Methodology for Introducing Individual Preferences of Space into Office Design: An Analysis of Environmental-Intellectual Productivity based on the SEM Model

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This thesis proposes a theoretical method to improve intellectual productivity by providing an environment that conforms to individual psychology and behavior activities, thus presenting a new office space design scheme for the future.

Japan is among the countries with the lowest birth rate and highest aging rate in the world. As such, it can be predicted that the worldwide reduction of labor force and the decrease of individual productivity will make the substantial increase in productivity become a top priority. The working environment is related to productivity, and currently, it offers more choices. The working environment does not any longer imply discomfort caused by a large number of people in it, but from the point of view of improving collective efficiency, people focus on how to maximize their respective capabilities in order to increase the overall intellectual productivity. It is generally recognized that in a space with a large number of employees, if they can choose the most suitable office environment and adjust themselves accordingly, the above objectives can be achieved. To deal with the individual preferences for space (spatial preference) and provide office space where employees can choose their own environment, this thesis classifies the spatial preferences of office space with the environmental psychological data obtained from large-scale surveys. In the design process, the above-mentioned office environment can be realized through design and planning schemes as well as the application of environmental equipment. Therefore, this thesis discusses these contents in the environmental and behavioral factors related to intellectual productivity, while putting them into the causal sequence model that will affect intellectual productivity.

In Chapter 1, the background and purpose of previous research are discussed, also providing the structure and outline of the thesis. The issues discussed include the necessity of improving intellectual productivity, the changes to the value and demand of office building resulted from the changes in the working environment, and the significance of focusing on individualized space design. This chapter also describes the purpose of this study, dividing employees into various types. Furthermore, according to the impact of the environment on intellectual productivity, this chapter presents a quantitative analysis of the differences among different types, so as to acquire office design-related knowledge. Finally, the rationality of using photos to explore spatial preferences is discussed.

In Chapter 2, a summary of the network questionnaire used in this study is described. Based on previous research, the environmental factors related to intellectual productivity were extracted, and issues such as behavior were designed to build the model. In addition, in the process of using photos to classify design preferences, the methods of selecting office photos and extracting impression evaluation words are described.

As one of the objectives of this thesis, to classify individual office space preferences, Chapter 3 analyzes the relationship between people's impression of the office photos and whether they are willing to work in the offices presented. According to the above method, office photos can be divided into three categories, based on the different impressions, and four groups, according to people's individual preferences, while employees can be divided into four categories, based on the similarity of individual preferences. The relationships among all categories of employees and their preferred photo groups are also described.

The specific conditions and judgment reasons regarding the preferences of office photos were asked, and the evaluation background was analyzed and studied using text mining.

In Chapter 4, because factors such as gender, age, occupation, individuality, and spatial preference are considered to have different attributes in the latter model analysis, the correlation between them and the four categories of preferences mentioned in the previous chapter are clarified according to the crosstab of questionnaire data.

To verify the hypothesis that "the environmental factors of the office will affect the intellectual productivity through behaviors and pressure motivations related to intellectual productivity," the "evaluation structure model of environment–intellectual productivity" without a structural equation model (SEM) is built in Chapter 5.

In Chapter 6, according to the types of office space preferences (4 types) described in Chapter 3, the differences between the "evaluation structure model of environment–intellectual productivity" are compared. With multiple group structural equation modeling for each type, the structural differences from environmental factors to intellectual productivity are quantitatively clarified, and the effective environmental and behavioral factors are defined in order to improve intellectual productivity.

From previous research, it can be found that gender, occupation, individuality, and other employee attributes have an impact on environmental satisfaction and intellectual productivity. Therefore, in Chapter 7, we used multiple group structural equation modeling to analyze and compare attributes such as gender, age, occupation, individuality, and spatial preference among different groups.

In Chapter 8, how to apply the results analyzed and clarified from Chapters 3 to 7 (i.e., based on environmental psychology, employees are divided into four categories according to their spatial preferences, and the environment improvement for different categories of employees will have different impacts on intellectual productivity) to the actual office design and improvement is discussed and studied.

In Chapter 9, using the "photo questioning system" built herein, a software that can judge the four types of spatial preferences is produced.

Chapter 10 summarizes the contents of each chapter, and the knowledge that can be obtained is verified. In addition, the limitations and future prospects of this thesis are discussed.

According to the above discussion, in order to improve intellectual productivity by designing an individualized office environment, that is, in an office environment with a large number of employees, planning a space that is in line with individual psychology and behavior, and proposing the design criteria of the environment that can comprehensively improve intellectual productivity, the thesis puts forward a new methodology, which has certain significance as a research result in its field.