THE RELATIONSHIP BETWEEN BUILDINGS AND ORGANISATIONAL PERFORMANCE IN THE HOSPITAL SECTOR.

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ABSTRACT

This paper presents a research project which is investigating the relationship between buildings, building users and organisational performance in the hospital sector. Here, significant changes are creating a mismatch between health-care priorities and building facilities which is threatening the quality of health-care provision. The research will result in a greater understanding of the relationship between people, buildings and organisational performance. A model will be produced which will help managers more effectively manage building facilities. It will also redress a deficiency in management theory which has neglected the influence of buildings upon organisational effectiveness.

KEYWORDS:
Facilities management; behaviour; performance; environment; social network analysis; hospitals.

INTRODUCTION

There is considerable evidence that a building’s internal environment influences the way that people behave, feel and interact in a work setting. For example, levels of work-force satisfaction, communication, creativity, comfort, health and safety and productivity can be affected by space layouts, lighting, finishes/decor, landscaping and service provision such as air-conditioning and IT (Romm and Browning 1995, Douglas 1996, Harrison et al 1998). This is important since the typical life-cycle costs of operating a building for an organisation are 77-88% labour, compared to 6-7% capital costs and 11-16% maintenance/energy costs (Valins and Salter 1996). Indeed, the World Health Organisation has made a priority of investigating the impact that building environments have upon employees’ health and it has been estimated that lost productivity due to building related health complaints could be as high as 10% (Wagenberg 1997, Okisho and Alexander 1997). Despite increasing evidence that buildings do affect peoples’ work performance, management theory relating to organisational effectiveness has largely neglected this issue. The focus has been upon behavioural and organisational issues such as styles of leadership, methods of motivation, planning and control procedures, organisational structure and so forth. While the concept of technology has featured heavily in management theory, it has become associated with the operation of machines and installations in production-orientated organisations (Perrow 1970, Porter et al 1975). However, Veen (1984) has argued that the concept of technology is much wider and is related to the totality of processes and operations which both production-orientated and service-orientated organisations use to transform inputs (resources, problems, questions, information) into outputs (products, solutions, services, answers). This technology includes an organisation’s buildings and in this sense, any research relating to the relationship between buildings and the operational performance of people who use them could make an important contribution towards redressing an important deficiency in management theory. The aim of this paper is to describe a research project which will begin to do this.

BUILDING/BUSINESS MISMATCHES IN THE HOSPITAL SECTOR

Research into the relationship between buildings and business performance is timely because unprecedented changes in business environments are creating an increasing gap between building
environments and the needs of organisations which use them. This is a particular problem in the hospital sector where technological advances, demographic changes, advances in clinical procedures, new trends in patient management, increasing public expectations of health-care provision, increasing accountability, reducing resources and pressures to improve performance are changing hospitals’ requirements of their buildings (Pitt and Griffith 1995, Wylde and Valins 1996, Smith 1999). This is leading to a mismatch between health-care priorities and health-care facilities which is threatening to compromise the quality of service which hospitals provide to the community (Valins et al 1996, McGregor and Then 1999). The relationship between building environments and organisational performance is particularly strong in the health sector for a number of reasons. For example, many patients’ illnesses make them highly sensitive to environmental conditions since, for example, a minute temperature increase in a burns ward could cause patient fatalities (Pitt and George 1995). Hospital patients and staff are also exposed to many potentially infectious bio-hazards which require containment. Furthermore, hospitals rely heavily upon highly delicate, sensitive and specialised electro-mechanical equipment which can often be acting as a crucial life-support system for very sick people. As Moy (1995) argued, hospitals are among the most complex, costly and challenging buildings to manage and a building facilities manager in the health service must aim for zero defects in the physical operation of a hospital because even the most minor malfunctions can be catastrophic.

This particularly strong relationship between buildings, people and organisational performance made the hospital sector a unique and relevant context within which to conduct our research. Indeed, since very few hospitals understand the value that their building assets contribute to health-care services, the results could make a significant contribution towards improving the management of building facilities in this sector (McGregor and Then 1999). As Valins and Salter (1996: 155) point out, “Getting value for money out of health and long-term care facilities …….. has always been a puzzle and concern to sponsors and managers contemplating new, or improving existing facilities”. Although there has been some research into identifying key performance indicators for hospital buildings (DHSS 1983, Deeble 1992, CII 1998), it merely facilitates control through benchmarking. It does not increase understanding of the relationship between hospital buildings, the people who use them and the quality of health-care services. This is the best basis for more effective building facilities management.

THE RESEARCH AIMS

It is within the above context that our research aims to investigate the relationship between buildings, building users and organisational effectiveness in the hospital sector. We are not interested in the functional performance of specific building components such as lifts, air conditioning etc. but with the holistic sociological, behavioural and emotional impact of a building’s internal environment in terms of peoples’ work performance.

The specific aims of this research are to:

1. Investigate the interactional, behavioural and emotional requirements of hospital buildings from a variety of stakeholder’s perspectives.
2. Investigate any mismatches between health-care requirements and health-care facilities.
3. To produce and test a conceptual model which accurately represents the relationship between buildings, building users and organisational effectiveness in the hospital sector.

Although the research will take place within the hospital sector, the anticipated outcome will be a greater understanding of the relationship between people and their performance within any building environment. A model will be produced which will explain the ways in which buildings influence people’s emotions, behaviours and interactions. Furthermore, the results will contribute a significant amount to management theory by adding a new dimension to the theoretical construct of organisational technology which has hitherto been explored from a very narrow perspective. This new theoretical base which will be represented in a conceptual model, will assist managers to optimise the contribution which their buildings make to core business objectives. It will also provide a rigorous
theoretical foundation upon which subsequent researchers in this field could build. Currently, this area of research is in its infancy and has no rigorous theoretical base. This is holding back advances.

PROPOSITIONS

The propositions to be tested in this research are:

- **That buildings have a range of stakeholders who, in order to effectively perform their organisational role, have varied and often conflicting interactional, behavioural and emotional needs.**
- **These conflicting building needs are resolved through power struggles between stakeholders with differing interests.**
- **Performance problems occur in areas where stakeholders have a relatively low power-base because this is where mismatches between buildings and business needs occur.**

In investigating the above propositions the research questions that need answering are:

- Who are building stakeholders?
- How varied are their emotional, behavioural and interactional needs of buildings?
- How do stakeholders resolve conflicting needs?
- Do buildings impede stakeholders’ needs?
- How do buildings impede stakeholders’ needs?
- Are there any mismatches between stakeholders’ needs and building facilities?
- Where do any mismatches tend to occur?

Collectively, the answers to these research questions will permit the development of a conceptual model which will explain the relationship between buildings, building users and organisational effectiveness in the hospital sector. The rationale underpinning these propositions and research questions and the method for investigating them is explained below.

RESEARCH METHOD AND RATIONALE

Robins *et al’s* (1997) critical discussion of the goal paradigm in organisational analysis observed that the identification of organisational goals is complicated by the multitude of formal and informal goals that drive organisations. For example, modern hospitals are driven by a wide variety of strategic, tactical and operational goals which relate to the quality of health-care to patients, the motivation of clinical staff and their health and safety, equipment maintenance and up-dating, profit making, growth and expansion, community service, minimisation of pollutants to the environment and so on. Among this wide range of corporate goals there will also be goals relating to the use and performance of building facilities. However, such goals are often difficult to isolate for a number of reasons. Firstly, most organisations consider buildings an operational overhead and a static factor of production which does not merit serious managerial attention (Varcoe 1996, McGregor and Then 1999). Secondly, most buildings have a diverse range of stakeholders who are individuals or groups that will be significantly affected by and/or will significantly affect decisions changing the building environment (London *et al* 1995). For example, in a study of the hospital design process, Loosemore and Davies (1994) identified 52 separate stakeholder groups whose requirements had to be considered. Many of these were external to the hospital organisation such as environmentalists, disabled pressure groups, emergency services etc.

**Social network analysis**

Data about an organisation’s constantly changing array of “official” goals are contained in various locations, the most obvious of which are its corporate mission statements, articles of association, statutes, annual reports and so forth. The content analysis of annual reports has been used extensively
in research into corporate social, ethical and environmental standards (Gray et al 1996, Gutherie et al 1999). However, Robbins et al (1998) argue that such sources are of little value in identifying corporate objectives because their prime objective is to pacify external stakeholder groups and to create a public image, rather than to communicate the reality of corporate values and expectations. Furthermore, they only provide insights into formal objectives and rarely mention those relating to an organisation’s building facilities. Perrow (1961) and Robbins et al (1997) argue that an organisation’s real objectives are far more clearly embodied in the statements and behaviours of people at various levels of an organisation. Their research indicated that different actors attempt to transform their interests into organisational goals by engaging in behaviour which they perceived as instrumental to them. This involves interacting with other stakeholders who may have conflicting goals and those with the most power ensure that their goals are given the highest priority. In this way, the goals of the dominant coalition become those of the organisation (Veen 1984). This implies that data about peoples’ building needs in emotional, behavioural and interactional terms, are contained within an organisation’s formal and informal communication networks and it is possible to analyse these using social network analysis (Scott 1991, Wasserman and Faust 1994). Social network analysis is a quantitative method of analysing communication patterns in organisations which is complementary to the systems perspective. The technique is attracting growing interest in the social and behavioural sciences and has its origins in sociology (Simmel 1950) and anthropology (Mitchell 1969). In essence, the social network perspective views an organisation as a system of objects (people, groups, organisations) who develop stable and regular patterns of interaction. These patterns have a structure which has a significant influence upon organisational effectiveness and can be used to interpret the social behaviour of the person’s involved. For example, some members of an organisation may communicate more frequently with certain people but not with others, certain topics of conversation may dominate communications between certain people but not others, some information may travel through certain pathways or networks etc. There will be reasons for these patterns of interaction and some may be more efficient than others in providing health-care. For example, in a hospital, one may expect that the building should enable surgeons to communicate directly with the emergency section because any delay in getting drugs etc. could cause loss of life. In investigating such patterns, social network analysis provides an accepted vocabulary of social structure which is underpinned by well tested and reliable indexing techniques. This is in contrast to other organisational mapping techniques such as Linear Responsibility Charts (Cleland and King 1975) and Structured data analysis (Demarco 1979) which were considered but rejected because of their limited ability to describe and index the structural attributes of systems. For example, by using social network analysis it is possible to identify central and peripheral actors within an organisation, to identify factions and coalitions, to identify gatekeepers of information and thereby, to identify those who hold positions of power. As empirical studies by Pettigrew (1973) and Kenny and Wilson (1984) have demonstrated, peoples’ positioning within a social network is arguably the most reliable indicator of their power because it determines their access to information and influence. In essence, social network analysis provides the most powerful tool available to unscramble the complexities of how buildings influence patterns of behaviour and interaction within organisations and thereby, to understand the performance of buildings in a holistic sense.

Data collection
The basis of social network analysis is data about people’s interactions and Bernard et al’s (1982) analysis of the reliability of various data collection techniques concluded that it is best to use a combination of interviews and diaries because they have a mutually corrective affect. For example, diaries enable data to be collected while fresh in a respondent’s mind, are not dependent upon the memory limitations of the respondent and are relatively unobtrusive. However, they do depend upon the diligence of respondents and require careful management. In contrast, interview data quality depends upon people’s memory limitations but it does provide detailed information about people’s perceptions, emotions and feelings. Therefore, data about stakeholder’s building needs will be collected using a combination of diaries and interviews. Initially, representatives of various building stakeholders will be asked to keep a simple diary of their interactions over a predetermined period of time. Stakeholder groups will be identified through the functional divisions and hierarchical levels identified on formal organisation charts because it is reasonable to assume that people’s expectations of buildings will be
related to this horizontal and vertical differentiation. While formal organisational charts are often said to be idealistic representations of structure, they provide a useful basic framework to organise data collection. External stakeholder groups will be identifiable in a hospital’s correspondence relating to the use of its buildings.

The simple diary will require people to record who they interacted with, the purpose of the interaction and difficulties in interaction relating to building design. At the end of the pre-determined period of data collection, the diaries will be collected back from a wide range of stakeholders and cross-referenced to produce a communication network which will be analysed using a social network analysis program. The most widely used programs are SOCK (Alba and Guttman 1972), NEGOPY (Richards 1976), STRUCTURE (Burt 1982), GRADAP (Stockman 1983) and UCINET (Borgatti et al 1999). The incompatibility in programs in terms of their assumptions, means that it is most sensible to use only one package and UCINET will be used because the range of structural measures and assumptions are most appropriate to the problem being investigated in this research. A typical social network produced by UCINET is illustrated in Figure 1. In the network, nodes can represent people or departments and the lines can represent what is of interest to the researcher or manager such as information flows (informal, formal, fax, letter, verbal etc), other resource flows such as money or materials, authority or responsibility (indicating power relationships) or friendship ties. In the process modelled in Figure 1, it is clear that some nodes are more central and peripheral than others in the flows which are being investigated. However, as discussed in the above sections, UCINET provides numerical indices to give the manager and researcher far more specific and valuable information about patterns of relationships. Indeed, UCINET is so flexible as to allow one to “drag” nodes to re-configure the structure and thereby, assess its impact upon effectiveness. This is extremely powerful in the design and the continual re-design of organisations for maximum effectiveness in a highly dynamic business environment.

![Figure 1: A typical social network produced by UCINET](image-url)
The limitations of social network analysis

The limitation of social network analysis is that the data produced is purely numerical. For example, while it may indicate frequent communication between two people, the communication itself may be poor due to some aspect of the building within which it occurred. Furthermore, while it may indicate that two individuals communicate, it is not able to provide reasons why. Consequently, the technique of social network analysis must be seen as an aid to explanation rather than an end in itself. To be of any value, social network analysis results must be placed in context by parallel qualitative analysis and this will be done by using social network analysis results as the basis for a second phase of data collection which will involve retrospective semi-structured interviews with representatives of each stakeholder group. Their purpose will be to discuss the social network analysis results and to gather qualitative data about people’s behaviour and differing perceptions of the building in use. For example, if two stakeholders communicate relatively frequently then their diary entries would form the basis of a discussion about how the building impacts upon that relationship, of what their building requirements are and of how they are represented and resolved.

The above process of data collection and analysis will reveal the expectations that different stakeholder groups have of hospital buildings. Furthermore, it will also reveal the nature of the relationship that people have with those buildings and the mechanisms which are used to resolve conflicting interests. The data will also reveal mismatches between changing health-care priorities and current health-care facilities. Conceptually, it will enable the production of a model which will represent the variety of stakeholders in a building and the way that they interact to resolve their specific building needs. The model will be tested by altering a variety of its dimensions to eradicate mismatches which were identified in the case studies. Refinements to the model will be made through the results of a second phase of data collection and social network analysis.

CONCLUSION

The aim of this paper was to explain a research project which is investigating the relationship between buildings, building users and organisational performance in the hospital sector. Here, significant changes are creating a mismatch between health-care priorities and building facilities which is threatening the quality of health-care provision. Although the research is to occur within the health-care sector, there is no reason to believe that the results will not be applicable in other settings. The significant innovation in this research is the recognition that buildings perform a social function and the application of a combination of complementary quantitative and qualitative methods from anthropology, sociology and the behavioural sciences to study their influence upon people’s performance in work. Being exploratory in nature, it is likely that this research will generate as many questions as it does answers and by doing so, lead to a new theme of research in the area of building facilities management.

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