USERS SATISFACTION ASSESSMENT IN ACADEMIC LIBRARY PERFORMANCE

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Abstract: Evidence indicates that various building aspects influence the comfort and productivity of occupants. In post-occupancy evaluation (POE) process, the elements of performance are those aspects of buildings that are measured, evaluated and used to improve buildings. The main purpose of conducting the assessment is to determine whether or not design decisions made by design professionals are providing the performance needed by the users of the facility. This study present the findings of an indicative assessment of the major technical and functional elements of performance, carried out on the main academic and research library of Universiti Teknologi Malaysia (UTM) main campus otherwise known as Perpustakaan Sultanah Zanariah (PSZ) Library. Published literature has been articulated to review knowledge areas pertaining to the performance requirements of academic and research library facilities. A checklist was developed to obtain the users' feedback on their experience with the built environment. The users were asked questions based on the performance of 22 functional and technical elements in the library. The findings of the user satisfaction survey were analyzed and reported to describe the degree of compliance with the collected performance requirements. It was found out that, users were satisfied with 17 out of the 22 elements of performance. Finally a plan of action was developed and recommended to improve the performance of the PSZ main academic and research library of UTM.

Keywords: Academic libraries, Built environment, Performance requirements, User satisfaction

INTRODUCTION

Many methods have been used in assessing the satisfaction level of buildings performance; satisfying the users is the prime concern of every modern library. Hence it is mandatory on the part of the libraries to measure the satisfaction of the users in order to provide better services. To measure the user satisfaction, standardised and appropriate tools are neecessary. Post occupancy Evaluation has been used in measuring building performance for decades, studies of post occupancy evaluation (POE) methodologies have tended to focus on commercial and residential buildings, and to some entent performance of higher education (HE) buildings. Educational facilities host a large number of users with various needs (Hassanain and Mudhei, 2006); therefore understanding how to make the most of this particular work environment would not only benefit the users but also the institutions themselves. POE is used to consider the extent to which a building meets the needs of its end-users while also recognising ways in which design, performance and fitness for purpose can be enhanced (Turpin-Brooks and Viccars, 2006). It is therefore a systematic process guided by research covering human needs, building performance and facilities management (FM). The rationale for conducting a POE is to reflect on the extent to which a building meets the needs of its users addressing such issues as occupant performance, worker satisfaction and productivity (Preiser and Vischer, 2005).

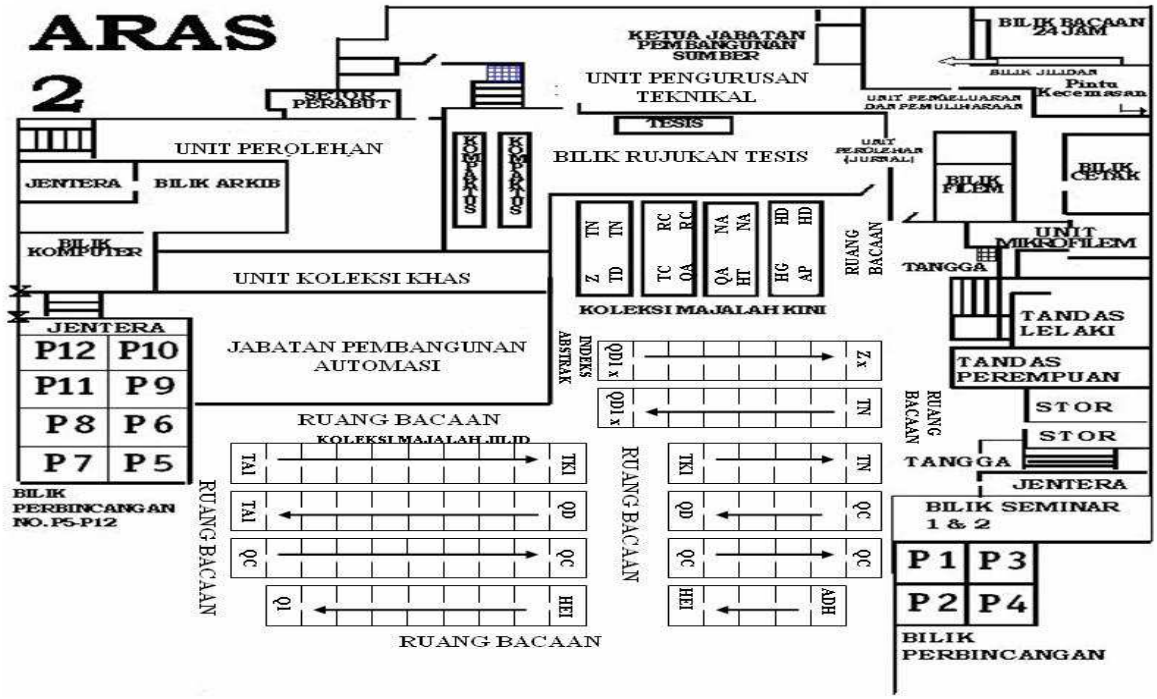

Fig 1: Floor Plan of PSZ (Field Survey, 2012)

Fig 2: Exterior view, PSZ library (Field Survey, 2012)

Fig 3: Interior view, PSZ Library (Field Survey, 2012)

Zimmerman and Martin (2001) view POE as a logical conclusion to the design process, with the feedback loop providing a valuable platform for lessons to be learned from building occupants. The benefit of this would be to unearth both how the existing space could be used more effectively, and provide information that could feed the future design of similar buildings. Cooper (2001) argued that if a building has been constructed with new systems in new ways with unknown outcomes, if there is no process in place to obtain feedback from the performance of a building, the building effectively remains a prototype. The British Council for Offices (2007) noted that clients would miss out on the opportunity to: (a) Discover if the building supports the needs of the occupying organization; (b) Identify flaws in the building which could quickly be corrected; and (c) Improve performance of building users.

All which in turn could have a noticeable impact on the organisation's profitability and improve staff morale by acting upon their opinions and suggestions. This would be beneficial to FM as there would be ongoing measurement of customer satisfaction therefore; this input could be used to improve their services (British Council for Offices, 2007).

Chaudhry, (1994) has indicated that establishing academic libraries in institutions fullfill the intellectual requirements of the community they serve and to achieve this objective, the library facility, as a designed environment, should be able to fulfill the necessary functional and environmental requirements that affect the efficiency and productivity of its occupants. The well being, health, and safety of building occupants and all those potentially affected by a building is a primary goal of a sustainable architecture. According to (Lackney and Zajfen, 2005), post-occupancy evaluation (POE) can provide valuable feedback to library administrators, in terms of space utilization and performance of technical systems in the library.

POE is an enabling process, which facility managers can use to continuously improve the quality and the performance of the built facilities they operate and maintain. It is defined as "the process of systematically evaluating the extent to which a facility, once occupied for a period of time, meets the

intended organizational goals and user-occupant needs" (Preiser et al., 1988). POE constitutes an appraisal of the degree to which a designed environment satisfies and supports explicit and implicit human needs and values for those whom a building is designed (Preiser et al., 1988). The early efforts of POE started in the mid of 1960s. Since that time, POEs have contributed significantly in the improvement and development of the building industry.

THE PERPUSTAKAAN SULTANAH ZANARIAH (PSZ) LIBRARY

The library occupies a central location at the Universiti Teknologi Malaysia (UTM) main campus in Skudai. It has a branch at the UTM City Campus, Kuala Lumpur and also branches at several faculties, learning centres and centres of Excellence. The library is a four-storey building with a seating capacity of 3,422 and a collection of nearly half a million volumes (view depicted in fig 1-3). It has a total of 179 staff. As an integral component of the academic programme, PSZ supports the university's teaching, learning, research, consultancy and publication activities. Its services and collection development activities are geared towards fulfilling the need for library materials and information in the university's core area of Science and Technology. Nevertheless, PSZ also has a good Humanities and Social Science collection to support courses in these areas which are offered by several faculties. The process of library automation at PSZ started in 1986. Today most of the library's operations and services are computerised. All processes including materials acquisition, indexing, circulation and information searching are conducted through the Computerised Library System known as SirsiDynix (Workflows 3.3.1J). (PSZ Library, 2011).

LITERATURE REVIEW

The functional elements of a building support the activities carried out within it, and they must be responsive to the specific needs of the organization and occupants, both quantitatively and qualitatively (Preiser et al., 1988).
These elements for academic and research library facilities are discussed below:

Acoustical comfort considerations

Library facilities have a number of acoustical demands, which are often not considered through the design and construction stages. Some of those acoustical problems that may occur in library facilities during its operation phase include; (i) Intrusive noise from another space or activity. This may include noise generated from meeting and media rooms, non-library outdoor activities, or building mechanical systems (Wrightson and Wrightson, 1999). (ii) Overlay reverberant spaces, where communication is difficult. These spaces seem noisy all the time, even when there are few people present. Excess reverberance is generated by sound literally bouncing off walls, ceilings, and floors without being absorbed. (iii) Lack of privacy due to interruption by unwanted speech from other workstations, carrels, or patrons.

Some effective ways to eliminate intrusive noises during the design and construction phases include; ensuring that noisy rooms (housing air handlers, pumps, and compressors) do not open onto quiet areas; locating outdoor mechanical equipment such as cooling towers, compressor units, and roof-top air handlers away from windows; and discarding the "open plan" concept of library planning when it comes to areas such as meeting rooms and circulation desk areas.

There are general approaches that could be applied to correct acoustical problems in libraries during the operation phase. These approaches include; providing sound absorption in the spaces that have hard finishes to lower reverberation time; avoiding sound reflecting surfaces in parallel walls; finding the source of intrusive noise, then quieting it or moving it; and placing carpets or resilient rubber flooring in high traffic circulation areas (Wrightson and Wrightson, 1999).

Visual comfort considerations

Lighting is one of the main considerations in library design, it influences user comfort, productivity, and perception of space. The recommended illumination level in libraries is 150 to 300 lux (CIBSE, 1994). To avoid deterioration of library and archival materials on exhibit, artificial light sources should be used to illuminate exhibition areas. Direct sunlight should not fall on exhibited items at any time. Skylight should be excluded (NISO, 2001).

Fire protection considerations

Libraries generally house high fire loads that can result in severe, even catastrophic losses when ignition occurs and adequate fire protection is not provided. Fire load can be defined as the amount of fuel within a room or a building, which will burn to release heat and feed the growth of fire (Stollard and Abrahams, 1991). In the USA, The National Fire Protection Association's most recent study on the causes of fires in libraries found that approximately 40 percent of these fires are incendiary or suspicious

fires (Freeland, 1999). The rest were caused by electrical distribution systems, heating equipment, open flames, and other equipment. Library facilities are classified as "places of public assembly" once the occupant load reaches more than 300 people (ICC, 2003a). As such, the code requires library facilities to be protected through the use of a sprinkler system and a fire alarm system. However, the presence of water in libraries could create a problem in the long term because it may leak and spoil the entire library collection.

Thermal comfort considerations.

The environment inside the library building needs to be controlled, not only to provide users with a pleasant atmosphere but also to protect the collection of the library. One of the major reasons for book deterioration in libraries is the environmental condition in which the books are kept (Smith, 1999). The average relative humidity average should not exceed 55 percent, or fall below 30 percent. The set temperature for human comfort is between 20 to 25*8*C (NISO, 2001).

Space planning and layout

"A library should be accessible and convenient. This begins with the site selection and extends through building design into selection of furnishings and equipment. A library should be easy to find, easy to enter, and easy to use" (Lushington, 1993). Satisfactory planning for library facilities undergoes the following phases: (a) *Plan development*: in this phase, drawings are developed to scale. They indicate proximities of major functions. The capacities for books and seating are calculated for each functional area. Moreover, and at an early stage the furniture as well a equipment layout should be indicated on the drawings. Plans are then reviewed to ensure that they satisfy the requirements of users and library staff. (b) *Design development*: in this phase, the design is completed, including all functional and technical systems. The design is thoroughly reviewed, considering that the location of equipment, furniture recommendations and the layout of spaces are final (c) *Plan implementation*: in this phase, and after final approval by the staff, the plan is presented to the governing authority for approval.

Privacy

Privacy in libraries is viewed as an essential element for the exercise of free thought and free association. Many libraries have developed written policies designed to preserve the privacy of their patrons and visitors (Falk, 2004). Measures for privacy in libraries could be implemented through provision of designated reading areas with high enough partitions or closed booths, provision of enough partitions between computer workstations, provision of designated rooms for special interest groups, and provision of instructional signs to enforce individual's privacy.

Accessibility

Accessibility of all parts in the building with a minimum of effort and a minimum of disturbance is considered to be one of the essential characteristics of a functional building. Libraries should have signs that are visible from as many locations as Post-occupancy evaluation of library facilities possible; to direct people and reduce the time they need to find what they are looking for. Signs are recommended to be red on white background. Signs should be used to display the following: emergency exits, "You are here" maps, direction to the support services "toilets, meeting rooms, auditorium, etc.", direction to stairs and elevators, floor numbers and contents, instruction messages, operation hours, and contents of the library (Beck, 1996).

RESEARCH METHODS

The objective of this paper is to present the findings of an indicative assessment of the major elements of performance, carried out on the main academic and research library. The main purpose of conducting the assessment is to determine whether or not design decisions made by design professionals are providing the performance needed by the users of the facility. The paper provides a systematic approach to evaluating the major performance requirements of existing academic and research library facilities. It is of practical value to library administrators and facility managers responsible for the day-to-day operations of such facilities.

To achieve the stated objectives, the study analyzed published literature to review knowledge areas pertaining to the performance requirements of academic and research library facilities and conducted a walk-through evaluation to identify the major problematic areas that require attention in the main library; Checklist was developed to obtain library users' feedback on their experience with the built environment. It subjectively assessed users' perceptions of the technical and functional elements which impact upon the performance of the library; findings of the user satisfaction survey were analyzed and reported to describe the degree of compliance with the collected performance requirements; and developed a plan of actions to improve the performance of the main academic and research library.

Table 1. Elements of performance along with their satisfaction indices and degree of satisfaction (Field Survey,2012)

Elements of performance		*Evaluation terms*					*Satisfaction index*	*Degree of satisfaction*
		VG	G	P	VP	N		
1	Library location	13	16	1	0	0	88.0	Strongly satisfied
2	Interior design	6	13	10	1	0	76.0	Satisfied
3	Presence of Floor carpeting	6	13	10	1	0	76.0	Satisfied
4	Furniture carpeting	5	11	10	4	0	71.3	Dissatisfied
5	Number of workstation	6	20	2	2	0	80.0	Satisfied
6	Location of workstation	10	17	2	1	0	84.0	Satisfied
7	Number of elevators	14	12	2	1	1	84.7	Satisfied
8	Quality of elevator lobbies	9	16	3	0	2	80.0	Satisfied
9	Width of hallways	9	15	4	1	1	80.0	Satisfied
10	Distance between shelves	7	15	6	1	1	77.3	Satisfied
11	Shelf height	4	19	2	2	2	74.5	Satisfied
12	Number of reading tables	6	13	10	1	0	76.0	Satisfied
13	Distance between reading tables	2	13	9	3	0	70.4	Dissatisfied
14	Privacy	5	9	8	8	0	67.3	Dissatisfied
15	Number of toilets	3	8	10	5	4	60.7	Strongly dissatisfied
16	Quality of toilets	4	19	2	2	2	74.5	Satisfied
17	Visual comforts	9	14	5	2	0	80.0	Satisfied
18	Acoustical comforts	7	17	5	2	0	78.0	Satisfied
19	Thermal comforts	12	14	3	1	0	84.7	Satisfied
20	Clarity of emergency exit	5	8	8	6	3	64.0	Strongly dissatisfied
21	Identification of library sections and storey	4	12	7	7	0	68.7	Dissatisfied
22	Design of circulation desk	9	9	4	5	0	76.3	Satisfied

Notes: VG=Very good; G = Good; P = Poor; VP = Very poor; and N = No opinion

DATA COLLECTION

The two complementary data collection methods for the assessment included: (1) Walk-through evaluation: to identify the major problematic areas that require attention. This method is subjective, and is based on personal experience with this particular type of facility. The walk-through was conducted in the first, third and fourth floors due to ease of access to all areas in these floors. The walk-through tour was conducted for the purpose of evaluating and documenting deficiencies in performance in fire prevention and protection requirements, functional measurements, lighting quality, furniture layout, identification of library contents and signage, and functional arrangement of spaces. (2) User satisfaction survey: to subjectively assess the users' perception of technical and functional elements of performance. The functional elements included the library location, interior design, floor carpeting, furniture, number and location of workstations, number of elevators, quality of the elevator lobbies, width of hallways, distance between shelves, shelf height, number of reading tables, distance between reading tables, privacy, number of toilets, quality of toilets, identification and numbers of library sections and contents, and the design of circulation desk. The technical elements included visual comfort, acoustical comfort, thermal comfort and emergency exit systems.

DATA ANALYSIS

The checklist addresss 22 questions and 30 persons, including 27 students and three staff were selected by simple random sampling. The users were asked the performance of 22 functional and technical elements. The evaluation terms used, along with their corresponding weight, were "Very Good" with 5

points, "Good" with 4 points, "Poor" with 3 points, "Very Poor" with 2 points and "No Opinion" with 1 point. Table I shows the number of responses by the library users for each of the 22 elements of performance listed in the checklist survey.

Table I shows the values of the satisfaction indices obtained for the 22 elements of performance. To be able to quantify the degree of satisfaction for each element of performance, the following calibrations were adopted: (a) If the satisfaction index is below 65 percent, then users are "Strongly dissatisfied". (b) If the satisfaction index is between 65.1 percent and 75 percent, then users are "Dissatisfied". (c) If the satisfaction index is between 75.1 percent and 85 percent, then users are "Satisfied". (d) If the satisfaction index is above 85.1 percent, then users are "Strongly satisfied".

FINDINGS OF THE ASSESSMENT

Library location. The library is located at the centre of the campus between all academic buildings. It acts as a focal point for the academic campus. It is possible to reach the library from any academic building within 10-15 minutes of walking. Staff and student are strongly satisfied with building location (88 percent).

Interior design, floor carpeting and quality of furniture. The interior design of the library is open. The circulation pattern is clearly defined from the moment the user enter the library until he or she exits. Circulation patterns are defined by the arrangement of shelves and the location of walls. However, the overall quality of the interior design could be improved due to the current mixture of the colour of the interior paint, furniture layout and carpeting. Moreover, all spaces are utilized for shelving which eliminates the sense of the open space. Those were some of the reasons that brought the satisfaction level with these elements (76 percent).

Number and location of workstations. The workstations are located in the open space at each floor. This facilitates reaching and memorizing the location of the work stations. Users of the library are quite satisfied with the number and location of the workstations (80 and 85 percent).

Number of elevators and quality of elevator lobbies. The library has one elevator at the far end, which is new with adequate capacity and speed. Users are quite satisfied with the number of elevators (84.7 percent). Also users are satisfied with the waiting lobbies (80 percent) even though they appear tight and the furniture quality and colour are not that appropriate.

Distance between shelves and shelf height. The aisle between shelves and shelf height are within the minimum recommend dimensions. The narrow distance between shelves is due to the heavy demand on the spaces. The majority of users are satisfied with aisle width and shelf height (77.3 and almost 75 percent).

Width of hallways. The width of hallways is more than enough. Hallways are clearly identified and free of obstructions. The users are satisfied with the width of the hallways (80 percent).

Number of and distance between reading tables. While the number of reading tables is within the minimum recommended, the students who are using the library are not quite satisfied with the number of reading tables (74.1 percent). The reason is that students are utilizing all tables for the purpose of studying for a long period of time.
Moreover, they leave their belongings on the table when they leave the library as an indication for reserving the table until they came back later. Also student satisfaction with distance between tables is low (70.4 percent). This is may be due to the back-to-back arrangement of the chairs and the close distance between the two parallel carrels.

Privacy. Staff and students are almost dissatisfied with the privacy issue (67.3 percent). This is because staffs are working in open offices and students utilize a carrel arrangement, which does not provide sufficient privacy.

Number and quality of toilets. Each floor has two toilets. The number of toilets is acceptable according to the International Plumbing Code (ICC, 2003b). The code requires the provision of one toilet for every 125 males and 65 females, yet the users do not consider the number of toilets satisfactory. This may be due to the fact that the location of the toilets is not clear or that the users utilize them usually in the peak hours, i.e. prayer times. The quality of the toilets is very poor due to poor ventilation. Both staff and students are strongly dissatisfied with the number and quality of toilets (almost 60 percent). Some of the students do not know the location of the toilets; others know the location but prefer not to use them.

Identification of library sections and storey. The library is missing many of the important signs such exit signs in some locations, storey numbers and collection sections. Signage is not well designed and located. Way finding inside the library is very poor, especially for new users or visitors. Users are not

satisfied with this element of performance (about 69 percent).

Design of circulation desk. Users are satisfied about the design of the circulation table (76.3 percent).

Visual, thermal and acoustical comfort. Both staff and students are mostly satisfied with the levels of illumination in the library. The satisfaction index of this element is about 80 percent. Also, staff and students are quite satisfied with the thermal environment in the library. The
satisfaction level is about 84.7 percent. There is, to some extent, noise generated though air supply diffusers and lighting fixtures, users were satisfied with levels of quietness. The satisfaction index for the acoustical comfort element was about 78 percent.

Emergency exits. User satisfaction with the clarity of the emergency exits was only around 64 percent, which is very low when compared to the performance of other technical elements of performance. Exit signs are not clear and the location of the some of the emergency exit doors is hidden behind the shelves.

CONCLUSIONS AND RECOMMENDATIONS

The purpose of conducting the assessment is to determine whether or not design decisions made by design professionals are providing the performance needed by users of the facility. This paper provides a practical guide to library administrators and facility managers responsible for day-to-day operations of such facilities. The study has determined the values of the satisfaction indices obtained for the 22 elements of performance, and identified the corresponding degree of satisfaction with each of the elements. Adaptation strategies merit attention, because they can help designers to improve quality of the library and improve the performance of the users.

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REFERENCES

[1] Beck, S.G. (1996), "Wayfinding in Libraries", Library Hi Tech, Vol. 14 No. 1, pp. 27-36.

[2] British Council for Offices (2007), Guide to Post-occupancy Evaluation, British Council for offices, London

[3] Chaudhry, M.R. (1994), "User services at the KFUPM Library, Dhahran, Saudi Arabia", Library Review, Vol. 43 No. 2, pp. 7-23.

[4] CIBSE (1994), CIBSE Code for Interior Lighting, The Chartered Institute of BuildingServiceEngineers, London, UK.

[5] Cooper, I. (2001), "Post-occupancy evaluation – where are you?", Building Research and Information, Vol. 29 No. 2, pp. 158-63.

[6] Falk, H. (2004), "Privacy in libraries", The Electronic Library, Vol. 22 No. 3, pp. 281-4.

[7] Freeland, D. (1999), "Fire Protection 101", Proceedings of National Conference on Cultural Property Protection; Cultural Property Protection from the Ground up, available at: www.museum-security.org/fire-protection-201.htm (accessed March 2006).

[8] Hassanain, M. and Mudhei, A. (2006), "Post-occupancy evaluation of academic and research library facilities", Strctural Survey, Vol. 24 No. 3, pp. 230-9.

[9] ICC (2003a), International Building Code, 1st ed., International Code Council/Thomson Delmar Learning, Florence, KY.

[10] ICC (2003b), Plumbing Code, 1st ed., International Code Council/Thomson Delmar Learning, Florence, KY.

[11] Lackney, J.A. and Zajfen, P. (2005), "Post-occupancy evaluation of public libraries: lesson learned from three case studies", Library Administration and Management, Vol.19 No.1,pp. 16-25.

[12] Lushington, N. (1993), "Getting it right: evaluating plans in the library building planning process", Library Administration and Management, Vol. 7 No. 3, pp. 159-63.

[13] NISO (2001), Environmental Conditions for Exhibiting Library and Archival Materials, National Information Standards Organization (NISO), Bethesda, MD.

[14] Preiser, W.F.E., Rabinowitz, H.Z. and White, E.T. (1988), Post-occupancy Evaluation, Van Nostrand Reinhold, New York, NY.

[15] Preiser, W. (2002), Learning from Our Buildings: A State of the Practice Summary of Post Occupancy Evaluation, National Academy Press, Washinton, DC, available at:www.books.nap.edu/books/0309076110/html (accessed March,2011).

[16] PSZ Library (2011), Universiti Teknologi Malaysia (UTM) main campus in Skudai. available at:www.psz/library/.htm

[17] Smith, A. (1999), The Future of the Past: Preservation in American Research Libraries, Council on Library and Information Resources, Washington, DC.

[18] Stollard, P. and Abrahams, J. (1991), Fire from First Principles: A Design Guide to Building Fire Safety, E. & F.N. Spon, London.
[19] Turpin-Brooks, S. and Viccars, G. (2006), "The development of robust methods of postoccupancy evaluation", Facilities, Vol. 24 Nos 5/6, pp. 177-96.
[20] Wrightson, D. and Wrightson, J.M. (1999), "Acoustical considerations in planning and design of library facilities", Library Hi Tech, Vol. 17 No. 4, pp. 349-57.
[21] Zimmerman, A. and Martin, M. (2001), "Post-occupancy evaluation: benefits and barriers",Building Research and Information, Vol. 29 No. 2, pp. 168-74.

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