecological and digital community environment. Typically, smart devices are hidden from view, so users rarely see them in space. The following table shows five commonly used smart devices.

Table 3. Some commonly used building space intelligent equipment

| | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| VRV control | Sensing devices | Mixed reality | Air control system | Voice control |

3.2 Ecological design

Ecological design emerged in the late 1980s. With the development of design theory and science and technology, it became an important practical direction of design in various design industries in the 1990s and gradually became one of the design evaluation criteria. The ecological design of the space mainly has two core connotations: first, the sustainable development of the environment, the comprehensive consideration of space and surrounding environmental factors, the establishment of a green ecosystem in the space, the reduction of natural resources consumption, the creation of a good space environment, the formation of a sustainable development system; The second is the commercial and safety. On the premise of meeting the functional requirements, it can save the cost, control the cost, improve the environmental safety and reduce the potential risks. In this questionnaire, the interviewees' demands for constant temperature and humidity, intelligent lighting and food odor have proved the demand value of ecological design.

At present, there are three main ideas for eco-design of domestic entrepreneurial communities in China. First, new environmental protection materials and scientific and reasonable construction technology are used to eliminate material pollution and construction pollution from the source in the construction, and reduce pressure and cost for the follow-up work such as environmental cleaning and air fresh circulation. Second, through the method of interior landscape design, to achieve the effect of indoor green design, the use of plants for a long time fresh air, the use of large area of green wall and other techniques, enhance the interaction between green plants and users, enrich the spatial connotation and visual effect; Third, intelligent equipment and control technology. Technological progress and innovative research and development of intelligent equipment are the main factors to promote the progress of ecological design theory and practice. Relying on intelligent equipment,

scientific control of light, temperature and humidity, air exchange, energy conservation and emission reduction. These three methods build the main body of the ecosystem in the entrepreneurial community and provide users with healthy, comfortable, intelligent and ecological space experience [3].

In terms of environmental protection materials, technology and ecological environment equipment, space ecological design can be said to be an extension of space intelligent design. Similarly, ecological environment equipment is also set outside the visual scope, which is difficult for users to see in the space. The ecological design seen by users is mostly interior landscape, which improves the visual effect and psychological effect while improving the ecological environment. The space below is the Muxin Studio(culture startup) office, built in 2019, located in Shanghai, China. The rich plant species are scattered at different levels, constituting the interior landscape at different levels, and forming the division of the space at the same time. Users feel as if they are in a quiet natural garden, which relaxes their body and mind during intense work and improves work efficiency.



Figure 1. Muxin Studio office interior landscape design

The ecological design strives to realize the effective check of ecology, beauty and energy saving, bringing people a higher level of sensory experience. Through the use of green plants, environmental protection materials to create a landscape environment; Seek balance in artistic quality, function, humanization of the space, create open environment; Using intelligent equipment, establish intelligent system, make full use of temperature, humidity, sunshine and other natural resources, create energy-saving intelligent environment.

3.3 Composite function design

At present, the emerging innovation and entrepreneurship space is quite different from the traditional office space, because it presents a trend of converged space community, so the functional types and users' demands of the space are more diversified, which puts forward higher requirements for the functional division and combination of the space [4]. The results of the survey also showed the need of entrepreneurs.

According to the spatial function types, it can be divided into five categories: office space, leisure space, mass innovation space, joint office space and exhibition space. Each functional space can be further subdivided, for example, office space can be divided into independent office space and Shared meeting space.

So various types of space function, at the same time to ensure that the work efficiency under the premise of improving space blend, promoting personnel exchanges, in layout design, cannot like the past traditional divided into office space layout for clear function division, so space composite function design can become the effective methods to solve the problem.

There are two directions in the design of spatial composite function. Office space and public space are endowed with a variety of functions, in the independent office space into the rest area; In the leisure space can also work, and provide modular space, space combination can be copied; The conference room is separated from the independent office space to form a Shared conference room, and the diversified internal layout enables users to conduct brainstorming, team communication and other activities. The second is to weaken the specific separation of the space, the use of transition space, color guide, building column and other methods to form a virtual space separation. Such a method has created many open Spaces. In the absence of concrete dividers, the use of space is not restricted, and the functions of space are bound to be diversified.

Take Zhongguancun Jinan entrepreneurial community(Zhongguancun Sub-park, completed in 2019, is located in Jinan, Shandong Province, China) as an example. In the process of space design, this community has carried out a better composite function design, accounting for as high as 45.4% of the public space. Meanwhile, the subdivision function of the public space is relatively perfect. However, the boundary of space is weakened, and only visual forms are used to divide the space, or specific functions of the space itself are used to divide the space (for example, sidewalk is used to divide the space), which enhances the integration of the space.

Table 4. Spatial planning of Zhongguancun Jinan entrepreneurial community

| Space type | Independent space | Public space | | | | | Total |
|---------------------|---------------------|---------------------|----------------------|--------------------|--------------------|---------------------|---------------------|
| Functional division | Office space | Gen space | Public meeting space | Recreational space | Public transport | Exhibition center | |
| Area | 4583m ² | 466 m ² | 691 m ² | 624 m ² | 839 m ² | 1200 m ² | 8400 m ² |
| | 4583 m ² | 3817 m ² | | | | | 8400 m ² |
| Proportion | 54.6% | 5.5% | 8.2% | 7.4% | 9.9% | 14.4% | 100% |
| | 54.6% | 45.4% | | | | | 100% |

3.3 Personalized design

Personalized and diversified design is based on human-based design. In the space of innovation and entrepreneurship, personalized design is mainly used to promote corporate image. For the inside of a start-up, its essence is a creative design. In this questionnaire, more than 60% of respondents hope to design office space by themselves, which is enough to illustrate the importance of personalized design in the space of entrepreneurial community. But at the same time, community space design needs a unified scale and tone, but as a collection of office space for many innovative and entrepreneurial enterprises and individuals [5]. Enterprises with independent office space need different personalized tendencies. Personalized design cannot focus on one or two entry points like common maker space and co-working space. Under the double requirements, the design needs to release the free scale, the public area carries on the unified style visual design, the user's independent office space maximally reserves the personalized imagination scope, the user may carry on the secondary design according to the demand. SOHO 3Q (a start-up community located in Chengdu, Sichuan Province, China), which was completed in 2019, maintains the relative unity of the whole space and forms the diversity of personalized design, providing the enterprise with secondary space design services and creating its own creative environment.



Figure 2. SOHO 3Q personalized design

4. Conclusions

As Churchill said, "we shape the environment, and the environment shapes us." When business space into China in 2000, from concept to lead the market demand, development to 2014 years, the rapid social development makes the demand influence space evolution of the concept of entrepreneurship, business space design is essentially in the users increasingly diversified needs to find a perfect balance, the method of users to enjoy the experience in this space.

Based on the investigation of domestic entrepreneurs and the case analysis of entrepreneurial communities at home and abroad, this study proposes the environmental design improvement strategy of smart

entrepreneurial communities to improve user space experience. Practical design practices are needed in the future to validate and further research.

Conflicts of Interest: The authors declare no conflict of interest.

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