Analysis of the Physical Behavior of Library Users in Reading Rooms through GIS: A Case Study of the Central Library of Tehran University

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Abstract—Taking into account the significance of measuring the daily use of the study space in the libraries in order to develop and reorganize the space for enhancing the efficiency of the study space, the current study aimed to apply GIS in analyzing the study halls of the Central Library and Document Center of Tehran University in order to determine how study desks and chairs were used by the students. The study used a combination of survey-descriptive and system design method. In order to gather the required data, survey-descriptive method was used. For implementing and entering data into ArcGIS and analyzing the data and displaying the results on the maps of the study halls of the library, system design method was utilized. The design of the spatial database of the use of the study halls was measured through the extent of occupancy of the space by the library users and the maps of the study halls of the central library of Tehran University as the case study. The results showed that Abooreyhan hall had the highest rate of occupancy of the desks and chairs compared to the other halls. The Hall of Science and Technology, with an average occupancy rate of 0.39 for the tables represented the lowest number of users and Rashid al-Dins hall, and Science and Technology hall with an average occupancy rate (0.40) had the lowest number of users for seats. In this study, the comparison of the space occupied at different periods in the morning, evenings, afternoons, and several months was performed through GIS. This system analyzed the space relationships effectively and efficiently. The output of this study would be used by administrators and librarians to determine the exact extent of use of the equipment of the study halls and librarians can use the output map to design the space more efficiently at the library.

Keywords—Geospatial Information System, Spatial analysis, Reading Room, Academic libraries, Library's User, Central Library of Tehran University.

I. INTRODUCTION AND PROBLEM STATEMENT

THE concept of library as a place for studying has been fortified by the fact that many users sit there and study their own sources. An investigation on the extent of in-library use of the materials in Calabar University demonstrated that non-library sources were used more than those of the library [1]. The findings of another study showed that academic libraries users would prefer single study desks to group ones. They were more interested in making use of the desks with electrical and internet connections and they liked group study rooms [2].

Furthermore, a new method was employed in designing and re-organizing the study hall with emphasis on several issues.

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For one thing, the number of group study rooms was increased. The libraries are no longer viewed as a calm place for studying; it is, however, conceived of as a place where a wide range of users visit for various purposes and they might talk and consult with each other [3]-[6]. An increase in the group research space in the central library of Tehran University is observed: there is a section next to the manuscripts called "researcher's hall" which is used for consultation and conversation with university professors and postgraduate students.

Carlson put forth the idea of "deserted libraries". From his point of view, modern technological advances would lead to an increase in virtual use of the libraries and a decrease in their physical use. It seems that most students in their dormitories and through internet connections take advantage of the prevailing sources and documents [7].

In addition, the results of previous studies have indicated that the students use the internet to access information which does not belong to the library [8] (e.g. Google). Furthermore, with the advent of such communications technologies as cell phone, the libraries try to take advantage of them in introducing and offering their services. For instance, the experience of Ryserson Library showed that there is a growing increase in using cell phones and relevant intelligent technologies among students and this technology had the potential of offering more optimal services to the library users [9]. New challenges of the library study space and selected solutions for its designing do, by no means, matter. What is of paramount significance is the urgent need to physical space in libraries [10] and to searching for recording the standards and re-organizing the library space based on them.

In-library study space is determined considering the space of the complex, working space of the staff, services space, and similar cases. The study space is often prioritized over the complex space. In order to keep balance in dividing the library space into several sections, the library designers and constructors take advantage of the booklet published by Association of College and Research Libraries for evaluating the study space [11]. Nevertheless, there are a wide range of factors outside the library that would make an impact on its use (for instance, the computer labs, small specialist libraries, and study rooms which are available in the university context). Furthermore, the recent developments in multimedia have complicated the design of the library space [12], [13]. Today, several libraries are frequently being re-designed.

In order to study the library space, measuring the extent of