A study of building obsolescence in standard design

Abstract

Once the building is obsolete cause by the defect of varying physical deterioration an ageing of various component and building of various age.

The primary objective of this dissertation is to find out life cycle of building element and obsolescence and the effect for the building obsolescence. The definition and differentiation between obsolescence and depreciation, as well as explanation for all different types of obsolescence are being identified on the early stage of the dissertation. A survey is then conducted, few case studies are being conducted to collect information from double storey terrace housing tenants in order to achieve the targeted objective. During the survey, some difficulties are being encountered, such as time constraint and restrict of the obsolescence building have been over cycle life 30 years olds.

The findings of the dissertation show that part of the hypothesis, which was set at the early stage is wrong. Not all types of obsolescence will cause depreciation of rental in office building. Legal obsolescence will not cause the renewal building and effect the service life of the building. At the end of the dissertation, recommendation will be made base on the research throughout this dissertation.

It should be noted that the results from this survey are not perfectly reliable. However, it is hope that it can be a guideline to those who wish to carry out comprehensive or further research on building obsolescence.

A STUDY OF BUILDING OBSOLESCENCE IN STANDARD DESIGN TERRACE HOUSES IN PERAK

Chapter 1

1. 1 INTRODUCTION

This chapter is the introduction of the dissertation. It will define the background of the study. Aim and objectives of the research will be listed to give a clear understanding on the purpose of this dissertation. Besides, hypothesis is also stated to tell the reader what are the key questions being examined.

Scope of study will be deliberated in this chapter too. It is to discuss on the coverage of this research. Research methodology will also be covered in this chapter to describe the method used to achieve the aim and objectives, as well as the way used to produce this dissertation. Case study, interview and questionnaire will be the main methodology of this research.

The last part of the chapter will be the research structure, where it shows the layout of the chapter of the dissertation.

1. 2 RATIONALE

The initial idea of this topic is developed during my visit to my aunt’s work place. Renovation of her office building is carried out at that moment. The reason for the renovation work, which she told me, was to make the building attractive again, so that, the look of the building would not be out of date. Therefore, it gave me an idea to do a research on building obsolescence.

Discussion with my colleagues and supervisor was carried out to narrow down the scope of this topic. Besides, many reading and thinking were done to decide what emphasis of my research is to be. Finally, the narrowed topic was found.

As I have found out, obsolescence has been a persistent problem affecting houses property in recent years. Due to the impact of obsolescence, many houses have been renewal and redeveloped after only 20 to 30 years life, long before reaching the end of their physical life. Many houses in the future are likely to enjoy even shorter useful lives as a result of increased rates of obsolescence.

Obsolescence occurs due to physical deterioration, wear and tear, technological advances, changes in the economic conditions users' requirements, design, appearance, taste, legal, and social needs.

Once the building is obsolete cause by the defect of varying physical deterioration an ageing of various component and building of various age. The research is undertaken to find out life cycle of building element and obsolescence and the effect for the building obsolescence. Hence, my research will discuss this issue in greater depth and goes on to consider different types of obsolescence.

By doing so, I wish that the results from this research will help me to understand the defect of component of material cause the obsolescence building. Such results may also help me in future to know on the prevent ways to treat the obsolescence in building.

1. 3 AIM AND OBJECTIVE

Aim

To investigate varying physical deterioration an ageing of various component and building of varies age.

Objective:

1. To investigate the life cycle of building element and obsolescence.

2. To investigate the effect for the building obsolescence.

3. To explain strategy for avoiding and minimizing the obsolescence in building.

1. 4 PROBLEM STATEMENT

Different project types have in themselves different project life cycle, which in turn influence the life expectancy of their various component. Different elements of building also have different stage obsolescence, Users or owners may change and have requirements different from those the element was initially intended to fulfill. Many of the technologies of modern facilities, as well as the activities they shelter and support to minimizing obsolescence, have changed substantially in recent decades and are continuing to change.

1. 5 SCOPE OF STUDY

The problem of obsolescence is hardly new so need find the board expertise and extensive experience to get the more information for this dissertation. We should be concerned that in an age of rapidly changing technology our buildings are apt to be obsolete. These building might have been built 35 years ago so we will investigate varying physical deterioration of ageing. These changes in technology are not only inevitable; in the long term they

are desirable because the new systems and services offer enhanced performance to the facilities, users and owners. However, in the short term, obsolescence can be costly. Thoughtful design and management can defer or avoid obsolescence and thereby improve efficiency as well as effectiveness of our facilities, and that is the ultimate aim of this dissertation.

1. 6 RESEARCH METHODOLOGY

Various research studies relating to building obsolescence in standard design houses in Perak had been carried out in many ways:-

- Literature review
- Case Study and Questionnaires
- Interview

1. 6. 1 Literature review

iterature research is very important to get the information in order to do the theoretical of this dissertation. Reading courses such as books, magazines, reference, articles, newspapers, journals and publication are some of very useful sources to get the data required for the dissertation. The sources can be reached by visiting the National Library, KTAR Library or bookshop in town. Internet advertising is very convenience to use especially for this dissertation, since it related to the internet itself and quite new. By logging onto the internet, website of the internet advertising of the property developer can visited and can get more ideal way of literature research sources. These normally gather from newspapers, journals and publications.

Publication:

1. “ Revision Notes on Building Maintenance and Adaptation, Butterworth (1984), George. T. Hall.

2. “ Depreciation, Obsolescence and Ageing, (1965), Cowan, P.

3. “ The Fourth Dimension In building : Strategies for Minimizing Obsolescence.(1993), Donald G. Iselin and Andrew C. Lemer.

1. 6. 2 Case Study

This stage will survey some standard design double storey houses located at Perak. Some houses was built in between the years 1970’s and 1990’s. Some properties also included building extension for large families, adaptations for the disable, reorganization of space, re-roofing that was present in some of the properties. The renewal internal for these properties was therefore about 20 years. This is a typical time scale for houses and it linked to the condition of properties, available funding, obsolescence, and the need to provide adequate houses in a community.

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Chapter 2

2. 1 INTRODUCTION

Over the past half of century, our country has been increasing the processes of ageing and obsolescence in building. An observation of buildings in any town will expose an array standards of physical ageing and condition. Many of the buildings are also being used for a purpose which they not original design that one form of obsolescence has affected them.

Today, the demand for new building already diminished that many town have become derelict and need some form of urban regeneration. However, such of the regeneration is more likely from renewal and modernization through the development of greenfield sites.

Many traditional structures have lower failure rates and costs less to maintain than some of the newer forms of the building. With the increasing level of affluence, standards in buildings, life styles demand to improve quality, space and other. This leads to both the desire for new building and to the renewal of existing structure.

More of the renewal of the building is cause by the obsolescence building that failure the structure and the physical. There is considerable degree of confusion surrounding the definition of obsolescence. These two terms are usually without precision. A detail study on the definition of obsolescence is carried out in this chapter to make a clear understanding on building obsolescence.

There are two impacts of the obsolescence on a building named are curable obsolescence and incurable obsolescence. Reflection of them will be given separately in this chapter.

Obsolescence itself can be divided into different categories. As this dissertation is undertaken to find out which types of obsolescence, it is necessary to understand the definition and differences of each type of obsolescence. Hence, the chapter will also go on to define different types of obsolescence.

Hopefully by doing this can provide a guidance to differentiate each type of obsolescence and eliminate the misconception of different types of obsolescence.

These changes are related to the uses of a building or certain spaces within the building are expected to serve (i. e., functional); the cost of continuing to use an existing building, subsystem, or component in comparison with the expense of substituting some alternative (economic); the efficiency and service accessible by the existing installed technology compared with new and improved alternatives (technological); or the broad influence of changing social goals, political agendas, or changing lifestyles.

2. 2 DEFINITION OF Obsolescence

Obsolescence is not depreciation. Both of them are two different terms. However, they are related.

Depreciation is an accounting terms and have a formal definition of ‘ depreciation’, drafted by the Accounting Standard Committee (1987), is: “ Depreciation is the measure of the wearing out, consumption, or other reduction in the useful economic life of a fixed asset whether arising from use, afflation of time or obsolescence through technological or market changes.

This definition is comprehensive and clearly stated what is the depreciation. Besides, the reader can understand the differentiation between the depreciation and obsolescence. Base on this definition, reader can understand the depreciation is a loss in the existing use value of the property and it occurs as the result of the building becoming obsolete. This

implies that obsolescence is the cause of the building and depreciation is the effect of the obsolescence.

Obsolescence was defined differently by many studies in North America and the United Kingdom.

In the United Kingdom, according to Baxter (1971) defined obsolescence as “ a decline in utility not directly related to physical usage or the passage of time. This definition is not quite correct because the author does not consider physical deterioration as part of obsolescence.

In accounting work, obsolescence is separated from physical deterioration. However, based on the original definition given by the Oxford dictionary, obsolescence includes physical deterioration: The word ‘ obsolete’ derives from the Latin ‘ obsoleo’, which was in use from the middle of the sixteenth century with the following meaning, “ which is no longer practiced or used; discarded; worn out; effaced through wearing down, atrophy, degeneration.

The other aspect that can cause confusion is whether the obsolescence is defined as “ a decline in the utility of the building as defined by Baxter (1971) or “ a loss of utility introduced by Flanagan et al. (1989). Both the definitions are correct because both decline and loss of utility are affecting the rental price of a building and therefore, shall be included in the definition.

To clarify, obsolescence is the process of becoming antiquated, old fashioned, outmoded, or out-of-date. It describes a decline in utility that not

result directly from physical usage, the action of the elements or the passage of time (Baum, 1991).

According to Nutt et al (1976), the buildings can only truly be defined as ‘ obsolete’ when they have become completely useless with respect to all possible uses that they have been called upon to support.

Utility the sense of use fullness, desirability or satisfaction is therefore central to the concept of obsolescence; if something is not felt to be providing utility, it will be considered obsolete (Smith et al. 1998). However, because there is no single measure of utility it is difficult to produce a rational, consistent and objective measure of obsolescence (Raftery, 1991). To overcome this problem, obsolescence in buildings is normally measured in terms of the real or nominal decrease in value (Salway, 1986).

Obsolescence also related to decay of tangible and intangible things that all products have an irresistible tendency to become old, but the speed of ageing is different for different objects and circumstances.

Obsolescence is much more difficult to control since concerned with the prediction of charges in fashion, technological development, innovation in the design and the use of buildings.

Obsolescence occurs due to physical deterioration, wear and tear, technological advances, changes in the economic conditions and user requirement. The design, appearance, taste, legal, and social needs will also have an impact to the building.

The impact of obsolescence on a building can be classified into curable obsolescence and incurable obsolescence. Curable obsolescence is one that can be control by the building owner through choice the construction materials, preserve high standards of maintenance and refurbishment. But, it can only manage to a certain extent. The factors into the curable obsolescence are including:

a. Construction faults

b. Level of deterioration

c. Poor level and standard of services

Normally, curable obsolescence can be easily counteracted by means of maintenance or repair.

Incurable obsolescence being the results of inappropriate changes is less easily controlled by the building owner. The most that can be done is to incorporate flexibility into the design of a building to make alterations and adaptations easier in the future. The treatment of incurable impact of obsolescence requires the introduction of new characteristic into a building, which may not be similar with the existing structure.

2. 3 CATEGORISATION OF BUILDING OBSOLESCENCE

Previous studies categorized obsolescence into physical obsolescence (Winfrey, 1931; Little 1964); functional and locational obsolescence (Cowan, 1965; Medhurst, 1969); environmental obsolescence (Medhurst, 1969); economic obsolescence (Seymour, 1982); aesthetic, legal, and social obsolescence (CALUS, 1986; Baum 1989).

The above studies considered technological and functional obsolescence as one category. However, at later stage, CALUS (1986), as well as Duffy and Henny (1988) suggested that technological and functional obsolescence should be separately categorized because of the differences in the impact on buildings. Suggestions from them are correct. Technological obsolescence should be considered as one of the major causes of obsolescence because of its important. A building that is functionally obsolete has to be demolished to obtain a better return from the site. However, it does not necessarily apply to a building that is technologically obsolete. For example, a lift has become technologically obsolete, but it does not render the function of the building obsolete. Therefore, the building will still be retained but the lift might be replaced.

Based on the above, obsolescence therefore, categorized as:

1. Economic Obsolescence;
2. Functional Obsolescence;
3. Aesthetic Obsolescence;
4. Environmental Obsolescence;
5. Legal and social Obsolescence;
6. Technological Obsolescence;
7. Locational Obsolescence;
8. Physical Obsolescence.

2. 3. 1Economic Obsolescence

Economic obsolescence seems to control the durability of real estate, whether residential, commercial or industrial. CALUS (1986) suggested that a

building might become economically obsolete following a change in the “ highest and best use for the land. This might result either from a change in the market condition or in planning policies.

Rand came out with another suggestion saying that besides changes in market condition and planning policies, a change in the national economy can also cause the land to appreciate over and above the normal increase in cost.

Compare both the suggestions; CALUS’s suggestion is poorer. He has neglected national economy as one of the reason that causes economic obsolescence. National economy must be one of the concerns as it has great effect to the land value. Once there is a change in the national economy, the land value will be affected.

According to Salway (1986), “ Economic Obsolescence is considered to be the result of a change in the “ highest and best use for the land. Such a change could be related to specific site or more generally to the surrounding area.

Economic obsolescence is a function of appreciation rather than depreciation: a building becomes economically obsolete not as a result of the existing structure, but through enhancement of the development potential of the underlying land.

The building value decreases over time due to obsolescence. The building can become obsolete if the land value exceeds the capital value of the building faster than its expected physical life. On this occasion, replacement

of the existing building becomes economically attractive, as better return from the asset can be generated.

For instance, the land value in a particular area drops due to relocation of the central business zone to another area. New development having advantage of cheaper land cost will be more competitive and attractive to the tenants and will cause the rental for the existing buildings to decline.

Economic obsolescence is incurable and difficult to predict due to lack of information on the future development and confidentiality of government policies.

2. 3. 2Functional Obsolescence

Functional obsolescence is a product of technological progress resulting either in change in the occupiers' requirements or in the introduction of new building products:

1. A building may be considered functionally obsolete due to its defective layout (e. g., inadequate floor to ceiling heights and close-spaced structural columns);
2. A building may become functionally inefficient because its inflexibility to accommodate new information technology (e. g., no raised floor for distribution of cables).

CALUS (1986) suggested that functional obsolescence is the loss of value of the subject facility resulting from a deficiency (other than physical deterioration) that impairs the subject when compared to a replacement

facility. Functional obsolescence is mainly incurable, which can shorten the economic life of a building (Rand, 1986).

Baum (1991) considered “ Functional Obsolescence as “ the product of technological progress that causes changes in the occupies requirements, impinging on the layout and facilities and also felt that legal and social obsolescence should be regarded as sub-sets of “ Functional Obsolescence.

2. 3. 3 Aesthetic Obsolescence

Buildings may deem unacceptable by occupiers if the appearance is outdated and incompatible with their corporate image. Either fashion in architectural style may have changed or, alternatively the building may simply look old and fail to satisfy an inspiration to be associated with up-to-date products. The improved appearance of a building could result in more satisfied employees and the higher standing of the firm and its services or products.

CALUS (1986) suggested that fashion permeates all facets of life including architectural experience. Whatever the long-term view of posterity about a particular architectural style, it will invariably fall out of favor in the medium term. The changes in fashion will provide an adverse reaction against styles, which characterized the immediately proceeding era.

Architectural style cannot be defined precisely. It is best described as a ‘ State of the Art’ of the building design, which is characterized by fashion, vogue, available technology, and personal taste. The introduction of a new architectural style can in some cases, cause buildings with an old design to appear old fashioned and less attractive to potential purchasers or lessees.

Buildings with a distinctive design appeal are more likely to have lasting appeal and to be less affected by changes in architectural style.

The effect of aesthetic obsolescence is greater in commercial buildings because the buildings with new architectural styles can fetch higher rental values. The decline in the revenue of old buildings requires the buildings to be refurbished to make them attractive and competitive again.

2. 3. 4 Environmental Obsolescence

Medhurst (1969) suggested that environmental obsolescence of a whole neighborhood may occur when the conditions in a neighborhood render it increasingly unfit for its current use. Changes in the character of an area may make a building unsuitable for its original intended use. Environmental obsolescence will normally be of greater relevance to depreciation of land than to the depreciation of buildings.

Environmental change such as high pollution, road congestion and urban decay causes environmental obsolescence. For example, an office building may suddenly become obsolete when the adjacent site is used for industrial use. Disturbances from factory engines and air pollution will deter tenants from staying and the building revenue will start to decline.

The need for a change in the infrastructure of an area can also cause a building to be environmentally obsolete. For example, the area needs more car parking, pedestrian areas, efficient public transport and roads.

This type of obsolescence is not directly related to building design and difficult to forecast.

2. 3. 5 Legal And Social Obsolescence

egal obsolescence stems from the introduction of new legislation or new standards controlling matters such as health, safety, and fire control, which in extreme cases may render a building obsolete. CALUS (1986) and Baum (1989) suggested that changes in social needs might result in occupiers demanding for high and compatible image, good neighborhood and amenities.

For instance, cinema in an area loss its utility due to introduction of home videos, VCD or DVD. So, cinema become uneconomic to operate because loses of revenue. The only way is to convert the cinema to other uses.

Many building become social obsolete although suitable for the purpose envisaged, because it is situated in the wrong location and therefore of only limited practical to use.

egal Obsolescence occurs where a building fails to meet current legislation requirement and the costs involved in bringing the building up to the required standard are prohibitive. In this case, legislation will advance demolition beyond the building’s physical life.

Examples, asbestos and other hazardous materials to health are now prohibited in new buildings and where they occur in existing building they need to be either removed or provided with sealed protection systems. The general condition of a building may in some cases make this financially prohibitive, even where grants for their removal are available, resulting in demolition.

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Chapter 2

2. 3. 6 Technological Obsolescence

A Technological Obsolescence occur when the building in no longer technologically superior to alternatives and replacement is undertaken because of lower operating costs or greater efficiency.

A building may become technologically obsolete before half of its physical life passed then the speed of change in current society suggests that in the future this life will be reduced even faster.

CALUS (1986) suggested that this form of obsolescence occurs as a result of technological innovation. For example, some of the existing electrical and mechanical services are no longer technologically suitable or superior in terms of performance or efficiency. Consider for example, improvement in the lighting efficiency of a new lamp, which may make an existing lighting system no longer economically or technologically effective. In some situations, as with building management systems, it may be possible to install these innovations, without replacing the existing asset.

2. 3. 7 Locational Obsolescence

ocational obsolescence occur when an area – and the property located in it suffers from devaluation because it is considered less fashionable or attractive by occupiers (Bryson, 1997).

A building can become locationally obsolete when the economic activities in the area change (Medhurst, 1969). A change in the city planning, such as

relocation of the commercial area and construction of new roads and motorways can change the economic activities of the affected areas.

2. 3. 8 Physical Obsolescence

ittle (1964) suggested that physical obsolescence occurs solely due to the deterioration of the building’s physical fabric. This suggestion is not correct because he stressed only deterioration of building’s physical fabric causes physical obsolescence. The readers may think that no other factors will cause physical obsolescence except for the deterioration of physical fabric. Actually, components of the building can be considered as one of the physical aspect of the building. Hence, if there is any deterioration of the building’s component, the building is considered physically obsolete too.

Therefore, Winfrey (1931) said that physical obsolescence not only due to the deterioration of the physical fabric but also the other components such as mechanical and electrical services and equipment used in the building. However, both the definitions have not mentioned what are the factors that cause deterioration of building’s physical fabric, materials or components.

Then, CALUS (1986) came out with the suggestion saying that an asset may remain as good as ever in itself, but be rendered obsolete by external factors such as physical deterioration. Physical deterioration is defined as “ deterioration of the physical fabric of building as function of use and the effect of the passage of time.

It is felt that the separation of physical deterioration from obsolescence is not significant, and it is considered as a category of building obsolescence. Flanagan et al. (1989) supported this view by saying that physical

deterioration was considered as physical obsolescence. This is because they have similar effects, which can cause the rental price of a building to decrease and its economic life shorten.

Flanagan et al. (1989) came out the statement stated that physical obsolescence is determined by environmental and non-environmental factors. Any material or component will deteriorate because of environmental factors such as radiation (solar and thermal), temperature ranges, water (rain, condensation, snow, ice), air contamination, biological factors (micro-organisms, fungi, bacteria) and stress factors (physical action of wind, hail). The non-environmental factors are generally the stresses that are imposed by humans in their various activities of living, working and playing. Examples are permanent loading, fatigue loading, impact, abrasion, chemical attack, normal wear and tear, and abuse by the user.

The rate of physical deterioration can be forecast within tolerable levels of accuracy using the lives of the respective building components. However, it must be remembered that considered variation exists in the lives of even the same building component depending upon a wide range of the different circumstances (Ashworth, 1996).

Kirwan and Martin (1972) suggested that this physical deterioration occurs as the deterioration of the physical structure of the building. It is not simply a factor of age but a combination of age, use and scale of maintenance.

Physical deterioration occurs more slowly than other forms of obsolescence, but it is predictable and curable provided the building is well maintained.

Baum’s (1989) showed that physical obsolescence is not as significant as functional and aesthetic obsolescence.

The rapid deterioration of buildings and their components can be attributes to many different causes:

- An emphasis upon initial building costs without considering the consequences of costs in use.
- Inappropriate design and detailing of buildings and their components.
- Use if materials and components that have insufficient data concerning their longevity.
- Constructional practices on site that were poorly managed, supervised and inspected.
- A lack of understanding of the various mechanisms of deterioration.
- Insufficient attention given to the maintenance the building stock.
- Inappropriate use by owners and occupies.

Whereas the rate of physical deterioration, can be controlled by the designer through the correct choice of material, methods of construction and appropriate standards of maintenance, obsolescence cannot, other than through the ability to provide a flexible and adaptable design solution to facilitate easier adaptation and renewal at same later date.

2. 4 SUMMARY

After the study, I clear understanding is developed on depreciation and obsolescence as well as different types of obsolescence. There will be no confusion and misconception surrounding them.

Depreciation occurs as the result of the building becoming obsolete. Hence, depreciation is considered as the effect of obsolescence and obsolescence is the cause of depreciation.

The impact of obsolescence is classified into curable and incurable. Incurable obsolescence is more crucial than curable obsolescence as it is more difficult to control. It can immediately shorten the physical life of the building.

Besides that, I also can understanding the 8 categorizes of obsolescence in this chapter. The categorizes of obsolescence economic, functional, aesthetic and fashion, environmental, legal and social, technological, locational and lastly physical obsolescence.

Through the study, it was found that there are no best and perfect suggestions or opinions in the concept of obsolescence. Especially during defining different types of obsolescence, different authors have their own suggest