Analysis of factors influencing office workplace planning and design in corporate facilities

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ABSTRACT This article presents an assessment of the influential factors that space planners and design professionals must consider during the planning and design of office space in corporate facilities, so as to enable staff to perform their tasks as efficiently as possible. Published literature has been analyzed for the purpose of investigating the role of office space as an enabling resource and addressing the concepts of space planning and management in corporate organizations. The analysis was extended to synthesize the factors that influence the provision of office workplace. These factors were classified under three distinct groups. The article addresses the need for sustainable planning of the office workplace and the importance of reviewing the performance of the office workplace during the operation phase. A survey was administered to qualitatively assess the perceived level of importance for each of the identified factors by a sample group of space planners and design professionals. The findings of the survey were analyzed and reported to conclude on the significance of the identified factors. This article provides a practical value to space planners, design professionals and facility managers involved in the development, design and operation of office workplaces.

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INTRODUCTION

Office buildings represent considerable value as being fixed assets for all organizations. The primary purpose of an office building is to facilitate the provision of a workplace and working environment for information and knowledge processing activities such as filing, planning, designing, supervising, analyzing, deciding and communicating. Office buildings have been developed in response to the need to plan, coordinate and administer these activities (Aronoff and Kaplan, 1995). These activities are carried out by staff that usually occupy assigned areas within the office space, and usually are provided with desks, personal computers and other equipment that may be required within these areas. Recent trends in planning and design of office workplaces have emphasized the support

of the hierarchical structure of management in the organization. Office design has been characterized by arrangement of workplaces that allow sequential processing of documents and express the hierarchical level of management positions (Szarejko and Trocka-Leszczynska, 2007).

Office buildings and spaces within do not only facilitate accomplishment of work tasks, they have the potential to improve it by contributing towards the provision of the optimum working and business environment (Atkin and Brooks, 2000). As many functions are being carried out in office space, utilization of space in office environments has become more efficient. In fact, it has been approaching that of a high-tech manufacturing facility. Office space has always assumed the role of being the place and the environment where people work, research, team together, create and document information. Therefore, it is imperative that this workplace environment should be planned, design and equipped as carefully as possible to maximize the efficiency of the workforce (Owen, 1993).

This article presents an assessment of the influential factors that space planners and design professionals must consider during the planning and design of office space in corporate facilities, so as to enable staff to perform their tasks as efficiently as possible. Identification of these factors take into consideration several dimensions such as work environment settings, space planning methodologies, technology, innovative and creative ways of operating at the workplace. This article provides a practical value to space planners, design professionals and facility managers involved in the development, design and operation of office workplaces. It brings into perspective the many considerations that have to be taken on board in facilities planning projects.

RESEARCH METHODOLOGY

To achieve the objectives of this research, the following activities were carried out:

- Reviewing the published literature to analyze the role of office space as an enabling resource and address the concepts of space planning and management in corporate organizations.
- Identifying the factors that space planners and design professionals must consider during the planning and design of office space, and further, classifying these factors under three distinct categories, where commonalities are shared.
- Addressing the need for promoting the practice of sustainable planning of the office workplace among design professionals and the importance of reviewing the performance of the office workplace during the operation phase.
- Administering a questionnaire survey to assess the perceived level of importance for each of the identified factors that influence the process of planning and design of office workplace in corporate facilities.
- Analyzing the data obtained from the questionnaire and reporting the findings to conclude on their significance and identify the level of importance for each of the identified factors.

OFFICE SPACE AS AN ENABLING RESOURCE

Space may be defined as any portion of an entire facility. Spaces may be classified as interior or exterior spaces. These spaces could be bounded by walls or partitions or could be unbounded. Typical units of measure of space are square foot or square meter of floor area and cubic feet or cubic meter of volume (Brauer, 1992). Proper

planning, design and management of the designated space for conducting the work of the organization is one of the prime duties of the facilities manager. Becker (1990) states that 'facilities management is responsible for coordinating all efforts related to planning, designing and managing buildings and their systems, equipment and furniture to enhance the organization's ability to compete successfully in a rapidly changing world'. Therefore, since space as an enabling resource has the potential to facilitate positive change in the organization and provide competitive advantage (Langston and Lauge-Kristensen, 2002), the objective of every facility manager in any organization is to channel resources to provide the right workplace environment for conducting the core business activities on a cost-effective and value-for-money basis. Therefore, it is essential that workplaces are properly planned, efficiently managed and used to their best advantage. However, this is not an easy task to accomplish, as it involves determining the requirements of users and the business, designing the workplace for accommodating these requirements and maintaining the provision of these requirements throughout the life cycle of the workplace (Muir, 2003).

Users usually have certain expectations about their workplaces. They wish for a workplace that is usable and conducive to the range of functions for which it was intended (Van der Voordt and Maarleveld, 2006). Among these expectations are provisions for undisturbed workplace environments that enable staff to concentrate at work; furniture that is flexible enough to adjust and rearrange; equipment that is more than sufficient to work effectively; customized workspace that serves multi-purpose functions for informal and instant meetings; controllable indoor environmental conditions; and ample storage at the work area (Lee, 2006).

SPACE PLANNING AND MANAGEMENT IN CORPORATE ORGANIZATIONS

Space planning is mainly concerned with providing facilities that fit users' requirements to continuously improve quality and ensure value for money. It can be thought of as the process of optimizing the layout of the building to suit the needs of the organization. Space planning takes place within the context of the business plan and the facility management plan of the organization. Indeed, it is best facilitated when data about the business, the legislative environment, the building, the needs of the organization and those of the staff are made available to the space planner (Muir, 2003). The space planner will be charged with the responsibility of developing workplace layouts that meet the needs of the organization, through utilizing the full capabilities of the infrastructure available for the organization within a set budget (McGregor and Then, 2001).

A prerequisite for the space planning of any project is familiarity with the zoning requirements for the site where the building is to be used for accommodating the business (Molnar, 1983). Zoning is a term used in city and regional planning to regulate the practice of land-use and the kind of activities conducted on sites based on mapped zones. Zoning regulates aspects like building height, densities, the location of a building on the lot, lot coverage, parking and similar aspects.

Space management has been conventionally thought of as the skill of maximizing the value of existing space and minimizing the need for new space (Langston and Lauge-Kristensen, 2002). The primary focus of space management is not only limited to the assignment and use of existing space. It also entails projecting future space requirements; identifying deficiencies within the assigned space; and helping users solve space problems. In essence, space management may be viewed as the application of management principles to an inventory of spaces and buildings to ensure that space use is maximized, and that space is distributed fairly where needed (Brauer, 1992).

FACTORS INFLUENCING OFFICE WORKPLACE PLANNING AND DESIGN IN CORPORATE ORGANIZATIONS

Although the knowledge presented in this article has previously existed in several facilities management and real estate literature sources, the survey of literature revealed that there has not been a focused study on the extent of identifying the influential factors that space planners and design professionals may consider to provide sustainable, cost-effective and productive workplace facilities. This section presents a synthesis of the knowledge areas pertaining to the technical, functional and financial factors affecting office workplace planning in corporate facilities, and presenting these factors in one source.

Functional factors

The functional factors relate to the fit between the building and the user's activities. Considerations in this category are derived from the goals, objectives, and the operations of each division in the organization. The set of functional factors are discussed as follows:

Operations and activities of the organization

While the term 'operation' is used to describe the general process by which an organization conducts its business, the term 'activity' is commonly used to describe an action by which the mission of the organization is accomplished. This suggests that organizations should carry out an analysis of their operations and activities that the current or proposed workplace is required to support. This analysis would provide a description for the operations that would be conducted and the missions that the staff would be accomplishing. In view of this analysis, facility planning personnel would be guided by the previously set missions that explain why a sub-organizational unit exists; the major classes of activities that are conducted to accomplish the mission; and the number of staff and their skills or job descriptions that are associated with the organization's activities. The facility planning personnel would then be able to compile a list of all equipment items that are essential to be brought to the new workplace (Brauer, 1992).

A significant aspect of workplace planning related to the operations and activities of the organization is in the development of workplace solutions to respond to the multi-faceted types of work and ways of working. Examples of these solutions include: touchdown areas that allow staff to access information quickly; bookable offices; and group collaborative workspaces such as board rooms equipped with technology to provide teleconferencing capabilities; and hot-desking (Pitt and Bennett, 2008). Hot-desking refers to the approach of compelling employees to share workstations through providing fewer workstations than employees to achieve the objectives of attaining higher workstation utilization and reducing the costs of providing workstations (Fawcett and Rigby, 2009).

Accurate definition of user requirements

Workplace strategies as well as layouts should be in direct response to the individual and collective requirements of the occupants (McGregor, 2000). Effective practice of space management depends on a clear understanding of the requirements and the directions of the organization (Muir, 2003). The planning of the workspace in the organization should be a response to the specific requirements of the staff and the business (McGregor and Then, 2001). Requirements in building projects define what is expected from a building solution rather than describe the solution itself. User requirements are concerned with facility characteristics that would enable users to carry

out their activities efficiently, safely and with regard for occupant satisfaction. There are indeed two categories of requirements. The first type is called functional requirements, which is a collection of statements and supporting data that describe what is needed in the building (Brauer, 1992). Examples of functional requirements include workspace layout, size of personal workspace, personal work surface area, furniture, workspace storage, shared equipment and social spaces (Schwede *et al*, 2008). The second type is called technical requirements, which describes the technical, financial, legal matters that make a project feasible (Brauer, 1992). The two types of requirements complement each other. Together they provide a complete set of information necessary to formulate an appropriate solution.

Space adjacency requirements

Co-locating team members in the same divisional unit is an apparent priority for achieving optimum levels of collaboration at the workplace (Brown, 2008). Co-locating different divisional units within the organization for the purposes of increased management effectiveness and higher productivity is a more subtle business objective (Wustemann and Booty, 2009). For developing a design solution, the space planning consultant needs to be acquainted with the preferred space adjacency demands among each divisional unit, as well as different divisions within the organization. Such information is needed to determine how spaces should be physically positioned relative to one another in a floor plan, or a site plan. Space adjacency demands could be expressed as 'spaces must be adjacent'; 'adjacency is preferred, but not absolutely necessary'; 'anywhere nearby is fine'; 'distance is not important'; and 'spaces should be far apart or in different buildings' (Brauer, 1992).

Development and implementation of workplace area standards

The early approaches for planning of workspaces were characterized by oversizing the amounts of space in anticipation that eventually with the increase of volume of business and the headcount within organizations, the initial excess of workspace would be absorbed. Such approaches have failed to take into consideration the present requirements of occupants, businesses and their future requirements (McGregor, 2000). Nowadays, space management has become a high priority for most office organizations, mainly due to the high cost of space, demands for more desirable space, and frequent adjustments required to accommodate the rapid growth or expansion of organizations (Brauer, 1992).

Developing and implementing space standards is one of the key responsibilities of any space management department in any organization. The development of space standards is a necessary prerequisite to the interior design process (Owen, 1993). A space standard governs the number of square meters allotted to each staff in the organization as workspace, taking into consideration the amount of space needed for a desk, chair, local storage and immediate access to the workstation (Wustemann and Booty, 2009). Space standards, while being used for minimum space allocation for staff, serve to establish guidelines and procedures for equitable distribution of space to all users based on their actual needs, hence, ensuring efficient use of space (Brauer, 1992). A further aspect of the development and implementation of workplace area standards is that space design and allocation should be based on the functions carried out in the space, rather than the traditional approach of allocating spaces based on the salary/grade hierarchy (Chilton and Baldry, 1997). Supporting this argument, Rondeau *et al* (1995) assert that standards are designed to ensure that employees have adequate space and furnishings to carry out the tasks assigned and are not usually subject to the whim of a supervisor.

Specification of common facilities – Areas

There exist at every workplace several types of common spaces such as conference rooms, reception areas, waiting areas, display areas and locker room. Common spaces could be rooms, work areas or other forms of spaces that serve several or all units within the organization. These common spaces are often identified by the fact that they are not managed or controlled by anyone in particular. In planning of the workplace, the space planner determines the demand for common use spaces at the organization, converts that demand into a list of shared spaces and defines user requirements for them (Brauer, 1992).

Anticipation of change in the organization

Organizations seldom remain static (McGregor and Then, 2001). When an organizations undergoes a change, so does its workplaces. An essential element in space planning is anticipating the need to accommodate future changes in the organization. There are two main apparent sources of changes. The first source can be attributed to the external changes that are usually beyond the control of the organization, such as technological changes and innovations, competition, globalization, regulation and de-regulation, and consumer behavior. An example of this category is organization's investment in information technology (NCPP, 2004). Studies have shown that technological changes in the office infrastructure, combined with space re-configuration, have the potential to enhance the effectiveness of the work environment, thus positively impacting the company structure and systems. When facilities are built or upgraded, organizations should endeavor to anticipate their information technology needs for the next 5–10 years to ensure that the new or upgraded space can meet those needs (Langston and Lauge-Kristensen, 2002). The second can be identified as the internal pressures from within the organization such as initiatives and proposals to improve flexibility and the capability to adapt to changes in the workplace, develop the culture of connecting staff and enhance communication, and improve the image of the business to attract customers and retain staff (Morgan and Anthony, 2008).

Technical factors

The technical factors relate to the health and safety of staff and visitors using the building. Considerations in this category are derived from the existing conditions of the facility as well as the mandates of the legislation for achieving a comfortable, safe and healthy workplace environment. The set of technical factors are discussed as follows:

Facility's physical constraints

Whether recycling an existing building or building a new one, the space planning personnel need to have complete set of information on the building in hand. This could be accomplished by developing a simple checklist noting all the items to be considered. Examples of items to gather information on include permissible building height, column spacing, types and finishes of floors, types of wall construction, capacities of elevators, fixture types, and illumination levels. Availability of this information facilitates the efforts of the space planner through understanding the physical constraints that may impact the planning of the workplace (Molnar, 1983).

Specification of ergonomic products

Ergonomics has become a significant design criterion that space planners are taking into consideration for achieving maximum resource efficiency and higher productivity rates at the workplace. In essence, the science of ergonomics is concerned with

applying biologic and engineering data and techniques to develop solutions for the interface of the worker and the workplace (Cotts, 1999). Rondeau *et al* (1995) describe the term ergonomic as a design created specifically to fit human dimensions and respond to functional requirements. Functional requirements are a collection of declarations and supporting data that describe what is needed in the building. These functional requirements are based on the goals and objectives of the organization and the operations of each unit within the organization (Brauer, 1992). Ergonomic solutions relate primarily to the provision of adjustable equipment, furniture and accessories (Rondeau *et al*, 1995).

Provisions for the disabled

The layout of the workplace should comply with the legislative requirements governing the provision of an accommodating workplace for individuals with sensory, cognitive and mobility impairments. As an example, the Americans with Disabilities Act requires that all areas available to the public be accessible to and usable by individuals with disabilities (Owen, 1993). Spaces in the building that would be affected due to the provision of handicap requirements include parking spaces, building entrances, stairs, elevators, rest rooms and workstations (Rondeau *et al*, 1995).

Adherence to life safety mandates

Throughout the process of workplace planning, space planning consultants and facility managers must be thoroughly familiar with the life safety requirements mandated by the local legislation. Rondeau *et al* (1995) indicate that fire evacuation plans, types and placement locations of fire extinguishers, sprinkler systems, unblocked exits, emergency lighting, adequate passage width, building fire alarm systems, non-combustible, flame-resistant furnishings, and unobstructed exit ways are some of the fundamental life safety concerns that must be addressed by design firms and facility professionals during the processes of space planning and interior design.

Analysis of telecommunication requirements

The workplace needs to be provided with the volume of cabling that will enable staff to handle information and communication demands at desk level. The space planner should be able to respond to individual staff needs for telephone, data terminals and other information devices in the planning of the workplace. The workplace of every staff should accordingly be provided with the appropriate number of power and data outlets that enable staff to effectively pursue their daily business activities (Owen, 1993). Effective cable management facilitates the provision of minimal unsightly runs of wiring across the office as well as minimizes the occurrence of trip hazards at the workplace (Wustemann and Booty, 2009).

Analysis of potential demands generated by equipment on the facility

The space planner should be able to establish whether equipment items will cause some conditions that the facility must accommodate. Conditions generated by equipment that the building must accommodate include excessive levels of noises, air containments such as particulates, gases, heat, moisture and fire hazards. The purpose of analyzing such demands that are placed on the building as a result of operating certain equipment in the facility is to alert the facility planner on the effects that may affect the building and its systems, and consequently workflow and productivity levels in the organization, as well as the provisions needed to accommodate the works of these equipment items (Brauer, 1992).

Financial factors

The financial factors relate to the feasibility of the space planning project. Considerations in this category are derived from the capability of the organization to invest in, and finance prospective facility projects. The set of financial factors are discussed as follows:

Budget allocated for office workspace programming

The amount of budget allocated to commission a design professional to gather and synthesize the requirements of users, for the efficient planning of the workplace, reflects the seriousness and the commitment of the organization to the exercise of facility planning. In this exercise, the users are consulted for the objective of obtaining these requirements. Later, these professionally defined requirements are compiled into a document, usually called an 'Architectural Program' (Brauer, 1992). Cotts (1999), however, describes some of the factors that negatively affect the development of an architectural program as lack of familiarity with the programming process, the view that programming is a luxury or an unneeded design cost, impatience to get to a design solution, and time pressure to complete the project.

Cost of usable space

Whether buying an entire building, leasing a floor or building a new facility, operating from more space than necessary ties up capital that could be used productively elsewhere. Moreover, operating from buildings that have unneeded special features, such as overrated structural load capacity, oversized utilities, unneeded communication systems or luxurious finishes, also ties up capital that could be invested somewhere else. Nevertheless, unnecessary capital expenditures on unneeded space or unneeded building features can easily be avoided if the requirements are accurate, comprehensive and well organized. Organizations, then, would find it easy to make decisions about the amount of space to buy, build or lease (Brauer, 1992). However, rental rates should only be part of the information needed to make a valid cost comparison between different buildings. Owen (1993) argues that assuming all other factors such as location and amenities are equal, the ratio between the rentable area and the usable area may differ from one building to another. To establish this ratio, the usable area on each floor of each building is calculated, and then multiplied by the rental rate. The result is the true cost per usable square meter. Once the cost per usable square meter of each building under consideration is determined, the organization can truly compare various options and select the one that fits its requirements.

Allowable project budget

In many cases, and next to human resources, office buildings are the second largest expenditure category for business organizations (Brown, 2008), regardless of whether these buildings are owned or leased (Williams, 1996). Supporting this fact, Alexander (1997) states that organizations of all kinds in different economies around the globe recognize the increasing cost of occupying buildings and providing services to support the business operations. Once a final budget for the project is established and approved by all concerned parties in the organization, it becomes the control point for the project and should not be exceeded (Owen, 1993). Budgeting is the disciplined pre-estimation of costs, and it is a key element for the proper planning and control of any project (Langston, 2003). The categories of work for which data are needed to develop the cost estimate for space planning and relocation projects include: items that are not normally provided by the landlord; furniture and fixtures; accessories; artwork; signage

and graphics; fees of external consultants; communications and data cable systems; moving costs; new equipment and installation charges; and document preparation (Owen, 1993).

Costs after moving in

When organizations move into a new or remodeled building, some of the users may find that their designated spaces do not meet their requirements for carrying out their tasks. Therefore, there is a usual period of adjustment in which users may move furniture and equipment; request a number of changes in the placement of partitions; and request modifications of lighting or thermal conditions. It is inevitable that productivity and cost of operations will be adversely affected during the adjustment to the new facility. Moreover, each required modification results in implementing a design and construction change, and consequently, an addition to the cost of the project (Brauer, 1992).

Cost per workstation

Nowadays, as working habits are becoming more flexible, the practice of providing one workstation for each employee might result in low workstation utilization and consequently additional cost to the organization. Therefore, organizations have started to devise approaches to minimize this cost through requiring employee to share workstations (Fawcett and Rigby, 2009). However, attempts to achieve cost-savings in this trait might result in decreasing the employees' productivity due to frequent distractions and loss of concentration (Erlach and Bichard, 2008).

SUSTAINABLE PLANNING OF THE OFFICE WORKPLACE

In light of the worldwide rising concerns for the environment, facilities planning and management professionals find themselves in the frontlines of the fight against waste generated from built-facilities. As built-facilities consume almost half of the world's resources, such high levels of consumption result in generating pollution and cause other environmental damages. Greenhouse gas emissions arising from power generation used to operate built-facilities are having damaging effects on the atmospheric ozone and global mean temperatures. Energy conservation is becoming a significant concern for facility managers. Aspects of waste and wasted energy are issues that facilities planning and management professionals should be taking into consideration if they are keen to add value to their organizations (Shah, 2007). The identification and implementation of programs to reduce resource usage is a significant issue. Mate (2003) indicates that some of the resource efficiency mechanisms that facility planners could apply include using energy-efficient lamps, and fittings, as well as setting appropriate lighting levels throughout the workplace; arranging the furniture and fittings in a manner that facilitates the provision of uniform lighting levels throughout the workplace, arranging air-conditioning zones so that rooms are not air conditioned when they are not in use; arranging for after hours switching off for air conditioning and lighting systems; and ensuring that windows are properly insulated to protect against heat gain and loss.

REVIEWING THE OFFICE WORKPLACE IN OPERATION

The physical office space, for many organizations, could be seen as a place for housing staff, and therefore a cost that should be minimized. However, inappropriate office space design may adversely affect staff's comfort, work efficiency and as such may result in staff turnover (Charles and Pero, 2006). The design and quality characteristics of an office building, in addition to the specific nature of an organization's requirements,

certainly establish the value of the facility for the occupier (Bottom *et al*, 1997). Upon the completion of the project and throughout the occupancy of the office workplace, space managers should ensure that the proper kind and amount of space are provided to all staff within the organization.

Space evaluations are one type of post-occupancy evaluations (POEs) that could be utilized to review the physical conditions of buildings in order to provide insights into the consequences of past design decisions and the resulting building performance (Brauer, 1992). Evaluations also allow developing lessons that could be learnt. These lessons provide for developing knowledge that could be used to improve future designs (Preiser and Nasar, 2008) and improve the quality of planning, programming, design, construction and occupancy of the office workplace (Van der Voordt and Maarleveld, 2006).

POEs as a measure of follow up after occupancy will help confirm that the new office workplace really works. POEs concentrate on building occupants or users and their requirements. In POEs, the facility manager would talk with the staff, and encourage them to raise any problems, requests or suggestions to their department heads for taking the necessary corrective actions (Owen, 1993). It is recommended that a POE, as a tool, is conducted approximately 12 months after completion to assess staff satisfaction with the layout of the office workplace, and hence, evaluate the outcomes of the project. The results obtained from the POE provide for a rational basis for improving the existing building and designing, constructing and operating better buildings in the future.

ASSESSMENT OF FACTORS INFLUENCING OFFICE WORKPLACE PLANNING AND DESIGN IN CORPORATE ORGANIZATIONS

This section presents an assessment of the perceived level of importance for each of the identified 17 functional, technical and financial factors influencing office workplace planning and design in corporate organizations.

Characteristics of the respondents

The assessment of the identified factors was limited as a case study to the views of a group of 22 experienced professional facility planners and designers, as subject matter experts, at the Office Services Department of the Saudi Arabian Oil Company. The core business activity of the company is production and export of crude oil and natural gas. Through the works of its professionals in three groups: planning and programs group; office building projects group; and executive office services group, the Office Services Department has the mission of providing assistance to various departments within the company through the following activities:

- Review, selection and delivery of standard office furniture and carpet for users of all levels.
- Office space supply, planning, design, reconfiguration, refurbishment, user relocation and move coordination.
- Disassembly, pickup and repository for all surplus office furniture.
- Coordination with other company organizations for building maintenance, renovation and compliance with fire and safety codes.

Development of a questionnaire survey

In addition to an open-ended section designed to encourage the group of professional planners and designers to comment on, or add to the list of the identified 17 factors,

the respondents were asked to mark in their perceived level of importance for each of the factors, through selecting one of four rating terms (levels of importance) provided in a questionnaire survey. The rating terms used, along with their corresponding scale weight, were 'Very Important', with 4 points, 'Important' with 3 points, 'Somewhat Important' with 2 points, 'Not Important' with one point.

Pilot-testing of the questionnaire survey

The developed questionnaire survey was pilot-tested through consultation with two of the respondents. The pilot-testing of the questionnaire survey served the purposes of testing the clarity and readability of the identified factor statements, pointing out locations of ambiguities, incorporating additional possible factors, and estimating the time needed for filling out the survey. No additional factors were added as the two professionals felt that the presently identified set of factors were sufficient.

Methodology

Once the collected assessments were tabulated, the multi-attribute utility approach of Change and Ive (2002) was utilized to analyze the ratings of the respondents and compute a mean rating point (MR), as a measure of the level of significance, for each factor within each group of factors. The following steps were undertaken:

- The total number of respondents for each factor was used to calculate the percentages of the number of responses associated with a particular rating term.
- The MR for each factor was calculated by summing the products of multiplications of the percentages of responses associated with each rating term times the scale weight of the corresponding rating term.
- The relative importance index (RII) for each of the identified factors was calculated by dividing the MR of that particular factor over the sum of all MRs of all factors within each group of factors.

Discussion of the results

The group of functional factors included six factors as illustrated in Table 1. The two factors 'operations and activities that the office workplace is required to support' and 'accurate definitions of user requirements of individual staff as well as different divisions within the organization' received the highest mean ratings and the highest importance index values, respectively, among all functional factors in this group. The author sees the above results to be highly reasonable. This is mainly due to two reasons. The first is the fact that planning and designing the workplace with full knowledge on the operations and activities to be undertaken would directly serve in achieving the set mission of the organization. The second reason is that accurate definition of user requirements of individual staff as well as different divisions within the organization would result in enabling staff to perform their tasks as efficiently as possible. Together, these two factors provide for immediate efficiency at the workplace on the functional level. Table 1 shows the mean rating value and the RII for each of the identified functional factors.

The group of technical factors included six factors as illustrated in Table 2. The factor 'adherence to life safety requirements mandated by the local legislation' received the highest mean rating value among all technical factors in this group. The author believes that the above result is highly reasonable as well, as adherence to life safety mandates is a requirement of the legislation for the continual operation of facilities and the survival of

Table 1: Functional factors influencing office workplace planning and design along with their mean ratings and relative importance index

Functional factors influencing office workplace planning and design in corporate facilities	Levels of importance				TR	MR	RII	%
	VI	I	SI	NI				
	4	3	2	1				
	%	%	%	%				
1. Operations and activities that the office workplace is required to support	68.2	31.8	0.0	0.0	22	3.682	0.184	18.4
2. Accurate definition of the user requirements of individual staff as well as different divisions within the organization	63.6	31.8	4.6	0.0	22	3.590	0.180	18.0
3. Preferred space adjacency among each divisional unit as well as different divisions within the organization	18.2	54.5	22.7	4.6	22	2.863	0.143	14.3
4. Implementation of workspace area standards for the assignment of spaces based on the performed functions	54.5	36.4	9.1	0.0	22	3.454	0.173	17.3
5. Specification of common areas required by all divisions (for example, conference rooms, reception areas and waiting areas)	54.5	31.8	13.7	0.0	22	3.408	0.170	17.0
6. Anticipation of the need to accommodate future changes in the organization (for example, expected expansions)	36.4	36.4	18.2	9.0	22	3.002	0.150	15.0
	—	—	—	—	—	19.999	1.000	100.0

the workforce, whereas consideration of the remaining aspects is not as crucial to the well-being of the workforce as consideration of life safety requirements in the workplace. The mean rating value and the RII for each of the identified technical factors are illustrated in Table 2.

The group of financial factors included five factors as illustrated in Table 3. The factor ‘budget allocated for office workplace programming’ received the highest mean rating value among all financial factors in this group. The author believes that this factor is highly significant due to the fact that the output of the architectural programming process serves to provide the design team with data to endeavor on developing a design solution for the workplace. Further, insufficient budgets allocated for programming might result in the misinterpretation of some of the project requirements. Bogers *et al* (2008) indicates that insufficient budgets for architectural programming would make it very challenging for architects to comprehend the contents of the architectural program. Table 3 presents the mean ratings and the RIIs for each of the identified financial factors.

The research has confirmed the significance of all of the identified factors. Assessment of the factors has revealed that they were judged as ‘Very Important’ or ‘Important’. On the basis of the results of the assessment conducted to obtain planners and designers’ perceived level of importance of the identified factors, the most important four factors to

Table 2: Technical factors influencing office workplace planning and design along with their mean ratings and relative importance index

<i>Technical factors influencing office workplace planning and design in corporate facilities</i>	<i>Levels of importance</i>				<i>TR</i>	<i>MR</i>	<i>RII</i>	<i>%</i>
	<i>VI</i>	<i>I</i>	<i>SI</i>	<i>NI</i>				
	<i>4</i>	<i>3</i>	<i>2</i>	<i>1</i>				
	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>				
1. Physical facility constraints (for example, building height, column spacing, floor types and finishes and wall types)	54.5	36.4	4.6	4.6	22	3.410	0.176	17.6
2. Specification of ergonomic products for raising productivity at the workplace (for example, adjustable furniture)	54.5	27.3	13.6	4.6	22	3.317	0.171	17.1
3. Provisions to accommodate individuals with sensory and cognitive impairments in the workplace	18.2	40.9	40.9	0.0	22	2.773	0.143	14.3
4. Adherence to life safety requirements mandated by the local legislation (for example, fire safety systems)	68.2	22.7	9.1	0.0	22	3.591	0.185	18.5
5. Provision of telecommunication requirements (for example, power, phone and data com outlet)	59.1	18.2	18.2	4.6	22	3.320	0.172	17.2
6. Accommodation of effects caused by operating certain equipment (for example, high levels of noises and fire hazards)	27.3	50.0	13.6	9.1	22	2.955	0.153	15.3
	—	—	—	—	—	19.366	1.000	100.0

Table 3: Financial factors influencing office workplace planning and design along with their mean ratings and relative importance index

<i>Financial factors influencing office workplace planning and design in corporate facilities</i>	<i>Levels of importance</i>				<i>TR</i>	<i>MR</i>	<i>RII</i>	<i>%</i>
	<i>VI</i>	<i>I</i>	<i>SI</i>	<i>NI</i>				
	<i>4</i>	<i>3</i>	<i>2</i>	<i>1</i>				
	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>				
1. Budget allocated for office workplace programming	59.1	31.8	4.6	4.6	22	3.456	0.220	22.0
2. Cost of usable space (for example, cost per usable square meter or square foot)	27.3	54.5	18.2	0.0	22	3.091	0.197	19.7
3. Allowable budget that should not be exceeded for the space planning project	36.4	50.0	9.1	4.6	22	3.184	0.203	20.3
4. Cost incurred after moving in (for example, cost due to changes in placement of partitions and lighting layout modifications)	22.7	59.1	13.6	4.6	22	2.999	0.191	19.1
5. Cost of providing one workstation for each employee	36.4	36.4	13.6	13.6	22	2.956	0.189	18.9
	—	—	—	—	—	15.686	1.000	100.0

consider during the process of planning and designing office workplaces for corporate organizations were ‘operations and activities that the office workplace is required to support’; ‘accurate definitions of user requirements of individual staff as well as different divisions within the organization’; ‘adherence to life safety requirements mandated by the local legislation’ and ‘budget allocated for office workplace programming’.

CONCLUSIONS

To recapitulate, spatial considerations have a strong bearing on the performance of the organization. Space planning and management both contribute towards the provision of a supportive workplace environment that enable the organization to achieve its strategic objectives in a cost-effective manner. As a matter of fact, in virtually every type of workplace environment, the evidence of space planning can be realized. Space planning is a discipline concerned with translating the space needs of an organization onto the floor plates of the building and producing a workplace environment suitable for the organization to gain a return on its investment. Space management, on the other hand, is concerned with providing the delivery of space services and the management of the completed space plan. In practice, office space in many organizations may be provided in absence of considering work environment settings, space planning methodologies, technology, innovative and creative ways of operating at the workplace. This article has investigated the nature and magnitude of significance of the factors affecting the planning and design of office workplace. The significance of this article stems from providing practical value to space planning consultants involved in developing layouts of office space in corporate facilities, through being aware of the significance of many factors that have to be taken on board in facilities planning projects. These factors have been identified and classified under three main groups including functional, technical and financial factors. It has been established that comprehension of, and designing the office workplace in light of the identified factors would result in attracting and retaining staff, which adds value to the organization. Incorporating these factors into consideration has also the potential to improve the performance of organizations through increased management effectiveness, higher user satisfaction and higher productivity.

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