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HOW MAY DESIGNERS CREATE FURNITURE THAT ALLOWS MEANINGFUL PLACE-MAKING IN MODERN OFFICE

CASE STUDY IN MALAYSIAN OFFICE ENVIRONMENT

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ABSTRACT

The aim of this ongoing study is to investigate a participatory design method. The study is to develop a working methodology for furniture designer to allow users to express their aspirations through place making or creation of meaningful office workspaces. In my early field work, I identify a participatory design approach with mock-ups to investigate the main methods and to explore design in developing new office environments. The researches so far have revealed that people used variety of ways to make the environment familiar and comfortable for them and mark their identity in the organization. By using mock-ups, respondents tend to reshape their workplace referring to their home or previous office and environmental experiences. These are not practical design ideas but they revealed needs and aspirations in relevant way and arguably will be very helpful in developing and identify design concept.

Keywords: Participatory Design, Place Making & Meaningful Workplace

INTRODUCTION

Over the past 50 years, there have been many discussions on the office environment especially on productivity rates, office function, privacy, safety, and satisfaction, but there has been few study of the relationship between design and workplace personalization (Knobel, 1987). According to Duval et al. (2002) and Brennan et. al. (2002), the majority of workers are negative about their environment although these offices were intended to enhance communication, conversation and team unity.

Many workers were stressed by long working hours, frustrating commutes and communication overloads (Duval et al., 2002). I suggest a place-making approach may enable us to overcome some of these problems; place making is enabled by design, but enacted by individuals (Schneider, 1987).

Many people spend most of their working life at the workplace. According to Wells et al. (2007), personalization offers many benefits to the worker and the organization, as it can enhance job satisfaction and well being and improve morale. Personalization can be defined as the modification of an environment by its occupants to reflect their identities. Workplace personalization can help release employees from work stress, help them to express emotion, and evoke positive emotions. It also makes the workplace more a place of pleasure and fun, creating a sense of meaning for the working environment. Therefore, achieving design solutions which enable placemaking and customisation would seem to be desirable. The workplace should be designed to fit into the culture and nature of the work of a group (Harrison and Dourish, 2006).

Designers could use the findings of this research to undertake the necessary user-based research to design office environments in such a way that they take into account workers' needs to create a feeling of importance and attachment to their work and organization. The sense of a meaningful and user-friendly workplace is likely to contribute to office workers' satisfaction. Therefore, as a designer and researcher, I would be interested in developing a design method that would help designers to create furniture that allows meaningful place-making to take place in the modern workspace.



Figure 1: Modern Office (Resolve System by Herman Miller 2001)

DEVELOPMENT OF RESEARCH OBJECTIVES

The research arose from my observation as a professional furniture designer. In my previous career, I have identified that there were weaknesses in design consultation between furniture manufacturers and clients in Malaysia. Most design decisions were made by suppliers and office managers without referring to users. From reading more widely it appeared that while some International office furniture makers have undertaken user studies, there is no published academic research on Participatory Design in this industry. From here I chose to investigate the potential of participatory design approaches for my PhD research.

I started my empirical work by conducting an initial study which involved interviews with administrative workers in the Science Park building at Sheffield Hallam University in the United Kingdom. The aim of the empirical work was to explore the user's experiences and their needs toward their workplace. These interviews were focused on how office workers interacted with their workplace in their daily activities at their workplace as suggested by Bayer and Holzblatt, (1999).

During the interview I discovered that there were problems getting the office workers to explain their ideas through verbal explanations. They did not have

techniques and tools to express their ideas. From there I started to seek appropriate tools to approach the users and my approach was influenced by Mitchell's (1995) work, using mock-ups as tools to communicate with users' in my data collection. According to Mitchell's (1995) and Lemons et al (2010) the mock-ups allowed users to express their opinions and aspirations in developing a new ideas.

The main objective of my research is to investigate the potential of participatory design approach in designing office furniture appropriate for the needs and satisfaction of its end-users. The participatory design movement was implemented in many other parts of the world with successful results (e.g Ehn and Kyng, (1991) and Mitchell, (1995)) However this was only the case in the United Kingdom, United States and many European countries but not in Malaysia. One of the ideas of this research is to see whether contemporary ideas from users can be implemented into professional design practice.

CONTEXTUAL REVIEW

WORKPLACE DEVELOPMENT

The 20th century has witnessed many changes in the office environment, in particular in construction and office technology and in the increases in the office workforce (Duval et al., 2002), which has resulted in large numbers of people sharing limited office space. Developments in computer technology have also influenced the layout of the modern office environment (Long, 1987 p.5).

The new idea that emerged in the organization of offices and work spaces after World War II was a socialist ideology that spread in the Northern European region and emphasized a more non-hierarchical environment. One of the main streams, “*Burolandschaft*”, was introduced in Germany by the Quickborner Team in 1950. The term is translated as “office landscape”. The main idea behind the system is to bring managers, officers and staff members to sit together to work as a team in a large open space (Budd, 2001).

In the 1960s in America, the X and Y theory was developed by Douglas McGregor. This management theory described two different criteria in workforce motivation. It was widely used in office management and organizational development. In this theory, it is assumed that X is the traditional view, where workers have to be directed and controlled, whereas Y is an integration of individuals and organizations (Gershenfeld, 2006). The X and Y theory influenced Herman Miller in designing Action Office 1 and 2. Open plan system (OPS) furniture designed for open plan offices was introduced in 1964. Robert Propst, assisted by Herman Miller’s furniture company designer, George Nelson, developed Action Office 1. It offered office furniture that consisted of a basic desk and filing accessories with a T-shaped cantilevered, die-cast, polished aluminium frame. In 1968, Propst developed Action Office 2, an office modular system that could be customized according to the user’s needs.

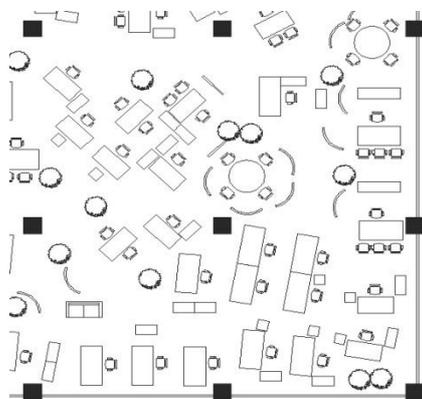


Figure 2: “*Burolandschaft*”

The panel-based design consisted of desktop, shelves, a storage unit and a panel system that

divided and organized space in the office (Knobel, 1987). Open plan offices provided a flexible working environment, space utilization and cost savings. They also promoted team work and communication among offices’ occupants (Chales and Veitch, 2002). This introduced revolutionary modularity in the overall shared workspace, but not which was not significantly extended to the individual workspaces It still represented a macro-view of office design which didn't necessarily value individuals and their needs.

In the 2000s, there was a change in the concept of the workplace. The concept of office design in the 21st century concentrates on satisfying the workers (Knobel, 1987). The mobile workplace was developed by Workscape21, a workplace studies program at Cornell University (Becker and Tenessen, 1995). Although, in theory, the concept offers advantages to workers in organizing their work, space and time, workers demonstrated a desire to work in a more fixed environment. Riratanaphong (2006), in his study on mobile workplaces, revealed that workers suffer from overwork, stress at home and feeling lost in their organization.

OFFICE ENVIRONMENT

The importance of a meaningful workplace and the concept of an office environment and its relationship with office workers has been discussed by a number of researchers, authors and scholars in recent years (e.g., Scheiberg (1990), Wells (2000), Wells and Thelen (2002), Spagnolli and Gamberini (2005), Vischer (2007), Haynes (2007). and Dinc (2009).

According to Bitner (1992), one of the challenges in designing an environment to enhance individual approach behaviours and encourage those that are appropriate, is that what is an optimal design for one person or group may not be an optimal design for others. Wells (2000), in her research in environment psychology, revealed an indirect relationship between personalization and employee well-being and between satisfaction with the physical work environment and job satisfaction. Wells (2000) concluded that the changing of offices to allow employee personalization of the office environment has a special significance. Personalization is the deliberate decoration or modification of an

environment by its occupants to reflect their identities. Schneider (1987) claims that environment and people are not separable and that the people in an environment make it what it is. They behave the way they do because they were attracted to that environment, were selected by it and stayed with it. Different kinds of organization attract, select and retain different kinds of people and it is the outcome of the attraction-selection-attrition (ASA) cycle that determines why organizations look and feel different from each other.

Furthermore, Scheiberg (1990) suggests that the personalization of space acts as a reflexive communication through emotional responses to the items that surround them; employees design a workspace that “speaks” to them and aids them in their day-to-day functioning, both emotionally and intellectually. The personalization of space can also indicate something to the unit and his or her emotional relationship or commitment to the unit or organization.

Wells (2000), Wells and Thelen (2002) and Wells, Thelen and Ruark (2007) highlighted the importance of understanding user needs and office personalization; their research revealed an indirect relationship between personalization and employee well-being with satisfaction with the physical work environment and job satisfaction as intervening variables. There are also gender differences in personalization.

USER SATISFACTION TOWARD MEANINGFUL WORKPLACE

The concept of general satisfaction is defined as the extent to which a worker feels positively or negatively about his or her job. It refers to employee’s satisfaction with the general aspect of work situation such as pay, supervision and the firm as a whole. (Noordin and Jusoff, 2009 p122).

According to Scheiberg (1990) there seems to be a connection between positive emotions regarding the workplace, satisfaction and job performance. Satisfying these factors can lead to greater satisfaction and ease in the workplace in turn making

an employee feel better about their job. Thus, personalizing their workplace becomes a meaningful and productive process. It relates to employees’ satisfaction alongside the general aspects of the work situation such as pay, supervision and the firm as a whole.

Futher, Perry and O’Hara (2003), in their research in display-based activity in the workplace, reveal that through making and use of place, workers project information about themselves, and what they are doing makes them more simply space for working and they become socially meaningful places.

OFFICE DEVELOPMENT IN MALAYSIA

Modern office development in Malaysia began when the first government office was built at Petaling Jaya in 1958, followed by the Parliament building which was built in 1963 and Radio and Television Malaysia (RTM) in 1968. In 1974, A Malaysian Government Complex was built in Jalan Duta, Kuala Lumpur. The building was one of the largest office buildings in Malaysia, with places for more various government departments.

The increase in the workforce in the early 1990s forced the Malaysian government to expand the office buildings to accommodate their office employees.

Malaysia began its search for a new Government administrative centre in the 1980s to divert some development away from Kuala Lumpur. A site at Prang Besar in the Sepang district, Selangor was chosen in view of its strategic location between Kuala Lumpur and Kuala Lumpur International Airport (KLIA). The New Federal Government Administrative Centre is named “Putrajaya” in honour of Malaysia first Prime Minister, YTM Tunku Abdul Rahman Putra al-Haj, for his invaluable contributions to the nation.

While Kuala Lumpur will remain the country’s capital city as well as the premiere financial and commercial centre, Putrajaya will play the role of the new Federal Government Administrative Centre. Construction of the new city began in August 1995. When the city is fully developed, it will have a total of 64,000 housing units, which will cater for a

population of around 320,000 people. In 2007, the population of Putrajaya was estimated to be over 30,000, which comprised mainly government servants (Federal Territory of Putrajaya website: www.ppj.gov.my, access on 22 June 2010)



Figure 3: Perdana Putra, Putrajaya

METHODS

The practical work of this research started with preliminary work in understanding the needs of office workers. The pilot work was performed between the months of March 2010 and May 2010 in Sheffield. Techniques such as observation and semi-structured and in-depth interviews were developed from social research.

In a later stage, scale mock-ups will be used in the data collection to allow users to demonstrate their practices and experience changes in their workplace, as suggested by Ehn and Kyng (1991), Mitchell (1995) and Lemons et al. (2010).

Lemons et al. (2010: p.288) in their study using models in teaching engineering design, claimed that physical construction of a model during an open-ended design task helped students generate and evaluate ideas and visualize their ideas better and helped uncover differences between behaviour and the conceptual models used to predict that behaviour.

I used a combination of participatory design using mock-ups to explore the main problem and opportunities in this research topic. User-centred design approaches have been used in design and it is agreed that it is crucial to involve the users in

product development (Beyer and Holtzblatt, (1999); and Lee, (2006)). The mock-ups allow respondents to simulate a performance of their daily activities according to their needs, and the artefacts provide physical proof of how users reshape their workplace.

ROLE PLAY WITH MOCK-UPS

Existing qualitative social science approaches such as interviews and direct observation were used to understand the users' environment experiences and approaches in their daily work. Through ideas, opinions and dissatisfaction about their current workplace, the main role play with mock-ups was enacted to generate some new ideas of workplace design. The aim of the role play is to:

- provide research instruments to support my design work.
- explore how people perform their daily activities in their workplace.
- explore new ideas in developing office workplace.

Indirectly, resulting from the role-play, was the design work that has contributed to the design development in this research. It has also generated design criteria that changed and created design opportunities for developing new workplace design. According to Lemons et al. (2010), physical construction of a model during role play design tasks help us to generate and evaluate ideas, better visualize our ideas, and help to uncover differences between real behavior and the conceptual model used to predict that behavior. Thus, the conceptual design work has also challenged the users to speculate upon their ideas and needs for working in their future office environment.

Mock-ups (Figure 4) were made using several materials such as cardboard, soft board and wooden blocks. Existing scale models, such as dolls mugs and flowers, were also used in the role play. The mock-ups were fabricated in a scale of 1:7, so they could be stored in a small box for mobility purposes.

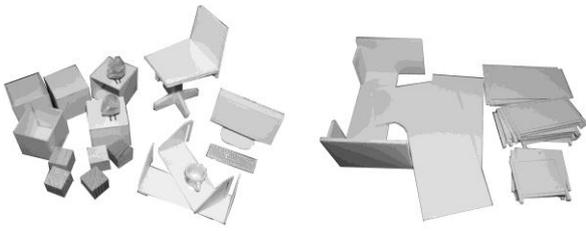


Figure 4: Mock-ups

INTERVIEW

The interviews started by the respondent explaining their working experience, background and their daily activities. The objective of the question is to develop a relationship between the researcher and the respondent.

The interviews were open ended and the questions were elaborated upon during the interview. Five main questions we used to guide the interview and these were elaborated in relation the respondent's interests. The five main questions were: (i) introduction - tell me about yourself (ii) user's approach to work - what is your job (iii) user's practical work - show me the practical tasks you do (iv) user emotional needs - is your workstation suitable or unsuitable (use mock-ups to explain the workplace) and (v) user's new ideas - if you have complete freedom, what will your workstation look like (use mock-ups to show idea).

OBSERVATION

Respondents used mock-ups to demonstrate their existing workplace, their approaches to their daily jobs and their ideas for new designs. Observations activities were recorded through audio and visual formats using a digital video camera with tripod and digital Single Lense Reflex Camera (DSLR). The video recording only focused on the task performed. Pictures were taken at two key points ; the pictures of existing, and the new idea of workplace layout. No pictures were taken which would identify participants. Pictures were taken to support the interviews and as visual evidence.

INITIAL FINDING

PLACE MAKING

Respondents were asked to perform their ideas to develop a new workplace layout according to their personal needs by using mock-ups. They were free to express their ideas and not limited to current environments. Place making can be divided into a two stages approach.

i. Existing Layout (Before New Idea Development)

Some respondents demonstrated that they reshaped their workplace from the first time they moved into their office.

For example R02 and R03 moved their cabinets according to their daily and personal needs. According to R02.....

"...I have moved the cabinet (figure 5). The cabinet was located at the table edge and it was difficult for me to open the cabinet door especially the bottom compartments. I also moved the cabinet so I can reach all my stuff within my hand range..."
(Respondent comment)

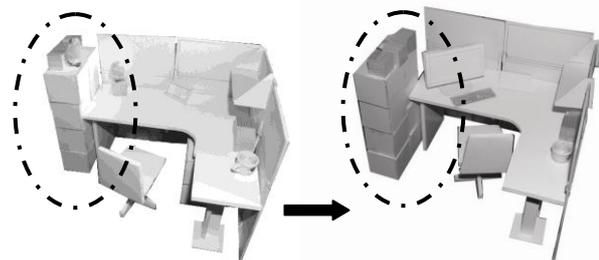


Figure 5: Workplace 'reshaping'

Meanwhile R06 has done major changes in her workplace. She rotated her workplace 180° for ease of her daily workflow. According to R06...

"...I moved my desk. We are facing the wall. It's not very nice. Somebody will come through the door so I have to turn around so they will get attention. So that's why we moved the desk around..."(Respondent comment)

According to Anjum, Ashcroft and Paul (2004) in their research regarding workplace design, office workers making decisions about the layout and furniture create an impact on workers' productivity. Type of job and user needs strongly influence users to reshape and rearrange their workplace.

ii. New Ideas in Developing a New Workplace

Respondents were asked to perform their ideas to develop a new workplace layout according to their personal needs. They were free to express their idea and not limited to current environments.

Most of the respondents tended to develop their workplace according to their nature of work and daily working activities. For example R01 (figure 6) needs a bigger table and storage due to his job tasks. Their ideas were also influenced by their experience with the current environment. Brunia and Gosselink (2009) claimed that workplace identity was more related to workers specific tasks and workplace personalization helped workers to give the environments a more human feeling, in which people would feel comfortable.

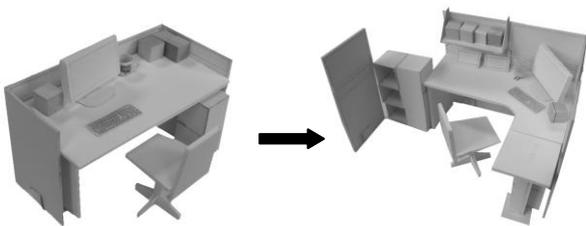


Figure 6: R01 environment experience

PRIVACY IN OFFICE ENVIRONMENT

Although privacy was almost never mentioned directly by the respondents in the interview, the way respondents reshape their workplace showed an important finding. Most of the respondents preferred to have a partition to divide their space with others and to show their territory. According to Anjum, Ashcroft and Paul (2004), workers arranged their desk and chair to avoid eye-contact and interaction with co-workers. An example of this is R06 moving her table around. R06's existing table is facing toward her boss.

"...I did face her completely... I'm looking at her all the time. I want to get rid of that...".(Respondent comment)

Furthermore, Ashcroft and Paul (2004) stated that, they (workers) also like to mark the boundaries of personal space by storage units, screen or partition

and by putting up personal posters or photos. Eg. R03 preferred to have high partitions for privacy

"...I prefer to have high partitions (figure 7) to prevent people chatting with me and to give some privacy..."(Respondent comment)

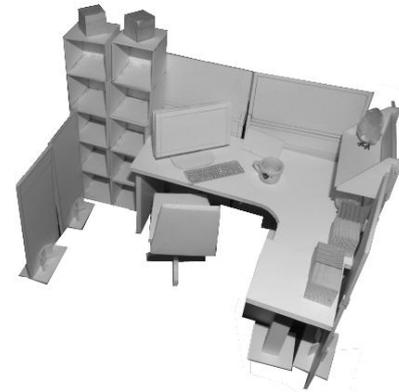


Figure 7: R03 Needs and aspirations

Supported by Kupritz(2001), he claimed that workers need privacy to concentrate on their work.

MEANINGFUL WORKPLACE

People need personalization to create a meaningful workplace. A meaningful office not only focuses upon a chair and desk, storage and partitions but the whole system of the office environment.

Meaningful workplaces are not just limited to physical aspects, but also include an emotional experience. Brunia and Gosselink(2009) and Scheiberg(1990) stated that emotions play a vital role.

Scheiberg(1990) said that "there seems to be a connection between the emotion regarding the workplace, job satisfaction and job performance". .

Most of the respondents were able to show how they would create a meaningful workplace. Examples of these are R03, R04 and R05 reshaping their workplace so they can feel like being at home. They created their own personal space at their workplace.

"...I need a space at the side of my table (figure 8). This space is place for me to have a rest and sleep..." (Respondent comment)

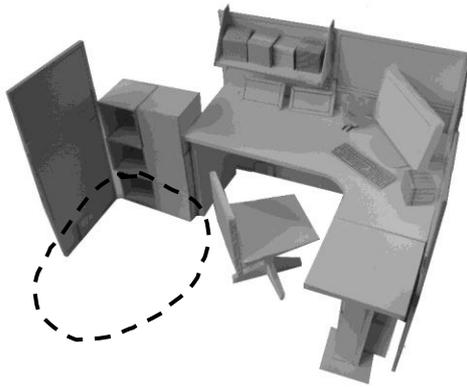


Figure 8: R03 Workplace

Meaningful workplaces can be achieved in different ways and for different reasons according to different needs. People seek several additional ways to make the environment familiar and comfortable for them and mark their identity in the organization (Brunia and Gosselink, 2009).

CONCLUSION

This research has adopted and tested a participatory design approach with mock-ups to explore and determined the appropriate method of user participation in developing a new workplace design. Using the outline methodology from the pilot work, it appeared that mock-ups were very productive tools to explore users' needs and aspirations. This research also indicates how furniture designers using a participatory design process may employ understanding of personalization, reshaping and place making to develop furniture. This method can be developed continuously by other researchers and disseminated through teaching future designers. Future research of the project will be conducted in Malaysia on a bigger scale and it will examine how these approaches can be made in practical process in design.

REFERENCES

Anjum N., Ashcroft R. and Paul J. (2004). Privacy in the Workplace Design. *The Design Journal*. Vol 7 Issue . pg 27-39

Benjamin Schneider B., (1987). The people make the place. *Personnel psychology Personnel Psychology*. Vol 40(3), Fal 1987, 437-453.

Bitner M.J., (1992). Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *The Journal of Marketing*, Vol. 56, No. 2 (Apr., 1992), pp. 57-71

Brennan A., Chugh J. S. And Kline T. (2002). Traditional Versus Open Plan Office Design: a longitudinal field study. *Environmental And Behaviour*. Vol. 34 No. 3 2002. Pg 279-299

Brunia S. and Gosselink H.(2009). Personalization in non-territorial offices: a study of a human need. *Journal of Corporate Real Estate*. Vol. 11 No 3, 2009. Pp 169-182.

Cresswell T.(1996). *Out of Place*. elsevierdirect.com

Deasy D., Flannery P. and Rhea D. (2001). Using Research to Foster and Predict Successful Innovation: The Resolve Office System. *Design Management Journal* summer 2001. P50-57

Dinc P., (2009). Gender (in) different in private offices: A holistic approach for assessing satisfaction and personalization. *Journals of environmental psychology* 29(2009) pg. 53-62

Beyer H. And Holtzblatt K. (1999). Contextual Design. *Interactions* Volume 6 , Issue 1 (Jan./Feb. 1999) ISSN:1072-5520. Pages: 32 - 42

Biernacki P. and Waldorf D., (1981). Snowball Sampling. *Sociological Method and Research*. Vol 10 No 2 November 1981. Pg 141-163.

Duval C. L., Charles K. E. And Veitch J. A., (2002), Open Plan Office Density on Environment Satisfaction. Institute for research in Construction, National Research Council of Canada.

Ehn and Kyng(1991). Design at work: cooperative design of computer systems: *Cardboard Computer: Mocking-it-up or Hand-on the Future*. Lawrence Erlbaum Associates. pgs 169-196.

Harrison S. and Dourish P., (1996). Re-Place-ing Space: The roles of place and space in collaborative system. *Proceeding ACM conference of Computer supported corporative work(CSCW96)*. P67-76. New York ACM

Haynes B. P., (2007). The Impact of the Behavioural Environment on the Office Productivity. *Journals of Facilities Management*.Vol 5 No.3 2007. Pp 158-171.

Knobel L., (1987). *Office Furniture*. London,Unwin Hyman Limited.

Lemons G, Carberry A., Swan C. And Roger C., (2010). The Benefit of Models in Building Engineering Design. *Design Studies* 31(2010). pp288-309

Lee Y., 2006. *Design Participation Tactics: Redefining User Participation in Design*.Helen Hamlyn Research Centre, Royal College of Art, London, U.K.

Richard J. Long (1987). *New Office Information Technology: Human and Managerial Implication*. Pg 5. London. Croom Helm Ltd.

Kupritz V. (2001). Aging Worker Perception About Design And Privacy Needs for Work. *Journals of Architectural Planning Research*18:1(Spring, 2001). Pg 13-21

Mitchell C.T. (1995). Action, Perception and the Realization of Design. *Design Study* Vol 16 No 1 January 1995. P4-28

McCracken G., (1998). *The long interview: qualitative research methods*. London. a sage University press.

Nancy G. Miller, Erickson A. And Yust B. L., (2001). Sense Of Place In Workplace: The Relationship Between Personal Object

And Job Satisfaction And Motivation. *Journals of interior design* 27(1), 35-44

Noordin F. and Jusoff K., (2009). Level of Job Satisfaction amongst Malaysian Academic Staff. *Asian Social Science*. Vol 5 No 5 May 2009.pp 122-126.

Perry M. and O'Hara K., (2003). Display-Based Activity in the Workplace. *Proceeding of Interact 03, Zurich Switzerland 2003*.

Riratanaphong C. (2006). Flexible Workplace: Benefit and Concern in Facilities Management. *Journal of Architecture, Planning Research n Studies Vol 4(2) 2006*. Fac of Arc n Planning Thammasat University. P41-52

Scheiberg S. L., (1990). Emotion on display: the personal decoration of work place. *American behaviour scientist*. Vol 33 No 3.pp330-338.

Schneider B., (1987). The people make the place. *Personnel Psychology*. Vol 40(3), Fal 1987, 437-453.

Spagnolli A. And Gamberini L., (2005). A Place for Presence. Understanding the Human involvement in Mediated Interactive Environment. *PsychNology Journal*, Vol 3 Number 1. Pg 6-15

Thomas F. Gieryn(2000). A Space For Place In Sociology. *Annual review*. Social 2000.26:463-496. Uni of Washington- health and science library.

Vischer J. C., (2007). The Concept Of Environmental Comfort In Workplace Performance. *Ambiente Construido, Porto Alegre*. Vol 7 no 1.pg 21-34.

Wells M., Thelen L. and Ruark J.(2007). Workplace Personalization And Organization Culture: Does Your Workplace Reflect You And Your Company. *Environmental And Behaviour*. Vol 39 No 5. 2007. Pg 616-634.

Wells M. and Thelen L. (2002). What Does your workplaces say about you?: the influence of personality, status and workplace on personalization. *Environmental And Behaviour* Vol 34 No 3. 2002. Pg 300-321.

Wells M. M., (2000). Office clutter or meaningful personal display: the role of office personalization in employee and Organization well-Being. *Journal of environmental psychology*. 20, 239-255.

Yi-Fu Tuan(1977). *Space and Place: the Perspective of Experience*. Minneapolis. University of Minnesota Press

Federal Territory of Putrajaya website: www.ppj.gov.my . access on 22 june 2010.