

e-Proceeding

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Does Brownfield Sites Impact On Nearby Property Prices?

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Abstract

Brownfield site is one of the main challenges that Malaysia has to face as a result of financial, administrative and policy problems. Negative environmental and social impacts of Brownfield sites jeopardize the health and well-being of residents causing nearby areas to be less desirable for occupation and investment resulting in price discounts. Hence, this research aims to critically review the magnitude of the impact of Brownfield site on property prices. An overview on previous studies has shown that property prices are significantly influenced by proximity to Brownfield sites. This indicates that the proximity to Brownfield site is accounted for when making property purchase decisions.

Keywords: *brownfield sites; house price; property market*

1.0 INTRODUCTION

Brownfields are commonly associated with distressed urban areas, particularly central cities and inner-ring suburbs that were once heavily industrialized (Davis and Sherman, 2010). The rapid development in Malaysia has escalated the number of abandoned projects, including housing projects. It has been reported that there are 48 housing projects abandoned including 8,932 units of houses in peninsular Malaysia (Ministry of Housing and Local Government, 2017). This issue has become more serious due to the problems caused by Brownfields (Dahlan, 2011). Although the issue of brownfield redevelopment has been raised since 2008, there are still many undeveloped areas (Nurlaila, 2014). To address the issue of brownfield development, a guideline has been published by the Town and Country Planning Department of Peninsular Malaysia to encourage the redevelopment of brownfield. Several empirical research on brownfield shows negative impact from brownfield sites toward house prices with price discounts ranging from 2% to 8%. Nonetheless, issues regarding brownfield is still unclear (Han, 2014) and the impact of brownfields on surrounding property values can be astounding (Green, 2018). Limited evidence on the impact of Brownfield sites on property values left regions planning without a firm basis to judge the future impact and redevelopment strategies of such areas.

Thus, in this paper, we attempt to investigate the impact of Brownfield Sites on the property market. This review paper will establish whether the impact of Brownfield sites on the local property market and thus bridges the gap of knowledge. This paper is organized as follows: Section 2 discusses Brownfield sites; Section 3 analyses the impact of Brownfield sites on property prices; Section 4 discusses the findings; followed by conclusions and implications in Section 5.

2.0 LITERATURE REVIEW

2.1 Brownfield Sites

Brownfield sites are abandoned, vacant, derelict or underutilized commercial or industrial properties where past actions have resulted in actual or perceived contamination and potential for redevelopment (National Round Table on the Environment and the Economy). In Malaysian context, brownfield is an abandoned development area and obsolete development structure (JPBDSM, 2012) that may be contaminated (JPBDSM, 2012). Contaminated and derelict land in Malaysia can be found at places such as ex-mining sites, motor workshops, petrol stations, oil depots, former railway yards, bus depots, abandoned rubber factories, landfills, industrial sites and sites with underground storage tanks (Yap, 2014). Past industrial activities have left hectares of land contaminated with organic and inorganic chemicals that render the land unusable for future expansion, development or reuse (US EPA). Brownfield area is unattractive to developers due to uncertainties in legislation and cost (Wedding & Crawford-Brown, 2006), the lengthy period of redevelopment process, and hardly receiving any demands from buyers. Brownfield is symptomatic of other problems that contribute to neighbourhood decline, frustrating revitalization efforts and leads to eyesores, fire hazards, and drug-related activities, vagrancy and rodent infestation (Cohen, 2001). Abandoned projects may also affect an area in various aspects such as views and economic aspects (Ferber & Grimski, 2002).

2.2 Brownfield Sites Impact on the Property Market

Property value is very sensitive to changes in surroundings. Any changes may attribute increase or decrease property value. In general, property attributes can be grouped into locational, structural, and neighbourhood (Goodman, 1989; Williams, 1991). Structural attributes represent the characteristics and conditions of the property. Structural attributes can take in the form of neighbourhood size, lot size, floor area, accommodations, building age, types of materials and finishes, structural quality, kitchen cabinets, and state of repairs (Adi Maimun, 2011). The condition of structural attributes may affect the property value either positively or vice versa. Meanwhile, neighbourhood attributes can be classified according to socio-economic variables, local government or municipal services and externalities (Chin and Chau, 2003) and facilities (Roe et al., 2004). Residential areas that have all the facilities required will form a good property market (Nor Asmahan, 2012) as provided facilities enhance the economic activity of that area. The location factor lies in the bid-rent theory as theorized by Alonso (1964). Alonso's bid-rent theory puts forward that every agent is prepared to pay a certain amount of money, depending on the location of the land. An attractively located property is highly sought after and pushes the prices up through the bidding process. Location, as analysed through the Hedonic model plays a major role in determining property prices (Adi Maimun, 2011). The location of a property mainly influences property purchase decisions. Many people are willing to pay a premium for a desirable location (Prasad and Richards, 2008). Properties located near the city centre, for instance, will likely fetch high prices since many economic and business activities mainly took place within the city centre area. In contrast, houses located farther from the city centre will experience a decrease in prices (Chin and Chau, 2003). Brownfield also affect house prices. According to Accordino and Johnson (2000) and Doerle (2012), Brownfield sites cause economic, health and environment problems. Brownfield imposes a significant externality on neighbouring property owners by lowering the market value of their properties (Accordino and Johnson, 2000). The effects of Brownfield are most acutely felt in the residential sector due to the large number of consumers (buyers and renters) within the residential market segment. Thus, much research on the impact of Brownfield sites on property values has focused on the residential sector. Table 1 summarizes previous research on the effect of Brownfield sites on residential property prices/rents.

Table 1. Previous research on effect of brownfield on residential property value

Author	Data	Variables	Analysis	Result
Anna (2007) United States	<ul style="list-style-type: none"> • 432 sites and 2,682 observations • 1980 – 2002 • Random sample of properties that located in brownfield area 	<ul style="list-style-type: none"> • Locational data: distance to CBD (meter) and distance to nearest road of any kind (meter) • Structural data: size of parcel and building capital density. 	Hedonic Model	<p><u>Price Discount:</u></p> <ul style="list-style-type: none"> • Location • 38% (located within enterprise zone)
Han (2014) United States	<ul style="list-style-type: none"> • 101,497 transaction (1991 - 2010) • House 	<ul style="list-style-type: none"> • Locational data: distance from brownfield sites (ft.) • Structural data: parcel identification (block and lot number), transaction date, deed date, a type of transaction, full address, sales price, and land use code. 	Hedonic Model	<p><u>Price Discount:</u></p> <ul style="list-style-type: none"> • Location • 0.87% (within 250 ft.) • 0.14% (within 250 to 500 ft.) • Duration • 0.17% (abandoned more than 3 years) • 0.04% (abandoned less than 3 years)
Yap (2014) Malaysia	<ul style="list-style-type: none"> • 557 sales • 2001- 2013 • House (low-cost terrace, terrace and detached) 	<ul style="list-style-type: none"> • Locational data: distance to Kemayan City (meter) and distance to Kulai Centre Point (meter). • Structural data: types of title, types of property, number of floors, number of rooms, land area (square meter) and built up area (square meter). • Neighbourhood data: distance to nearest school (meter). 	Hedonic Model	<p><u>Price Premium:</u></p> <ul style="list-style-type: none"> • Location • 19.6% (1 km from Kemayan City) • 23% (1 km from Kulai Centre Point)
Gilderbloom, Meares and Riggs (2016) United States	<ul style="list-style-type: none"> • 169 sales • 2000- 2008 	<ul style="list-style-type: none"> • Locational data: distance from city centre (miles) and distance from brownfield sites (miles) • Structural data: number of housing units, household income and housing age • Neighbourhood data: total crimes per 100000 residents 	Hedonic Model	<p><u>Price Discount:</u></p> <ul style="list-style-type: none"> • Year 2002 • \$10,342 (within 0.5 miles) • \$6,995 (within 1.0 miles) • Year 2006 • \$7,615 (within 0.5 miles) • \$7,556 (within 1.0 miles) • \$6,463 (within 1.5 miles) • Year 2008 • \$11,911 (within 0.5 miles)

Author	Data	Variables	Analysis	Result
				<ul style="list-style-type: none"> • \$9,757 (within 1.0 miles) • \$8,261 (within 1.5 miles)
Han (2017a) United States	<ul style="list-style-type: none"> • 101,497 sales • 1991-2010 • House 	<ul style="list-style-type: none"> • Abandoned property data: parcel identification number (block and lot number), full address, the dates the Vacant House Notice was first issued and reissued, the type of structure, the tax payment status, and the lot size (The Vacant House File, The Baltimore City Department of Housing and Community Development). • Structural data: parcel identification (block and lot number), transaction date, deed date, a type of transaction, full address, sales price, and land use code. 	Weighted Repeat Sales Piecewise Linear Regression Model	Price Discount: <ul style="list-style-type: none"> • Location • 1.5% (within 250 ft. on second sales) • 1.0% until 2.7% (when the number of nearby abandoned properties increases by more than two between the first and second sale)
Han (2017b) United States	<ul style="list-style-type: none"> • House 	<ul style="list-style-type: none"> • Neighbourhood data: level of social organization, neighborhood disadvantage, level of government intervention and neighbourhood housing market characteristics. 	Hedonic Model	Price Discount: 1.384%
Schwarz, Gill, Hanning and Cox (2017) United States	<ul style="list-style-type: none"> • 18,109 sales • 1997-2005 • House 	<ul style="list-style-type: none"> • Locational data: Distance from the nearest brownfield • Structural data: house prices, age of building at the time of the sale, number of bathrooms and bedrooms, lot size (ft.) and whether the house has air conditioning or not. 		

The increasing number of foreclosures, vacant and abandoned properties across the country led to a significant volume of research and empirical studies that estimated the negative spillover effects of such distressed properties on neighborhood quality (Frame, 2010; Joice, 2011). Research carried out in the United States by Anna (2007) uses 432 sites and 2,682 observations from 1980 to 2002. This research focused on contaminated sites collecting random samples of properties located in brownfield areas and with similar land use restrictions. Anna (2007) concluded that parcels in an enterprise zone transact at a 38% discount. Nonetheless, it is statistically insignificant. Properties that have been abandoned for more than three years, reduced their value within 250 ft. by roughly 1%, within 251 until 500 ft. by 0.27%, within 501 until 1000 ft., by 0.05% and within 1001 until 1500 ft. By 0.14% (Han, 2014). Han (2017a) observed that an additional abandoned property within 250 ft. at the second sale reduced the nearby property values by approximately 1.5%. An increased number of nearby abandoned properties by more than two between the first and second sales will decline its property values between 1.0% and 2.7%. In another research, Han (2017b) included the neighbourhood factor through neighbourhood level of social disorganization, neighbourhood concentrated disadvantage, level of government intervention and neighbourhood housing characteristics. Through multiple regression analysis (MRA) using 510 transaction sales in the United States, the research shows that there is a price discount of 1.384%. Gilderbloom et al. (2016) analysed the effects of EPA Brownfield sites on housing

values, foreclosures, and premature deaths in Louisville, Kentucky, between 2000 and 2008. They found that in 2000, houses within a half-mile radius of Brownfield sites are worth \$10,342 less than houses outside that area. When the scope is expanded to a one-mile radius, homes inside the radius are worth \$6,995 less than homes outside it. In 2006, within a half-mile of a Brownfield site, houses were worth \$7,615 less than houses outside it. Houses located within a mile were worth \$7,556 less than other homes. Houses located within a mile and a half were worth \$6,463 less. The pattern continued in 2008. Homes located within a half-mile of the site were worth an average of \$11,911 less, which was less than homes within one mile, valued at \$9,757 less. The latter homes were valued lower than homes at a mile-and-a-half distance. Homes in this radius were worth \$8,261 less than homes outside it. Meanwhile, Schwarz et al. (2017) observed that Brownfield reduces property values up to 0.5 mile from the nearest Brownfield, with coefficients indicating a reduction of 3% in sales value for a 10,000 sq ft increase in the size of the nearest Brownfield, and significant at the 5% level for the continuous distance (coefficient of -0.026). Looking at the discrete distances, Brownfield size negatively affected property values up to 1 mile (coefficients of -0.006 to -0.031). In Malaysia, research on Brownfield was carried out by Yap (2014) where 557 transaction sales between 2001 to 2013 were used. Yap (2014) found out that there is an increase in house price of 19.6% for residential areas that are located 1 kilometer from Kemayan City, an abandoned shopping complex. For residential area located 1 kilometer from Kulai Centre Point, house prices increased by 23%.

3.0 DISCUSSION

Much of the literature that exists focuses on the complexity of Brownfield redevelopment with a limited number of quantitative studies that focused on the effect of brownfield on residential property value. Lack of literature on the impact of brownfield on residential property value may contributed to the complexity of redeveloping brownfield. Moreover, most studies were based in the United States. The lack of Malaysian empirical study research raises the question of whether Brownfield sites will bring impact on the property market and if so, what is the magnitude of impact? The lack and uncertainty of market information affects the property market player's decision making such as valuers in valuing property prices and developers in developing areas. Therefore, there is a need for a study to establish the effects of Brownfield on residential property value, particularly in Malaysia.

4.0 CONCLUSION

This paper has established a few key findings related to the impact of Brownfield sites on property prices. The study concluded that the impact of Brownfield sites on the property market varies depending on the situation. The various impact of Brownfield sites on property prices highlighted the need for a local based study, particularly in Malaysia. The findings of the study further clarify the impact of Brownfield sites on property market literature. Property market players such as valuers, planners, developers and researchers may find the findings beneficial in making various decisions related to property such as research, planning, developing and valuing properties.

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