Innovative Workplace Design: A Case Study of the Faculty of Architecture, Delft University of Technology

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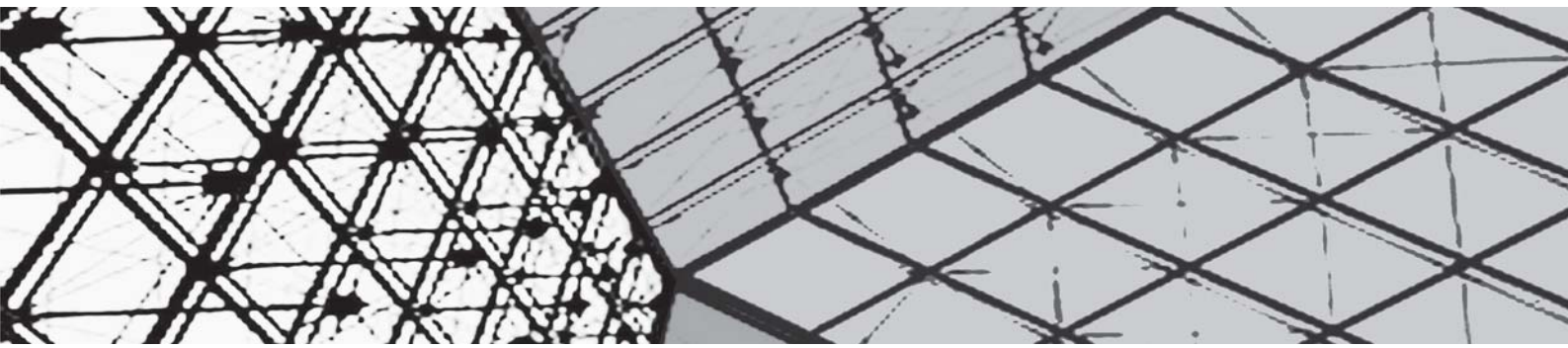

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Abstract

Flexible working is a concept that allows workers to have freedom to choose when and where they work. Advanced information and communication technology make it possible for the organisation to develop this new concept. At present, there are many organisations that introduce flexible workplace. Also in the university where majority of occupiers are knowledge workers, innovative workplace design offers possible advantages. Recently, the innovative workplace design concept has been introduced to a temporary building of the Faculty of Architecture, Delft University of Technology, which its faculty building burnt down on 13 May 2008. Although there are perceived benefits from flexible workplace, there also have some arguments on the actual performance. There are several performance measurement tools that have been used in order to evaluate corporate real estate performance. This paper aims to explore and analyse the effect of workplace innovation on a temporary faculty building and to offer ideas and reflections for performance measurement tools that truly respond building users and reflect on objectives of the organisation.

บทคัดย่อ

ความเจริญก้าวหน้าทางเทคโนโลยีก่อให้เกิดความสามารถในการปรับเปลี่ยนสภาพแวดล้อมในการทำงานเพื่อตอบสนองต่อความต้องการของพนักงาน ซึ่งเป็นแนวความคิดที่ได้ถูกนำมาใช้อย่างกว้างขวางในองค์กรต่าง ๆ รวมทั้งในองค์กรที่ประกอบไปด้วยบุคลากรที่มีความรู้จำนวนมาก เช่น มหาวิทยาลัย เนื่องจากแนวความคิดนี้ได้ก่อให้เกิดประโยชน์อย่างมากในด้านต่าง ๆ ทั้งนี้คณะสถาปัตยกรรมศาสตร์แห่งมหาวิทยาลัยเทคโนโลยีเดลฟท์ ประเทศเนเธอร์แลนด์ ได้นำแนวความคิดนวัตกรรมการออกแบบสถานที่ทำงานมาใช้กับอาคารชั่วคราวของคณะฯ เพื่อทดแทนอาคารหลังเดิมที่ได้เกิดอัคคีภัยทำลายไปเมื่อวันที่ 13 พฤษภาคม 2551 อย่างไรก็ตาม ถึงแม้ว่าจะมีประโยชน์ที่หลากหลายในแนวความคิดนวัตกรรมการออกแบบสถานที่ทำงาน แต่ยังมีข้อสงสัยในผลการปฏิบัติงานจากรูปแบบ

การทำงานที่เกิดขึ้น บทความนี้มีวัตถุประสงค์เพื่อสำรวจผลกระทบของนวัตกรรมการออกแบบสถานที่ทำงานที่มีต่ออาคารชั่วคราวคณะสถาปัตยกรรมศาสตร์ มหาวิทยาลัยเทคโนโลยีเดลฟท์ รวมถึงวิเคราะห์การวัดผลการปฏิบัติงานจากรูปแบบการทำงานดังกล่าว เพื่อเป็นแนวทางสำหรับการวัดผลการปฏิบัติงานที่ตอบสนองต่อผู้ใช้งานและสะท้อนวัตถุประสงค์ขององค์กรอย่างแท้จริง

Keywords

Innovative Workplace Design (นวัตกรรมการออกแบบสถานที่ทำงาน)
Flexible Workplace (ความยืดหยุ่นในการใช้สถานที่ทำงาน)
Performance Measurement (การวัดผลการปฏิบัติงาน)

1. Introduction

Workplace is made up of various elements of an organisation. In a simple form, it is a place where work is produced. Work is a purposeful productive activity and may involve making material goods, creating or transforming information, and/or offering a service. Differing from the meaning of space, the connotation of place is being specific that one place is not the same as another (Alexander et al., 2004). The concept of workplace in the 21st century is the place that is designed and arranged with the aim to create a productive environment for people who perform activities in an organisation. Over the last decade, the changing in information technology, organisational work patterns and expectation of employees give rise to the development of new working practices. The changing nature of work results in the increasing demand of workplace as an attractive physical asset that responds to the requirement of creative knowledge workers. The design of working environment that respects the needs of occupiers and responds to the changing needs of activities in different work patterns will make the organisation have superior resources compared with rivals and may become the basis for competitive advantage if they are matched appropriately to environmental opportunities (Andrews, 1971; Thompson & Strickland, 1990). The adaptation of the new workplace affects not only the demanding investment budget, but it also concerns satisfaction of people and productivity. In higher education sector where most of the occupants are knowledge workers, the idea of creating a high performance workplace has been developed in many universities. The introduction of innovative workplace design has come to the main concept of a temporary building of the Faculty of Architecture at Delft University of Technology, the Netherlands since the fire destroyed the whole faculty building on 13 May 2008.

The objective of this paper is to explore the impact of physical environment, created by using the innovative workplace design concept, on organisational performance. The paper gathers current theories on workplace innovation, performance measurement tools, results from external research together with the author's study, comments and opinions on the criteria for workplace making and performance measurement guidelines of workplace innovation. Results from the external research are discussed together with author's observation in the case study. Building attributes, space planning and design concepts, furnishings for workplace innovation and employee satisfaction are examined, as they have an influence on the workplace performance. A case study provides the background and details of innovative workplace design developed at the Faculty of Architecture, Delft University of Technology. The paper offers ideas and reflections for developing an integrated approach of performance measurement tools of the innovative workplace design concept in similar organisations. Figure 1 demonstrates structure of the study.

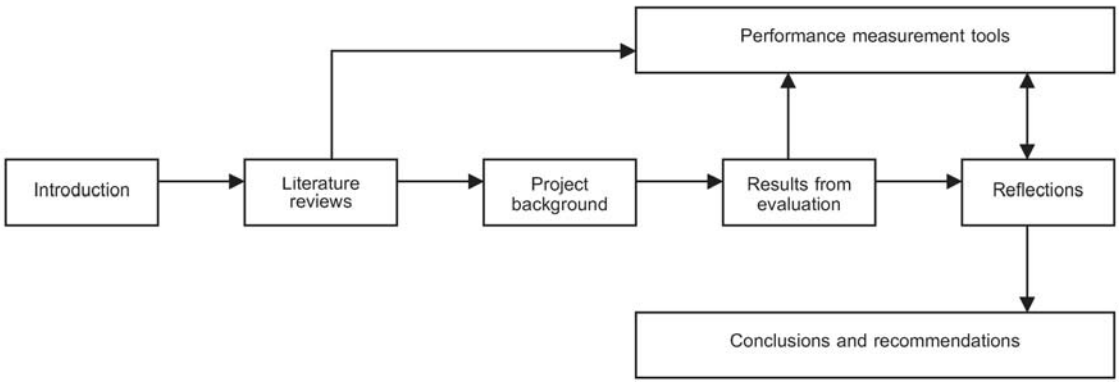


Figure 1. Structure of the study.

2. Innovative Workplace Design

By definition, the term innovation means the process of introducing new methods or devices. The term innovative workplaces defined by the U.S. General Services Administration (GSA, 2003) is used for those that integrate business processes and individual work practices with work strategies and office space, resulting in healthy, high-performance workplace solutions. Workplace innovation is associated with the term 'new workplace practices' or innovations in the business organisation and work processes, which includes the introduction of new ways of working and the flexibilisation of the work such as flexible scheduling or flexible work arrangements. In real estate and facility management, the term workplace innovation is used primarily for the renovation of the physical working environment (Van der Voordt, 2003).

Innovative workplace design is a concept that associates the various forms of innovation in the business organisation, work processes or workplace practices such as the ten forms of workplace innovation, including team innovation, organisational restructuring, innovative work plans, another mix of new skills, empowerment and innovative forms of remuneration (Balkin et al., 2001). This term also involves technological advancements, physical work settings and managerial policies that are required for the development of workplace solutions. There are many terms that are synonymous with innovative workplace design, which include innovative offices, new offices, new officing, alternative offices, alternative work environments and new workplaces (Van der Voordt, 2003). Another term that relates to the innovative workplace design concept, the integrated workplace is the result of a collaborative, multidisciplinary approach to developing and providing workspace, uniting organisation's strategic real property plan with organisation's strategic business goals that responds to the people and work practices of each individual and group, and provides them with the physical space and tools needed for their success (GSA, 1999). There are some workplace strategies that share the same idea as innovative workplace design such as hot desking, hotelling, non-territorial office, etc. Whatever it is called, this new working practice is relating to the way in which work and communication can be categorized in location and time. New working practices encompass a variety of arrangements which are evolving from the traditional office practice where work was mainly undertaken by an individual who had an assigned desk in a specific location.

Flexible working covers a wide range of initiatives within organisations that include staff who occupies the most suitable location and possibly works in different activities and in different places. Flexible workspaces are often used as activity-related workplaces. Personnel can then choose from a diverse range of workplaces, tailored to various tasks. They can select the workplace that best suits the activities of that moment (Van der Voordt, 2003). Many organisations have applied innovative workplace design including Unilever, Microsoft, Interpolis, Shell and the Rijkskantoor in Haarlem (Delft University of Technology, 2009c). This concept is also applied for students and staff in universities where part of the group members are part time employees (Parkin et al., 2006). The driver behind this approach is that the traditional ways of working is no longer suit for the changing demands of knowledge workers for their working environment.

3. Performance Measurement

The changing concept in organisational work settings, policies and norms of the innovative workplace design affects on organisational performance. There must be a clear measurement system that can evaluate this new working practice in order to determine a value from it. Performance

measurement systems developed as a means of monitoring and maintaining organisational control which is the process of ensuring that an organisation pursues strategies that lead to the achievement of overall goals and objectives (Nani et al., 1990). Results of performance measurement help to identify areas of strengths and weaknesses, and decide on future initiatives, which can be used as a tool to effective management (Amaratunga & Baldry, 2002). In relation to the changing ways of working, the assessment of workplace performance influenced by employees' satisfaction plays an important role to create a productive workplace. Workplace performance assessment is differentiating among three kinds of organisational performance: facility performance, human performance, and corporate performance. There are attempts to find convincing evidence that workplace improvements have direct impact on productivity via the organisational performance measurement. However, the linkage between innovative workplace design and organisational performance has less tangible results in terms of the effectiveness of organisation and people. The concerns of productivity and people have encouraged the organisation to consider the importance of their built assets beyond the boundary of facilities costs. Various perspectives towards performance in the workplace are evolved in terms of performance criteria applied to it as shown in Table 1.

Performance is always a phenomenon that consists of several different factors. Varcoe (1994) has made a strong case for selecting performance indicators related to cost, quality and delivery, and continued to discuss the relevance of the selection of performance indicators that resonate with core business performance indicators, in order to reflect the business contribution of facilities management (Varcoe, 1996). In search for a high performance workplace, the challenge for the organisation is to rethink how their resources can be utilized more productively and firmly support business objectives. In attempting to change the focus of an organisation, Brignall (1992) suggests that performance measurement is a key agent of change. The Balanced Scorecard (BSC) originally developed in the early 1990s by Robert Kaplan and David Norton. The basic notion of the balanced scorecard is that organisational performance ought to be evaluated from more than simply a financial perspective. It helps to translate the strategy into actions from financial, customer, internal business processes and learning and growth perspective.

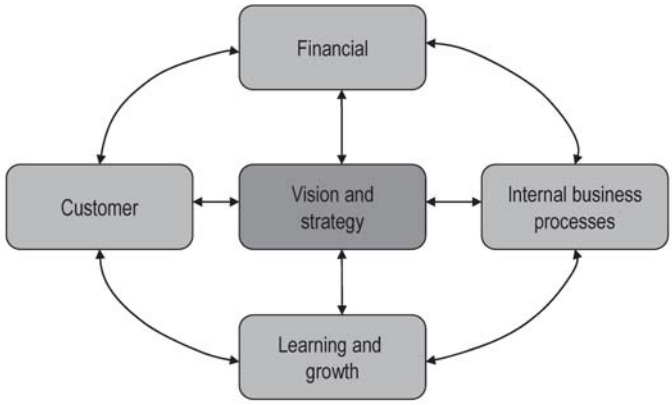


Figure 2. Four perspectives of the Balanced Scorecard.

Table 1. Performance criteria organisations should meet (Van Ree, 2002).

Till 1950s	1960s	1970s	1980s	1990s
Effective	Effective	Effective	Effective	Effective
	Efficient	Efficient	Efficient	Efficient
		Productive	Productive	Productive
			Flexible	Flexible
				Creative

Van der Voordt and Vos (1999) identified 75 variables that can play a role in the relationship between workplace innovation and the performance of the organisation and its personnel. These variables are clustered together in five main groups consisting of organisation, work processes, end products, facilities and external factors. Lindholm and Nenonen (2006) stated that performance, from firm's owner and management perspectives, is measured by the realization of a firm's vision–first and foremost business success such as profitability and productivity. Performance measurement tools of corporate real estate management cover different kinds of strategic measurement systems and tactical techniques. While strategic measurement systems such as the balanced scorecard focuses on the process that translates strategy of an organisation into concrete objectives, tactical tools are more internal tools that aim to analyze current situation or identify developing areas. Furthermore, tactical tools such as Post Occupancy Evaluation (POE) and benchmarking are mainly used in project situations as the need arises, and less permanently as the strategic measurement systems. Another tool performing POE is the Work Environment Diagnosis Instrument (WODI) toolkit that is developed by the Center for People and Buildings (Volker & Van der Voordt, 2005). The toolkit includes a working environment diagnostic tool for an indicative or diagnostic evaluation, a list of key performance indicators that can be used for benchmarking purposes, and a space utilization monitor to measure the occupancy of workplaces (Maarleveld et al., 2009). This toolkit has advantages in its integral approach and applicability to both traditional and innovative offices.

In higher education sector, a practice of the innovative workplace design is assessed based on performance measurement criteria regarding to its strategy. In contrast of traditional office where most of space is provided according to grade and status, the innovative office changes the way people occupy space in a more efficient and effective way. Flexible workplace achieves efficiency of space use that offers different activities performed in various locations with less space requirement. However, the way to measure performance of this working practice is not commonly understood. This is

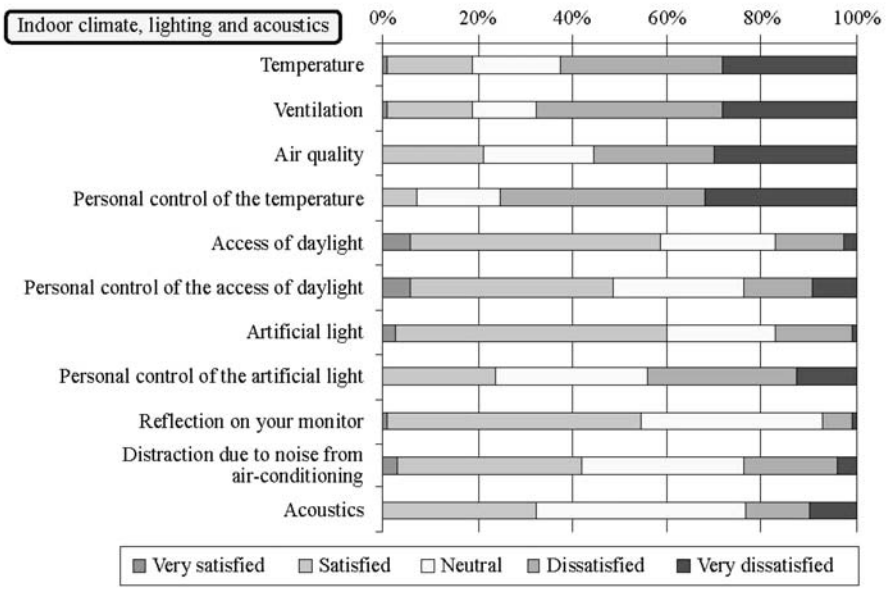


Figure 3. Example of results from a measurement with the WODI toolkit (Maarleveld et al., 2009).

because there are widespread misunderstanding about the term performance and productivity. While productivity can be measured by the ratio between output and input, organisational performance covers broader area formed by productivity, profitability and competitive advantage (Van der Voordt, 2004; De Vries et al., 2008). This brings the organisation to consider the way to create a high performance workplace with all relevant aspects of the organisational performance.

4. Temporary Faculty Building

On 13 May 2008, the main building of the Faculty of Architecture, Delft University of Technology was destroyed by fire, which caused a great damage to the whole building. Since the fire, many studies took place in tents, which brought about the immediate search for a substitute building as a place for studying, teaching and working under one roof. Figure 4 illustrates the former main building on Julianalaan that was introduced as a temporary building for the Faculty of Architecture. Among the optional buildings that were offered to the faculty, this chosen building stood out not only for its direct availability, but it also achieved lower construction costs and can put to function in a short period of time. As the limited space that is available, a concept of using space more efficient and achieve maximum advantages has become the faculty's main approach for developing a temporary building.

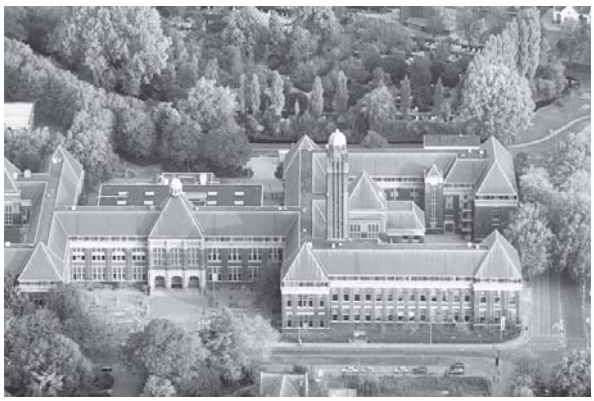


Figure 4. Temporary faculty building (Delft University of Technology, 2009a).

In the old faculty building, there was a requirement for space that promotes interaction and discussion. With more than 800 members of staff, many part-time appointments within and between departments that called for a restructuring of the work environment, the Faculty of Architecture had already presented plans for a more activity-related working environment in January 2008. The temporary faculty building has total floor area of 32,000 square metres. It is much less space than the old faculty building that has 45,000 square metres. With more than 800 members of staff, the flexible workplace concept has been introduced to a temporary faculty building not only to answer the limitation of space problem, but it also offers a more efficient and effective place to work. The main reason is that it simply can not convert many large spaces in the temporary building into small rooms without an enormous loss at available space. The idea of flexible workplace is to offer the state of adaptability to workers over their working environment. Instead of providing all personal space for everyone, this concept allows workers to have freedom to choose working environment that best suit their needs. In the temporary faculty building, the flexible working is also needed to avoid a low office occupation rate and freeing up space that can be used as workshops or studios. This is supported by the fact that the faculty wanted a more transparent office concept. It wanted to get away from the cubicle mentality, to create a more open organisation in which everything is more visible and employees and students interact with each other (Dalmeijer, 2008). The study by Noëlle Huijgen of Fokkema Architecten that conducted a study on flexible workplace in the old faculty building found that many square metres remained unused, because many people were not always at their workstations. Figure 5 demonstrates a layout of the temporary faculty building.

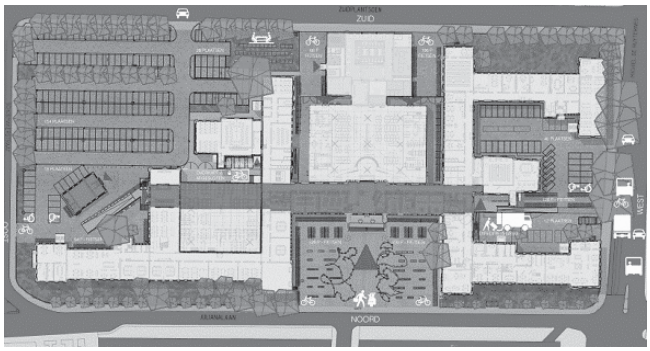
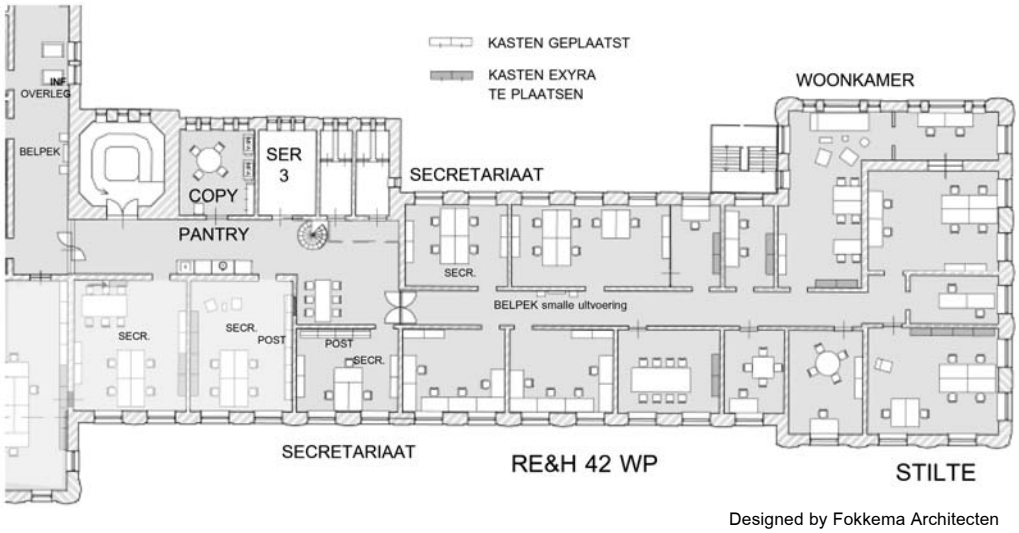


Figure 5. Layout of the temporary faculty building (Delft University of Technology, 2009b).

5. Working Spaces

Various types of workstations are provided to support different kind of activities ranging from quiet study areas that support individual work, the communal areas the offer place for students and academic staff to work together and the facilities are provided for large and small groups. A high ceiling makes the studio space even more spacious that can be easily adjusted for some particular activities. The studios are equipped with flat LCD screen. Most of the students work on their personal laptops. However, the room is also provided with a few PCs as for software license regulation. Free standing tools are provided for group work in some corners of the room. Reserved desk policy is also required for studying and teaching activities. There are spatial arrangements that group each department at the most adjacent area, which larger departments take up several floors, but located above each other in order to limit the walking distance with department as much as possible. Figure 6 illustrates floor plan with furniture layout of the Department of Real Estate & Housing. Each room is open to employees and faculty members that connected together along the corridor allowing for both individual and collaborative works. Figure 7 shows the general working spaces' characteristics in several departments.

The workspace is required both for collaborative work and individual work as shown in Figure 8. Figure 9 shows furniture layout in silent area. According to limited working spaces, individual work is provided in a form of hot desking, which means that if the workstation is left more than two hours, it should be cleared for another person who needs to use it. Although there is a possibility for a person who wants to occupy a favorite workstation everyday, it must be understood that it is not a personal workstation.



Designed by Fokkema Architecten

Figure 6. Floor plan with furniture layout in the Department of Real Estate & Housing.

Figure 7. The studio.

Figure 8. Workstation and furnishings in silent area.

Designed by Fokkema Architecten

Figure 9. Floor plan with furniture layout in silent area.

For the ICT policy, most of the computers will be replaced by laptops with the exception for those in the secretariat office. All employees will receive mobile phones to substitute landlines. Employees will be contacted via their mobile phones except for the secretariats that remain to have landlines. Set by 'a clean-desk policy,' staff and visitors followed the faculty policy that are provided with personal storage with the access to lockers and shared book shelves. This way help archiving a more efficient space in less floor areas compared with the old faculty building.

Support work such as administration, secretaries and others has high occupancy, and needs to be approachable and accessible at all times as shown in Figure 10. For all other employees, from interns to managers or research staff, a wide array of possibilities was designed: small meeting corners, open or closed, special 'quiet cells,' lounge spaces and coffee parlors. The secretariat office is provided staff with their own workstations that differ from other employees of the faculty. This can be interpreted from the nature of work that the staffs are more likely to operate in fixed workspaces. Instead the use of mobile phone and laptop, the secretaries are provided with land line telephones and PCs. Since each department has a fixed space for secretariat office, supported facilities is surrounded the office to provide various kind of work activities needed during the day as shown in Figure 11.

People are encouraged to work in various places other than in the office or studio. To meet the need for additional spaces to work, a number of workbenches have been installed in the BK City, the name of the temporary faculty building. The workbenches provide students a space to plug in their laptops and prepare for class or check their e-mail. Equipped with stools at bar height, workbenches have been placed at 10 locations throughout the corridors of the BK City. Along the building wings as shown in Figure 12, street of the BK City

Figure 10. Secretariat office.

Figure 11. Supported facilities: photocopy machines and mailbox.

Figure 12. Service point and a street with seating.

Figure 13. Furniture in coffee pantry.

offers opportunities for staff and students to communicate or work for a short time such as preparing for a lecture or checking their e-mail. Figure 13 illustrates spaces for informal communications that can take place in restaurant and lounge areas or coffee pantries.

After six weeks after the fire, the new furniture for the new faculty building was ordered from Vitra as the main supplier. Vitra, an international company that uses design to create productive, healthy and inspiring environments, offers a range of furnishings for work environment and relaxing space for the faculty. For the interior environment, the major concern is the possibility of noise. By outfitting the ceilings and the shelves that separate the smaller desks with noise absorbing materials, it can almost completely eliminate any hinder through noise. The architect managed to create a sense of protection, scale and privacy without making actual rooms using various sizes of cupboards, shelves and seats (Dashorst, 2008). All teaching rooms are fitted with curtains and acoustic wall or ceiling panels. The conference rooms are also fitted with an acoustic ceiling and acoustic photo screens.

Another place for work is in the faculty library. The library opens Monday to Friday from 9.00 to 17.00 hours. It is a place that contains all 35,000 collections of books and magazines from the old library. The bearing structure at the new faculty building allows limited dead weight on the floors. Therefore, the library is only built on a secondary structure that was added under the existing floor to provide extra support for the shelves and books. There are a number of working spaces for students and staff that are offered in the library, which include twelve PCs provided for the visitors as shown in Figure 14. The narrow tables in the

Figure 14. Faculty library.

Figure 15. Espresso bar.

Figure 16. Relaxing corner and coffee pantry.

quiet area are provided for reading books and magazines. The overall spaces allow users to have freedom to perform activities depending on their choices.

Meeting people with a coffee feeling is an atmosphere that is normally found in the BK City. Surrounded by more seating and reading materials, the espresso bar, as shown in Figure 15, is the meeting place that students and staff can have conversations with a more relaxing manner. In many corners of the faculty building, coffee pantries are offered to those who want to take a break and meet with colleagues during the day as shown in Figure 16.

Table 2. Flexible workplace facts (Delft University of Technology, 2008).

Workspaces	Storage
• Workstations are provided with high ergonomic concerns with furniture from Vitra. • Most of workstations belong to everyone except from the secretariat. • Clean desk policy is meant for the occupier that leaves workspace for more than two hours. The workspace has to be cleaned and clear for the next user. • A silent room is provided for concentrated work. Thus, it is not allow for talking.	• Every staff has 1.2 metres of shelf space in a secure cabinet. Each cabinet has three keys: one for each shelf user. Replacement keys may be obtained from facility management personnel. • All equipment, materials and documents should be kept in the storage after leaving the office. • Extra storage space is provided for department uses. • The static (non-active) archives are to be housed in the basement. • Personal lockers are available by using campus card to activate. • BK City has been fully equipped with sprinklers, in compliance with all fire regulations. • Arbo (Dutch Office for Working Conditions) conditions have been fully met.

Table 3. Square meter and useful area comparisons between the old faculty building and temporary faculty building (*The Making of BK City,* 2009).

Program	Old faculty building on Berlageweg	Temporary faculty building on Julianalaan	Temporary / Old faculty building (comparisons)
1. Educational workshops	5,680	7,840	+38% students present in the faculty
2. Office	6,300	6,340	+1% in different concept
3. Teaching rooms	1,090	1,100	+2% same capacity
4. Library	650	870	+34% more study areas
5. Teaching (hands-on practices)	3,580	3,250	-9%
6. Laboratory	860	660	-23% more space on TU Delft campus
7. Conference	1,100	770	-30% more space on TU Delft campus
8. Restaurant	380	690	+82% multifunctional use
9. Public space	1,220	2,050	+68% more space
10. Storage	3,300	1,240	-62% less necessary after the fire
Gross area (square meters)	**42,000**	**32,000 + 4,000** (green house)	**- 14%**
Total useful area	**24,160**	**24,820**	**+3% more useful**

6. Method and Results of the Evaluation

In February 2009, a research was conducted by the Rotterdam Institute for Social Scientific Research (RISBO) for the evaluation of occupancy and use of all spaces. The first part of the study was a utilization measurement. The second part of the study consisted of a quantitative survey. The quantitative research was complemented by a qualitative study in a form of two focus group discussions that aims at explaining, interpreting and supplementing the results from the questionnaire survey (Gorgievski et al., 2009). The occupancy utilization has been measured by the number of occupied workstations divided by the number of workplaces. A quantitative survey comprises of a general questionnaire and a questionnaire to everyday experiences over three days in a form of a diary. The employees have received the questionnaire and the diary by e-mail. The general questionnaire asked questions about satisfaction with physical aspects and privacy, as well as how they perceive their works and the degree to which the work environment affects this. The questionnaire is filled out first for one time and then the diary is completed at the end of the work day. The diary assesses what they did on a given day, where they did it and how they felt at the time. The employees have been asked to write a diary in three different days. Filling out the general questionnaire takes about 15 minutes. Filling out the diary entry takes about 10 minutes each time. The answers will be kept anonymous. For the activity related work, the so-called flex-team is asking management team for the activity related to work and the allocation of individual territories. Figure 17 demonstrates a part of the web-based questionnaire that contains ten parts.

The survey received from 266 employees that completed a questionnaire on flexible workplace concept. The overall response to the questionnaire is 26.4 percent. And nearly 66 percent of a diary kept, which over eight percent of the employees also fill in the diary. Focus group discussions and capacity utilization measurement is also processed and analysed. Results reveal that workstations for employees are on average 27 percent occupied. The employees feel the current environment is open and vibrant. The improved dynamic working environment has been recognized with the possibilities to meet other people and have informal face-to-face conversations as shown in Figure 18. Furthermore, the environment is not very crowded; the preferred workplace is generally available. The high capacity of space utilization has not been achieved in all workspaces. Most departments still have enough space for more people without substantial physical modification of the workplace (*The Making of BK City,* 2009).

The survey highlighted areas for improvement that concern the acoustics and layout of the workplace, safety, visual and auditory privacy and storage capabilities. Moreover, employees want to have a direct influence in the way the office is designed and furnished on their working environment. The employees indicate that the concept of flexible working sufficiently supports a number of tasks. Although the employees are overall satisfied with the new accommodations for the faculty, they are somewhat less satisfied with the concept of flexible office plan as shown in Figure 19 (Gorgievski et al., in press).

7. Discussions

This section covers two parts. The first part is the perception of a group of faculty members that has on the temporary faculty building and reflection from the designers. The second part is the analysis and reflection from the author. The flexible workplace at the new faculty building seems to offer a lot of benefits that include space efficiency and flexibility over time and location. However, there are some

Part 1. Satisfaction with your work environment

Overall satisfaction

1. How satisfied are you overall with:

	☹	☹	😐	😐	🙂	🙂	☺
1. Your own office situation ⓘ within the faculty?	⊙	O	O	O	O	O	O
2. The accommodations your department occuples?	⊙	O	O	O	O	O	O
3. The overall accommodations for your faculty?	⊙	O	O	O	O	O	O
4. The flexible office concept ⓘ ?	⊙	O	O	O	O	O	O

Satisfaction about physical aspects

2. How satisfied are you with the following aspects of your work environment?
Please keep in mind your overall impression of the work environment in which you work regularly.

	☹	☹	😐	😐	🙂	🙂	☺
5. Lighting	⊙	O	O	O	O	O	O
6. Temperature	⊙	O	O	O	O	O	O
7. Acoustics	⊙	O	O	O	O	O	O
8. The beauty of the work environment	⊙	O	O	O	O	O	O
9. The appearance of the work environment	⊙	O	O	O	O	O	O
10. The atmosphere of the work environment	⊙	O	O	O	O	O	O
11. The comfort of the work environment	⊙	O	O	O	O	O	O
12. Layout of the workplace ⓘ	⊙	O	O	O	O	O	O
13. The relative position of different types of spaces that you use regularly ⓘ	⊙	O	O	O	O	O	O
14. The position of facilities ⓘ relative to the workspaces that you use regularly	⊙	O	O	O	O	O	O
15. The location of different departments relative to each other	⊙	O	O	O	O	O	O

3. In the space below you can elaborate on your answers (maximum of 500 characters).

Figure 17. Part of the web-based RISBO questionnaire (Gorgievski et al., 2009).

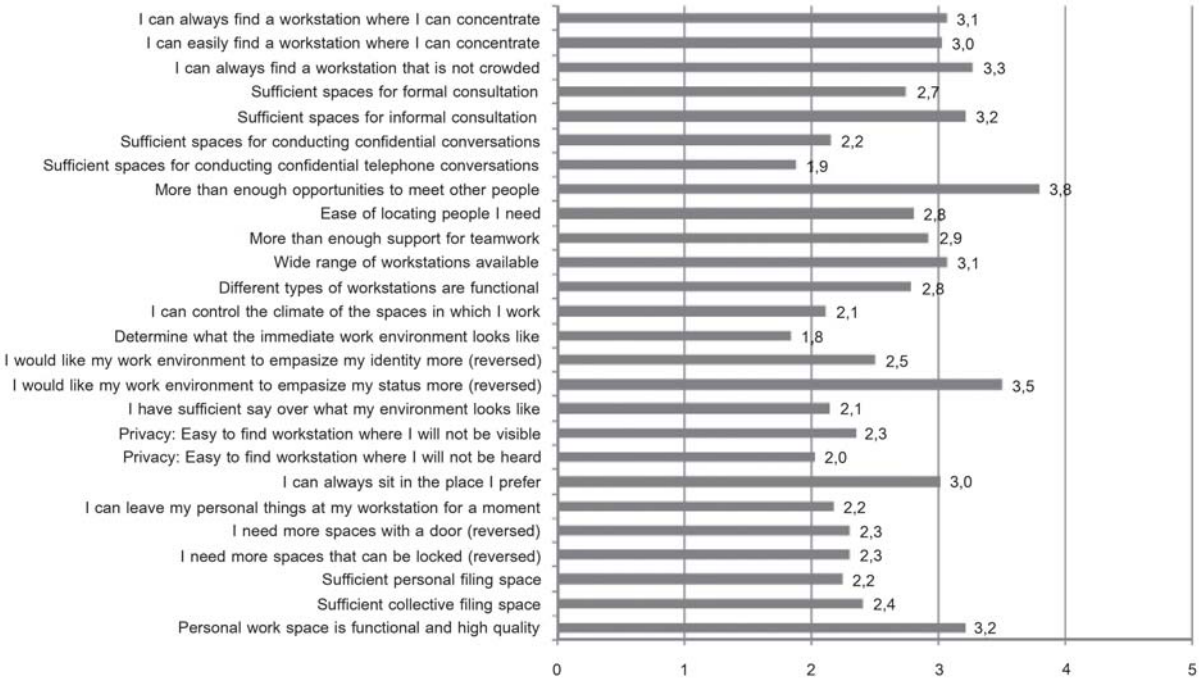


Figure 18. Extent to which work places fulfill task and psychological requirements; N = 266 employees, 1 “totally disagree” to 5 “totally agree” (Gorgievski et al., in press).

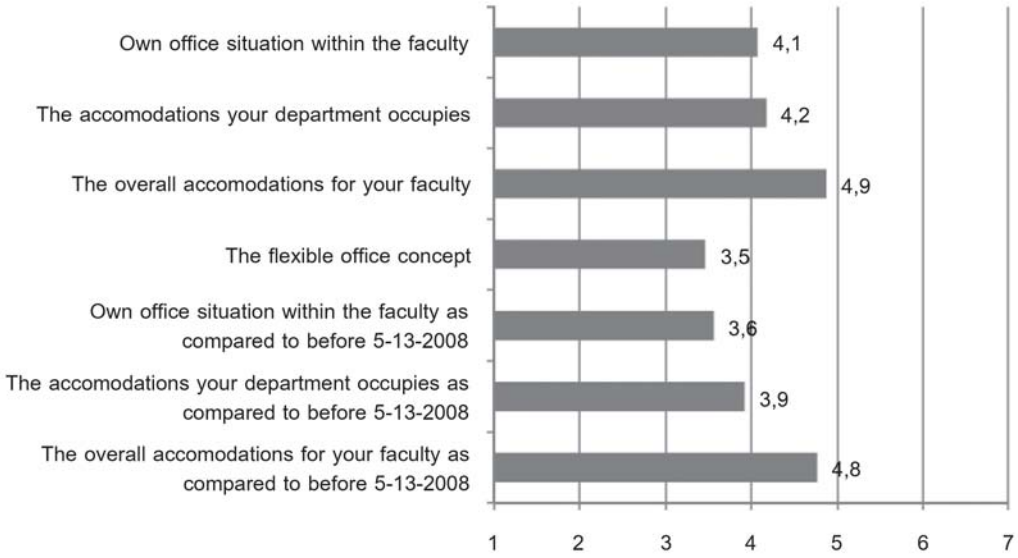


Figure 19. Satisfaction with the working environment; N = 266 employees, 1 "very dissatisfied" to 7 "very satisfied" (Gorgievski et al., in press).

arguments from research staff about the suitability of the flexible workplace at the new building. The debate is about the requirement of workspaces that should depend on research activities. The work of academic staff which whom to give lectures, supervise student projects, carry out research and/ or run a research team or a section in a department requires proper workspaces to perform particular activities. Workspace where they can pile up papers and space for books and archives is something that does not provide in the flexible workplace concept. Prior to this current situation, researchers experienced their personal workspace, are more appropriate to their work. The demand for different forms of workspace for various forms of academic works is even higher for the ones that work in the more complex research project that involve a lot of written material and who need a permanent base to conduct research, bid for external funds and produce publications (*The Flex Solution,* 2008).

There are some answers from the designers for the arguments. Firstly, a previous study from the old faculty building has shown that many square metres remained unused (Dalmeijer, 2008), because many people were not always at their workstations. Flexible workplace can make more efficient use of space with the bundling of support functions in specific designated units, rooms and areas, for instance, desk islands, meeting rooms of various sizes, pantries with bar stools, mail boxes, cloak rooms, small cells for reading and writing and some privacy. Storage for papers and books are less required than the old situation. This is because people are less bound to the location where they work. As the fact that much paperwork lost during the fire, the staff are encouraged to work digitally. The way that the staff can locate anywhere in the building with the accessibility to electronics files and digital works make it possible to have less paperwork. Furthermore, books and papers can be stored in the departmental secretaries and the main library instead of personal storages or desks. This concept is not forcing anyone to drastically change their habits, but aims to develop a dynamic research and education landscape where social and interaction will be part of the daily routine, and a place where the feeling of home will go beyond the desk (Dashorst, 2008).

Based on the balanced scorecard, the basic model for office accommodation developed by Voordt (2003) consists main components of organisation, work processes, end products, facilities and external factors that contribute to performance of the organisation as shown in Figure 20. This model is considered the office organisation in terms of input, throughput and output variables. The organisation is considered as an input, work processes as a throughput and end products as an output. External factors may include economic developments, the labour market, legislation, private parties or globalisation. The model helps understanding the effects of real estate and facilities on organisational performance and clarifying the objectives and measureable results from the real estate intervention. This leads to some related questions for this case study. What is considering as an output of the faculty? Does employee and student satisfaction is considered to be an output? Or does it also include student enrollment per year? Does the output cover number of tasks or projects that are carried out by employees in specific times?

Kaplan and Norton (1996) gave a metaphor of an airplane pilot that focuses on single instrument of flying to business manager in today's complex competitive environments that brought to the balanced scorecard concept. The basic notion of the balanced scorecard is that organisational performance should not be evaluated from only one perspective. Performance measurement conducted by RISBO focuses on the occupancy rate, space utilization and employee satisfaction among staff of the faculty. Although the results shown that overall employee satisfaction has been achieved, it is essential for the evaluation of some additional aspects such as the issues of absence and sickness level and staff turnover in relation to building conditions. Instead of focusing only on employee and student satisfaction, the effects of the building on other stakeholders should also be considered (Jensen et al., in press). For instance, the survey may include the perception of the citizen of Delft on the temporary building. Furthermore, what is the reflection from the owner of this temporary building? In terms of the external factors, what is the perspective of the authority of the city of Delft for the conversion of the former main building, a heritage building protected by the state, to an educational purpose? In terms of environmental responsibility, how are the energy use and transport-related effects of the building? How does the actual energy usage compare with the usage estimated in advance?

The comparison of square meters from previous and present situation has shown that there are more useful area in the temporary faculty building that has fewer total square meters as shown in Table 3. For the organisational development, what is the impact of the changing in space availability on project efficiency in terms of time and budget?

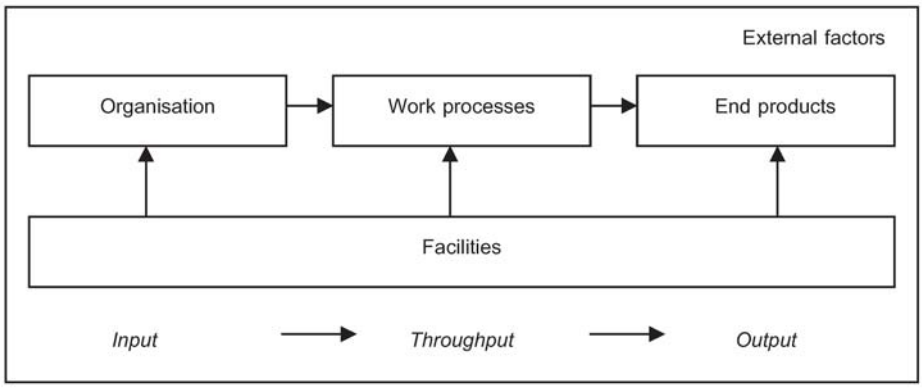


Figure 20. Facilities for supporting organisation and work processes (Van der Voordt, 2003).

What are the effects of workplace innovation in terms of team formation and horizontal communication? What are the consequences of new ways of working on cultural factors? Although this case is a temporary building that lasts approximately for four years, the evaluation from these issues can be used for the developing of guidelines of the new faculty building in the future.

The early POE framework (Preiser et al., 1988) proposed three levels: indicative, investigative and diagnostic POE. Each level requires different degrees of sophistication and data-gathering techniques, finances, time, manpower and the required outcome. In terms of performance measurement tools, the WODI toolkit provide a wide range of POE investigation from indicative to diagnostic level, and can be used separately or combined, in different order (Maarleveld et al., 2009). In addition, the WODI toolkit can be applied ex ante (in advance of a change process) or ex post (after the new working environment has been taken into use) that is useful for further research and the study of the new faculty building.

8. Conclusion

The case study provides background and details of the innovative workplace design that developed as a means to achieve the efficient and effective use of space. To make a decision on workplace innovation, it can be considered the process in the chain of input-process-output model. The start of a workplace design project with the analysis of the business will enable the focus on the very wide range of business issues that workplace could affect. On one hand, business strategies concern the process that is collaborative between human resource, technology, capital and ICT. On the other hand, real estate strategies concern the application of real estate and facilities. The consideration of workplace making that is based on both business and real estate strategies is needed for a decision making of the workplace. These two groups of input factors affect work process, output and performance of the organisation. The case study shows that there are different perceptions of the effects of the innovative workplace design. Instead of focusing on single group of users, the organisation is required to consider the effects of workplace innovation in various perspectives of stakeholders, which will affect performance of the organisation. Performance measurement tools are used for measuring and identifying the success of corporate real estate and workplace management. Bröchner (2004) stated that the attempting to measure the performance of facilities and of facilities management while disregarding the effects on the core activities of a firm leads to a gap between business managers and facilities manager. Bridging this gap implies the development of more sophisticated measures that are able to trace how support performance leads to core business performance. The approach to measure performance of the innovative workplace design should focus on both tactical and strategic measurement. The decision making at the beginning of the project affects work processes and performance of the organisation. Subsequently, the analysis of results from performance measurement is used for decision making of the ongoing operation and future adaptation or a new project. The clear consideration of this dynamic process and the development of an integrated performance measurement system that is based on the understanding of relationships between business and facilities perspectives is a way to create a high performance workplace.

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