Towards Healthcare Service Quality: An Understanding of the Usability Concept in Healthcare Design

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Abstract

The purpose of this paper is to review the literature on “usability concept” in built environment and healthcare design, and suggest a possible usability conceptual framework in achieving quality service. This paper will focus on three usability keys factors: efficiency, effectiveness and user’s satisfaction. This overview will help future researchers to investigate the relationship between spatial design and “usability concept” from the user’s experience and expectation of the outpatient area as part of the Malaysian Primary Healthcare (MPHC) service in a public hospital. This usability is useful in improving outpatient area service outcome, which is more valuable to the end-users.

Keywords: Healthcare design, Quality service, Spatial design, Usability concept.

1. Introduction

Part of a healthcare design is planning a good service for its users and its design complexity is characterised as major. Daily operations in hospitals are affected by the rapid changes and trends. Planning and designing of spaces and facilities in a hospital are influenced by the society and its behavior. In producing a good design, the building process involves the local authorisation, medical planner,
architect, interior designer and facility management to hospital employees and whoever else is involved in
the built environment field. However, the success of the design is achieved through the satisfaction of the
users on how spaces in the hospital function and influence the quality of the hospital design.
In many ways the quality of the hospital depends on the design ability to adapt with organisational,
operational and technical changes. In designing a hospital, it is also necessary to consider the expanding
number of patients, the lasting effectiveness of the design, efficiency of the design and its flexibility to
make changes when required. All those are usability outcome or solution in producing a quality design,
guidance for the management process and improve the healthcare service. Malaysia Primary Healthcare
(MPHC) has grown actively since the Alma Ata Declaration made in 1978 and one of government’s
agenda is to prioritise people first and performance now in MPHC service (Razak, 2010). Currently, there
are 136 public hospitals, which are considered as outpatient area in MPHC (MOH, 2010). The outpatient
area in public hospitals offer all the family specialist clinics, pharmacy, education and promotion health
area, rehabilitation, administration, medical laboratory, health record, staff facilities, diagnostic image
room, and public facilities which can accept 800 to 1000 patients per day in a total area of 12,000 - 8,500
meter sq (EPU Guideline, 2008). By definition, all outpatient facilities are alike in having no overnight
patients. They can range from simple physicians’ offices that provide primary care to large, independent
“hospitals without beds” (Carr, 2009; 2010). The outpatient area is a main focus where services are
delivered to the users who are the daily patients from the various categories and background. This paper
is based on the literature studies of the usability theoretical framework to understand the use of the
usability concept in built environment. This is a preliminary study, which will later develop research
questions for a following PhD-study which will focus on the usability of healthcare spatial design of the
outpatient area in the Malaysian public hospitals.

2. Literature review

2.1. General literature on usability principles and its concept in built environment.

A lot of usability principles and concepts had been discussed and the definition of it depends on the
field of study, but it is mostly determined by the following 3 key factors:
• Effectiveness – whether users can achieve to get the product.
• Efficiency – how long it takes them to achieve it.
• Satisfaction – the users’ feelings and attitudes towards the product.

Usability is the degree to which something – service, facility, or product, is easy to use and a good fit
for the people who use it as it is a characteristic of the product. It is whether a product is efficient,
effective and satisfying for those who use it and it depends on what kind of goals the user holds. The
usability definition is adopted from the international standard on usability ‘….effectiveness, efficiency
and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular
environment’ (ISO, 1998). Usability is also the extent in measuring a service or organisation in achieving
specified goals or mission (Blakstad et al., 2008; Alexander, 2008; Fenker, 2008). Usability is a part of
human behaviour study or action. It recognises that humans are lazy, emotional, and disinterested in
putting a lot of effort generally preferring things that are easy to do. It shows that usability is focused to
how users can complete a task in the easiest way within a short time, it means the service provide is
learnability, memorability and those factors refers to the efficiency and the effectiveness of the service or
product or task. This is visibly seen through the perspective of Arge (2004), in which the term usability
describes whether or not a product is fit for a specific purpose. Usability or functionality in use is
concerned with a building’s ability to support the economic and professional objectives of the user’s
organisation. (Alexander, 2008)
2.2. Efficiency

The efficiency of the service provided is to test the amount of effort and the time taken by a user to complete the task. The efficiency is based on a ratio of a system’s service work output and its work input. This can be seen through the patients’ or users’ experiences with the hospital service, whether they are able to complete every procedure after receiving treatment. These are all due to the accessibility and reachability factors.

2.3. Effectiveness

The effectiveness of the service provided is measured by how a user completes the tasks. Often effectiveness is interpreted as the ability to reach a target that has been set up in order to achieve the desired effects of something. Therefore in hospital design the rule of space provision or space workflow and facility arrangement should readily be user friendly, functional, and flexible in design because it will be used by various patients with various health problems and by various types of users both able and disabled people. According to Shaw and Ivens (2002), customer experience is a blend of the company’s physical performance and the emotions evoked intuitively measured against customer expectations across all the moments of contact (Nenonen et al., 2008).

2.4. User satisfaction

User satisfaction in common language has to do with fulfillment of a desire or a need through the users’ feelings and attitudes towards the service or product. (Bahari & Ling, 2010). The phenomenon of the users’ experiences involving the users’ emotions reflects the users’ satisfaction and that the service outcome is of quality. (Nenonen et al., 2008; Poldma, 2009)

2.5. Usability attribute

In some situations, the usability evaluation depends on the usability attribute, which is the user’s values of culture, time context and his background, and knowledge (Lindahl & Granath, 2006). This factor influences the user’s needs and satisfaction, familiarity with the service, and the expected fulfillment of the service which tend to influence his behaviour or action. (Blakstad et al., 2008; Gulliksen, 2006; Hignett & Lu, 2009; Alho et al., 2008). The usability measurement outcome also influences the user’s characteristics, lifestyles, values and demographics (Alho et al., 2008). Those considering factors are more appropriate and improve the usability study in the built environment as well as in the usability studies as a part of cultural phenomenon that can only be improved through a better understanding of the user’s experience. The conclusion of the understanding of the usability concept, attribute and the outcome from the various literature studies as well as the theoretical background study is shown in figure 1.
2.6. **Usability concepts in healthcare design**

A hospital has a complex design and a facility of interrelated functions that must accommodate the constant movement of people, equipment and supplies throughout its structure, which addresses healthcare function with users as the core of its creation. The planning and design of hospitals therefore
need to focus on creating space and environment for users; thus, sustaining the complete balance that could constitute a healthy organisation vis-à-vis human management and its human-based facilities. A hospital is designed according to service oriented building and the satisfaction does not come from the use of new technologies but the design should be able to facilitate consumer assignment and it affected by efficiency and effectiveness of the design that includes critical planning to work flow, operational policies, clinical procedures, serviceability and infection control plays a fundamental role in determining the success of the facility and the service provided especially in designing a space based on public users. Although building design is based on speed priority, economy, technology, image and status, it is based on people’s sensitivities and senses. Therefore, in designing or planning a space, it is important that the environment is appropriate to meet human emotion requirements, feelings, behaviours and interactions. The users’ feedback throughout their experience becomes information or is the key answer to improve service performance. (Alexander, 2008; Fenker, 2008).

2.7. Usability in healthcare spatial design

A good hospital design is structured through movement in space and spatial layout is important in shaping the ways in which visitors explore, engage, and understand the function of the facility or space. It is demonstrated that behaviour patterns are systematically linked to spatial characteristics of access and visibility. Furthermore, the healthcare spatial design is also important to understand what people do and think, and it needs "vis-à-vis" user’s condition, background and situation in order to increase the effectiveness of the service.

Spatial design focuses on the flow of space between the interior or exterior environments and it emphasises the discipline of working with people and space. Configurations of building layouts have great impact on the users’ behaviours and the design based on spatial design indicator makes space more efficient and effective and it combination of end user experiences and contexts that transform empty spaces into aesthetically functional interior places (Poldma, 2009). The service that comes from this scenario is more satisfactory and of higher quality. (Huelat, 2007).

Usability is a part of problem solving (Blakstad, 2008) in creating something new or improving and transforming the present design or organisation. In order to do this, designers or the facility management must know how and why the space works. Understanding how and why things work requires us to analyse and explain (Friedman, 2003). Therefore, it is important to understand and to apply the concepts of usability, in order to provide a better understanding of the users’ experience of buildings and give positive views to the organisation (Alexander, 2006).

After the service has delivered and its space is utilised by the end users, only then can the users judge or respond to the service outcome. In this situation, the facility management is needed in planning a more organised space and facility, and at the same time the strategic facility management process is used to understand the organisation and its flow and mission (Hamid et al., 2008; Becker & Parsons, 2007). This scenario shows that the facility management strategy is important in designing a space or arranging the healthcare facilities or services, so that the use of space becomes more valuable (Garde, 2008). Table 1 shows the previous studies of spatial design.
Table 1: The usability studies of healthcare design.

<table>
<thead>
<tr>
<th>Author</th>
<th>Main –focus</th>
<th>Sub –focus</th>
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<tbody>
<tr>
<td>Ayas (2008)</td>
<td>Affective design of waiting areas in primary healthcare</td>
<td>To understand affective values towards the physical environment in servicescape design.</td>
</tr>
<tr>
<td>Garde (2008)</td>
<td>The design of a new NICU Patient Area: Combining design for usability and design for emotion</td>
<td>To investigate and explore the relation between design for usability and design for emotion in a design process, in order to produce positive ambience experience and satisfy end user.</td>
</tr>
<tr>
<td>Hignett &amp; Lu (2009)</td>
<td>An investigation of the use of health building notes by UK healthcare building designers</td>
<td>Study on existing principles and concepts behind healthcare building design. To investigate and observe the efficiency planning of space, design process and patient expectation from the design.</td>
</tr>
<tr>
<td>Huelat (2007)</td>
<td>Wayfinding: Design for understanding the basic ability for people to get from point A to point B, the factors of reach ability, accessibility and learn ability</td>
<td>The process of users’ journey and identify the space and the task the study of spatial behaviour or orientation (predecessor of wayfinding) and relationship to space or the environment.</td>
</tr>
<tr>
<td>Jensø (2005)</td>
<td>Usability of hospital buildings: Is patient focus leading to usability in hospital buildings?</td>
<td>The understanding of the theoretical framework developed by CIB TG51 “Usability of buildings” and studies of project documents and interviews from the St. Olav’s Hospital project.</td>
</tr>
<tr>
<td>Kazanasmaz (2006)</td>
<td>Design efficiency in inpatient facilities of hospitals</td>
<td>To identify the utility value of built floor area, its allocation to serving and circulation spaces and the relative proportions and space potential-flexibility and adaptability for future changes.</td>
</tr>
<tr>
<td>Mollerup (2009)</td>
<td>Way showing in hospitals. Describes the causes of the wayfinding problems in hospitals</td>
<td>The reasons why people have problems finding their way in hospitals.</td>
</tr>
<tr>
<td>Pati et al. (2008)</td>
<td>Inpatient unit flexibility design characteristics of a successful flexible unit</td>
<td>To explore flexibility needs in adult medical-surgical inpatient care with the objective to understand its meaning from an end-user perspective and identify characteristics of the physical environment that promotes or impedes stakeholders’ requirements</td>
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2.8. Usability concept and patient focused

When people go to hospitals to seek treatment, sometimes when they enter the hospital entrance, the condition of the space makes them feel uncomfortable. Previous studies have shown that good spatial design can reduce stress and physical effort among the patients or hospital users and increase the overall efficiency and effectiveness of the hospital design (Mollerup, 2009). A smooth work flow will affect the users’ satisfaction (Codinhoto et al., 2008; Wolf & Lehman, 2008) and most of the studies have also shown that the design based on users’ experience and patients’ opinions can produce better outcome to the design field, organisation goals or users.(Behkami & Dorr, 2009). In a hospital design, the patients’ opinions are taken as part of producing a quality management, and the users’ satisfaction is taken to determine the service quality dimension. Health care is about meeting the physical, psychological and social needs of a person who seeks care (Harun & Ibrahim, 2008). With hospital service quality models, physical, psychological and social needs as a part of the measurement. Consequently, it is only logical to incorporate the elements of social support into the model to reflect the holistic concept of healthcare
outcome (Rose & Uli, 2004). Table 2 shows previous studies on end user satisfaction to hospital service based on the users’ opinions.

Table 2: Previous studies of user satisfaction in hospital service.

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<tr>
<th>Author</th>
<th>Main-focus</th>
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<tbody>
<tr>
<td>Abusaid (2007)</td>
<td>The development of an instrument for evaluating service excellence in health care settings</td>
<td>To investigate the characteristics and attribute of service excellence SEVEXCEL in healthcare setting.</td>
</tr>
<tr>
<td>Becker &amp; Parsons (2007)</td>
<td>Hospital facilities and the role of evidence-based design</td>
<td>Discuss the role of evidence-based design in facility planning and design as a key element in helping the field of facility planning and management continue to strengthen professional practice.</td>
</tr>
<tr>
<td>Bishop (2008)</td>
<td>From the perspectives of children and young people’s experience of a pediatric hospital environment and its relationship to their feeling of well-being</td>
<td>To understand children and young people’s experience of a hospital environment and to identify the salient attributes of the physical environment. Identify what constitutes a supportive pediatric environment.</td>
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<tr>
<td>Ibrahim (2008)</td>
<td>Patient satisfaction with health service of outpatient department</td>
<td>To assess level of satisfaction with the service and the relationship between socio-demographic factors and patient attitude factors.</td>
</tr>
<tr>
<td>Harun &amp; Ibrahim (2008)</td>
<td>Human-environment relationship study of waiting areas in hospitals using “Kansei” engineering concept</td>
<td>To investigate physical characteristics of the space which satisfies user. To identify the emotion and perception of the users’ experience in hospital waiting area.</td>
</tr>
<tr>
<td>Hsieh (2009)</td>
<td>Taking patients’ voices into account within quality systems: a comparative study</td>
<td>To explore how patients’ voices had been taken into account within quality management systems using user satisfaction survey and dealing with patient complaints.</td>
</tr>
<tr>
<td>Liong (2009)</td>
<td>Satisfaction of outpatients on service quality: A case study at two specialist clinics</td>
<td>To measure outpatients’ satisfaction on specialist clinic service.</td>
</tr>
<tr>
<td>Luke (2007)</td>
<td>An assessment of the service quality expectations and perceptions of the patients of Awali Hospital in the Kingdom of Bahrain</td>
<td>To investigate the service quality using SERVQUAL. To investigate patients' expectation through their experience of hospital service and how the service influences the level of satisfaction.</td>
</tr>
<tr>
<td>Manaf &amp; Nooi (2009)</td>
<td>Patient satisfaction as an indicator of service quality in Malaysian public hospitals inpatient and outpatient users’ satisfaction- Two dimensions of service quality- clinical and physical satisfaction</td>
<td>To investigate patients’ feelings on services provided by their caregivers.</td>
</tr>
<tr>
<td>Tsai et al. (2007)</td>
<td>Hospital outpatient perceptions of the physical environment of waiting areas: the role of patient characteristics on atmospherics in one academic medical centre</td>
<td>To examine hospital outpatient perceptions of the physical environment of the outpatient waiting areas. Examine the relationship of patients’ characteristics and their perceptions and needs for outpatient waiting areas.</td>
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</table>
2.9. Usability concept and its relation to the quality of service

Satisfaction is a part of measurement of the service quality and usability key factors, and is referred to as serviceability. Measuring user’s satisfaction helps to identify user’s expectations. Expectations would be vital because users judge quality of care they accept according to standard internal they what state quality. Thus, this internal standard is based on the patients’ expectations and perceptions through their experience of the service (Cho et al., 2004; Hsieh, 2009). By understanding the expectations and perceptions, we can start in to bridge gap between service delivery and user defines quality service.

![Diagram](image)

Fig. 2: The understanding of the Usability concept in healthcare design through service quality process.

According to Alexander (2004), serviceability is the supply perspective of the building. Usability focuses on the users’ perceptions of the easiness phenomenon and its efficiency with which they can use the building. Serviceability, on the other hand, describes the capability of a building to provide a range of performances for which it is designed, used or required to be used, over time. While usability states a demand perspective, serviceability states a supply perspective (Jenso, 2005). Quality itself is an ever evolving perception by the users to value the service, be achievable and be able consistently. It is an ongoing judgment process through human relationships and interaction by meeting their needs. It is similar to Voordt and Wegen (2005) that a part of usability meaning and measurement has a relationship to quality achievement key factors reach-ability, accessibility, efficiency, flexibility, satisfaction. (Voordt, 2009). The relation between user satisfaction and service process, according to Anton and Perouhoff (2002), service quality is level of degree on customer satisfaction through users or consumer experience to the service (rephrase to get clear meaning) (Basri, 2008). Service quality is about the quality of service delivered, according to Parasuraman et al. (1985, 1988) who introduce the SERVQUAL model. SERVQUAL represents that customer experience of the service will affect the service quality. From the study, it is also shown that service quality is all about the end user’s satisfaction among a user’s
expectations of the services offered, the user’s perceptions and how the service meets the user’s needs of the service. (Martínez & Martínez, 2010). This model showed that the achievement of service quality depended on the end user’s background and service goals and it’s about a process of user’s experience. Figure 2 illustrates the relationship between usability and service process.

3. Conclusion

In conclusion, the paper developed an understanding of the usability concept and how its benefits could be used as a guideline for the designer and facilities manager. In addition, what perceived service quality is and how to measure it and its relation to usability outcome were also discussed. Therefore, spatial design is important to study especially from the service process and design aspect such as for way finding design and spatial layout, accessibility, workflow and people behaviour. By giving full attention to these factors it will reflect the space setting design and space requirement based on end-user’s expectation. In addition, the space becomes more efficient, effective, user friendly and comfortable. Furthermore, the hospital is built for a long term design because the service is always needed by the people. That is why most of the usability concept is used with the purpose of measuring the existing design of healthcare services, in order to improve the quality of service and at the same time it becomes a reference to the medical planner in designing a new hospital.

Later my studies will focus on users’ experiences through outpatient area spatial design as part of hospital service, which are using the usability principles- efficiency and the effectiveness of the service. This study will involve on spatial layout of outpatient area in public hospital and human behavior towards that space. It will conduct through the observation, semi structure interview and walkthrough process by considering the factors of user and service distance, relationship between the service to another service, time efficiency to reach the service and to investigate how users satisfied with outpatient area service – based on their expectation and emotion through their experience.

Acknowledgements

The authors would like to thank the Malaysian Ministry of Health (MOH) and the Malaysian Public Works Department (JKR) for supporting this research.

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