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Reaction of Adjoining Housing Prices to Newly Constructed Sub-Way Lines: Evidence from Empirical Literature

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ABSTRACT

Based on location theory, the degree of land use impact depends to a great extent on the trivial enhancement in accessibility afforded by the transportation system. The forecast of economic theory would be that accommodation prices in close proximity to the subway stations would increase accordingly due to having convenient access and lesser cost of itinerant within the metropolis. Earlier studies have provided some substantiation on the effect of transit systems on urban residential prices. The majority of property value studies, centered on single-family homes, have uncovered premiums for nearness to transit which are in the six to seven percent assortment. Additionally, a large amount of the previous studies revealed that distance from adjoining light rail transit station and magnitude of dwelling buildings are the most important factors in ascribing house prices. Through employing the reciprocal of distance to determine or estimate the gradient outcome, some studies discovered the influence of the new station on property price appreciation mainly disappears at distances more than a 12 minute walk (0.6 miles) to the station. Using panel data on housing prices and urban rail transit facilities, the past studies revealed that a correlation test reveals important correlations between home prices and rail transit services. One of the fascinating implications of the positive effect of a new subway line on accommodation prices is the connected increase in property tax revenues. Inferences from earlier works of scholars imply a tax revenue increase of no less than 7.5 percent, which may perhaps potentially be allotted for investment in subway lines. Based on the outcome of past researches, opportunity for future research lies in the fact that comparison should be made both transversely across regions as well as across system types (for example, heavy rail, light rail, bus ways and the likes). Further research should be carried out to ascertain whether the impact varies depending on the distinctiveness of the area in which the annexation or extension is erected.

Key words: House Price, Metro Station, Property Value, Subway Line, and Transit Rail Station

1. INTRODUCTION

As a matter of fact, it has long been documented that the provision of community infrastructure has a deep influence on the blueprint and pattern of metropolitan development and the spatial division of urban housing values. The presence of highways, streets, roads, heavy and light rail, sewer services in addition to other municipal infrastructure influences the performance of both suppliers and demanders of residential along with commercial properties (Damm et al, 1980). The advantages of these facilities and services are, in any case in theory, in part or entirely capitalized into municipal property values. Early empirical literature has provided some background information on the influence of transit systems on metropolitan property values. Especially, the impact of subway lines on prices of owner-occupied single-family home or residence has been extensively studied (Damm et al, 1980).

Closeness to light rail transit (LRT) stations has two dissimilar effects on real estate prices: positive or negative. Positive effects are connected to improved ease of access to LRT users. Quite the opposite of this, sound, noise as well as social vices and crime factor amidst LRT stations may have a lessening effect on real estate values (Getz, 1975). For that reason, there is a no agreement in all studies. Whereas some studies brought into being a momentous positive impact on housing values (Chen et al., 1997; So et al., 1997; Laakso, 1992), a number of studies were not able to unearth any noteworthy positive impacts (Hennebery, 1998; Forrest et al., 1996 as quoted by Yankaya and Celik, Undated).

Furthermore, while studies have reached different conclusion, the case studies have mutual and convinced resemblance. In the current body of knowledge, empirical studies emerged in the industrialized countries particularly North-American Cities (Cambridge Systematic Inc, 1998), Los Angles (Cervero and Duncan, 2002), Atlanta (Cervero, 1994; Bollinger and Ihlandfeldt, 1997), Washington D.C. (Cervero, 1994), Toronto (Dewees, 1976), Hong Kong (So et al., 1997), Sheffield (Henneberry, 1998). In view of the fact that the rail transit business is determined by rising returns to scale entailing and involving a huge amount of output with continually diminishing marginal in addition to average costs, transit venture or investments emerge in more affluent developed countries owing to high primary cost requirement of such venture. In the range, span and scale of Turkey, as an emergent and developing country, in Izmir and Istanbul, rail transit investments have not yet been accomplished regrettably. In addition, monitoring as well as measurement of the effects of these categories of investments dictates a consistent and adequate database which is always a big predicament for empirical studies in third world countries (Celik and Yankaya, 2006 as cited by Yankaya and Celik, Undated)

More latest and recent studies have relied on either tax assessor's records or genuine landed property transactions, and have characteristically been "before/after" studies (ostensible and purported comparative control analyses) or have used multivariate regression (Getz, 1975). Nevertheless, in the United States, nearly all of these earlier studies have centered on the effect of highway facilities. For instance, in a cross-sectional study, Adkins (1958) concluded that land adjoining to interchanges alongside a Texas expressway increased in value from 300% to 600%, and that land further than that experienced much slighter, nonetheless still positive, increase. Brigham (1964) came up with a multiple regression model based on appraisal data which corroborates a positive relationship amid highway accessibility along with land value; Burton and Knapp (1959) and Lemly (1959) employed comparative control analysis based on sales data, and arrived at similar conclusion (Damm et al, 1980).

Despite the fact that Czamanski (1966) did not study ease of access to highways per se, he did discover, by employing multiple regression and analysis of variance (ANOVA), that proximity to the central business district (C.B.D.) is a key determinant of landed property value. Golden (1968) established that increases in real estate value happened to a larger degree for properties located near to freeway or expressway interchanges than in control neighborhoods farther away from it. A University of Kentucky (1975) proportionate and comparative control study based on survey responses by owner-occupiers of both commercial along with industrial establishments concluded that quite significant increases in landed property value take place upon the completion of a six-mile free access bypass. Besides these studies, there have been several observations of variation in prices of properties close to transport systems devoid of any comparative control including Heenan (1968), Langfield (1971) and Miller (1971) as cited by Damm et al. (1980).

However, two researchers uncovered that the enhanced proximity afforded by transit or highways had trivial, minute or no effect on land and landed property value. Eyerly (1965) evaluate and compare tax records over a time span of six years and discovered that real estate values in a substitution area increased below the adjoining areas. Cribbins (1964) employed sales prices for parcels of land sold close to three sections of interstate routes in North Carolina in a multiple regression analysis. He established that the highways examined had no quantifiable and assessable impact on landed properties contained by the study areas. He, therefore, concluded that broad-spectrum increases in landed property value emerge and appeared to be determined mainly by other forces obtainable within the localities studied (Damm et al, 1980).

A good number of the investigators who did not unearth that transport facilities have a positive influence on real property values came to a conclusion instead that real estate values are simply restructured throughout the region. For this reason, amassed increases are not really stimulated by transport infrastructures. For instances, on the strength of an empirical analysis of the advantages of a highway development, Mohring (1961) observed that landed property value increases in the surrounding area and environ of a highway may perhaps be balanced by virtual decreases in another place as activities swing to locations in close proximity to the highway to take benefit of the improved ease of access and convenience (Damm et al, 1980).

Literatures on the influence of transit on landed property prices have been far scanty, and repeatedly more diffident in range and scope, than their highway matching part. Through analyzing properties with anecdotal propinquity to a bus system, Downing (1973) uncovered that landed property prices are greatly reliant on ease of access. Moreover, Boyce et al. (1972) and Allen and Mudge (1974) disclosed that real property value upwardly increases steadily owing to the presence of a predetermined heavy and weighty rail system and they were balanced by decreasing downwardly in the outskirt of the area. In a chronological appraisal and review of rail transport in emerging economies, Gauthier (1970) established that areas near rail stations experience upward increases in land and landed property value to the disadvantage of areas father away, given that resources, construction and production may turn out to be more concerted in centers, whereas solemn improvement lags take place somewhere else (Damm et al, 1980). Based on the aforementioned, it could ne deduced that there is still unfilled gap in the existing literature on the response of adjoining house prices to the establishment of rail way station lines.

2. CURRENT LITERATURE ON THE EFFECT OF SUBWAY LINES ON HOUSE PRICE

2.1 More Recent Empirical Literature

A substantial bulk of literature explored on the profitable effects of transit lines on the values of surrounding residential accommodation. Notable among these researches include: Bartholomew and Ewing (2011); Baum-Snow and Kahn (2000); Bowes and Ihlanfeldt (2001); Chatman et al. (2012); Debrezion et al. (2007); Grimes and Young (2013); Hess and Almeida (2007); Kim and Lahr (2014); Kim, Ulfarsson and Hennessy (2007); Werner et al. (2016);. Bartholomew and Ewing (2011) attempted an extensive review and analysis of older studies on the influence of transit and increased pedestrian access on real property prices. The review centered on hedonic pricing studies that endeavor to demonstrate revealed-preference (RP) for new transit improvements and developments. They uncovered that there is a largely positive impact on real estate values amid the introduction of new transit alternatives as a matter of fact (Camins-Esakov and

Vandegrift, 2017).

The confirmation and support for the outcome of Bartholomew and Ewing's study could be seen in Debrezion et al.'s (2007) research in their meta-data analysis of the impact of transit expansions, growth and improvements on real estate prices. The meta-dataset enclosed and contained seventy three (73) preceding, earlier and prior studies of hedonic pricing special effects of transit, fifty two (52) of whom centered and focused on residential accommodation prices. The general effect in favor and support of residential properties was a 1.9% upward increase in accommodation prices for every two hundred and fifty (250) meter increase in nearness and closeness to the subway line station through an effect of 6.2% for houses contained in a quarter of a mile from the transit station. Through employing a subset of twenty six (26) data sets, they discovered on average a 2.5% upward increase percent per 250 meters, and a 7.6% impact within a quarter of a mile for light rail stations.

Bartholomew and Ewing, furthermore, revealed that:

a) The category and nature of rail (including regularity, extent, location, accessibility and local traffic prototype and pattern) has a great and huge effect on accommodation prices.
b) Expanse and distance to the central business district (CBD) has a negative association, relationship and connection amid the impact of rail transit lines on real property prices. In other words, the nearer to the CBD, the larger the positive impact of a newly introduced rail transit system on real estate value).
c) There could be a "disamenity" effect due to negative externalities of rail train stations (additional sound, noise, pollution, effluence, and/or misdemeanor as well as crime decrease and lessen land and landed property values), but the impact is negligible and minimal for light rail lines.
d) The larger the concentration and compactness of development and improvement, the bigger the positive impact of the rail transit station.

Conversely, the articles reviewed by Bartholomew and Ewing (2011) as well as Debrezion et al. (2007) did not evaluate and appraise the effect of extensions, expansion and annexation to light rail nor did they center on New Jersey, but to a certain extent study cases athwart and transverse multiple countries (Camins-Esakov and Vandegrift, 2017).

On the contrary, the work of Kim and Lahr (2014) extensively focused on New Jersey. They analyzed the announcement and opening of the Hudson-Bergen Light Rail (HBLR) using a hedonic price model amid residential property repeat-sales. The HBLR is a light-rail system operating in northern New Jersey, which was opened in 2000. Kim and Lahr began to measure and evaluate customer valuations over the whole HBLR through critically analyzing accommodations that were sold earlier and prior to the announcement and subsequent opening of the line, and comparing them to sales (inflation adjusted) following the opening of the line. Apart from the fundamental repeat-sales methodology adopted, Kim and Lahr incorporated and integrated independent variables for in-flight and aerial distance (as the crow-flies) in addition to network distance (using the streets) by means of a gradient approach and strategy for the network distance variable. The analyses equally encompassed a sequence of socio-demographic variables. They unveiled that light rail upwardly increased residential prices through an average annual rate of 18.4% with the impact decreasing by one percent for each fifty feet further away from the station. They also found that, at a distance of ¼ of a mile, the effect vanished and disappeared (Camins-Esakov and Vandegrift, 2017).

Correspondingly, Chatman et al. (2012) carried out a study on the economic benefit of the opening of the River Line. Similar to Kim and Lahr (2014), the model employed a repeat sales blue-print replica with the logged ratio and quotient of the most recent transaction price divided with the oldest transaction price as the contingent or dependent variable. The model incorporated a series and sequence of distance variables to explain and account for the spatial associations that would be of concern in determining price appreciation or increase affects (that is, nearest commuter rail, highway, bus station and major CBDs). Furthermore, the model employed demographic variables analogous to Kim and Lahr (2014). On the other hand, Camins-Esakov and Vandegrift's (2017) study differed from Kim and Lahr (2014) in that their study was restricted to property distinctiveness including age of home, bedrooms, bathrooms, lot size renter occupied and the likes as well as critically analyzing the line by means of repeat-sales. Moreover, their study equally analyzed distance from whistle-blowing location to ascertain whether there was a negative impact connected with the River Line noise (Camins-Esakov and Vandegrift, 2017).

Astonishingly, Chatman et al.'s analysis came to a conclusion that there was a negative effect connected with the River Line in the five-mile radius surrounding the new stations. Chatman et al discovered that whereas low income along with smaller houses close to the new stations did have advantage from the subway line, residential properties farther away from the station experienced a decrease in housing price. Chatman et al. (2012) described this as change or transference of value from residential properties further away from the station to properties closer to the stations. Fascinatingly, the net change in housing value was negative because the decline in value to some extent exceeded the resultant increase. The calculated increase happened after the rail was functioning and operational (Camins-Esakov and Vandegrift, 2017).

All through the construction period, proximity and nearness to the rail line was connected in the midst of negative externalities of building (that is, material delivery, noise and additional traffic) reduced residential property values. The authors guess, surmise, infer and deduce that inhabitants anticipated and projected that the line would perhaps increase traffic and crime which contributed, in no small measure, to the lower values once ground was broken down on the line. Significantly, Chatman et al. (2012) incorporated properties within a five-mile radius of the station, a range far larger and bigger than numerous other studies. Moreover, the work of Camins-Esakov and Vandegrift (2017) analyzed sales in one hundred and twelve (112) boroughs and along the whole length of the thirty-four mile line, which captures areas with lower concentration of inhabitants.

2.2 Interceding Issues that Weaken the Link between Real Property Prices and Rail Stations

Other interceding and mediating issues may have an influence on the correlation between land and landed property prices along with rail subway lines. In a study carried out by Hess and Almeida (2007), they investigated the Buffalo light rail and follow and trace the special effects of the line on landed property values twenty years subsequent to its commencement of operation. Akin to Trenton, Buffalo is a metropolis experiencing sluggish growth. As for Buffalo, they realized that the impact of light rail on residential accommodation prices is more evident close to stations encircled by higher income residential accommodations. Furthermore, Kim and Lahr (2014) concluded that household or family unit income had a positive, although minimal, effect on property value. Nonetheless, the upward increase of the property value was larger, bigger and more noticeable at stations farther away from the CBD.

Altogether, these two results raise queries and question. In as much as the purpose of the planned and projected expansion in the city center, downtown and business district of Trenton is to transport outside commuters into the Central Business District, then Trenton may have a partial effect on real property values (City Data, 2013). Trenton has a medium household income of partly the average New Jersey income. These distinctive features of the proposed expansion make it tremendously complicated and hard to find out the precise and correct effects will be, and also make it indispensable to carry out a more focused investigation to observe the effects of expansion in particular. Establishing a relationship between an extension and a new line does not describe and explain the pre-existence of light or heavy rail service (Camins-Esakov and Vandegrift, 2017).

Nevertheless, an examination of an improvement to a current line accounts for this effect. Grimes and Young (2013) examined the real property price upward increase due to upgrades on the Auckland's municipal passenger or traveler rail "Western Line" in 2005. Grimes and Young explored on property value increase due to the announcement and broadcast of the upgrade. They hypothesized that rational and lucid homeowners would instantaneously be acquainted with the value and worth of the transit upgrade and improvement. They analyzed their data by means of a straightforward quadratic regression amid distance along with distance squared as the merely two independent variables. The outcome of the findings indicated a positive impact from the improvements and upgrades by the extent, degree, magnitude and level of the effect getting higher when the distance to the rail station decreased. Conversely, quite a number of the stations indicate a negative impact at incredibly close accessibility or proximity to the station. Whereas there are apparent dissimilarities between other studies and an extension and annexation on the River Line (passenger versus light rail; full line upgrade versus extension; Auckland versus New Jersey), other studies did buttress the assertion that changes to a rail line can add value. Despite the fact that the studies mentioned previously indicate that light rail increases land and landed property values, the machinery through which proximity causes increasing real property values is uncertain (Camins-Esakov and Vandegrift, 2017).

Bowes and Ihlanfeldt (2001) explored what informs new rail stations to influence real estate values; principally whether diminished commuting costs or attract retail inflicted any rise in value and whether negative or downbeat externalities or incessant criminal doings caused any decline in value. Bowes and Ihlanfeldt's article studied the MARTA system in Atlanta. They eventually tested models for hedonic pricing (the benefit of easier commuting access), crime intensity, and retail employment density. The conclusions provide evidence for what most studies instinctively uncover; the undeviating impact of increased proximity is higher than the negative impacts of a rail station and higher than the indirect advantage of retail development and improvement as a matter of fact.

Additionally, the indirect gain of retail shops on landed property value increase is larger than the negative impact of crime activities with the exception of for property extremely close to the rail train station in low-income environs in close proximity to the CBD (that is, in crime vulnerable and susceptible neighborhoods, a light rail station focuses on the crime which decreases real property values). Bowes and Ihlanfeldt, moreover, established that these effects on real property value increase are far away from definite and differ with the explicit income, distance to Central Business District, and distance to the rail station. Despite the fact that most previous studies appraised and assessed light rail by studying real estate prices, there are other methods to evaluate the economic effect of light rail (Camins-Esakov and Vandegrift, 2017).

Werner et al. (2016) determined the impact of a newly constructed light rail from the perception of ridership, that is to say, whether there is a, by and large, increase, decrease, or mere shift of travelers and commuters from alternating public transit to the newly constructed light rail. Their review and analysis of five newly constructed light rail stations uncovered an overall increase in the general number of travel and journey taken on public transport. Ridership increased because of passengers' revealed predilection and preference for advanced quality and quicker transport (virtual to bus transport). Whereas these outcomes and results did not allow one to directly deduce and evaluate the impact of an extension and alteration to the River Line, Werner et al. (2016) revealed and showed the huge number of effects light rail could have on a abutting housing prices as a matter of fact.

Equally, Baum-Snow and Kahn (2000) discovered in five cities (Atlanta, Boston, Chicago, Portland, and Washington) that public rail upgrades had a positive effect on general ridership with working experts aged 20-32 accounting for the upward appreciation. Nevertheless, this impact was negligible because the study was investigating only upgrades and improvements to existing and current lines. These two models indicate that a newly built line or improvement on an existing line both increase the function of the rail system. Certainly, adding together transit options may raise the value of the existing and current transit alternatives and choices (Camins-Esakov and Vandegrift, 2017).

Kim, Ulfarsson and Hennessy (2007) unearthed that in as much as there is direct motor vehicle service to a light rail and banister station, it rises ridership on the light rail and on the motor vehicle, van, car, automobile and truck system. The essentials of a bus system in Trenton would inform the real increase in ridership. However, it is fascinating and exciting to note that a light rail expansion if instituted in synchronization by means of bus routes could augment the amount of public transit commuters and travelers in general and lessen the amount of car commuting in the conurbation. Furthermore, Kim et al. analyzed patterns of walker or pedestrian movement around light rail stations. Despite the fact that the acceptable standard average walking distance beginning light rail station is about 0.25 miles, the average walking distance was 760 meters, or else 0.47 miles for the St. Louis MetroLink (Camins-Esakov and Vandegrift, 2017).

This implies that landed property at a larger distance commencing from the station will undoubtedly have the possibility to witness price upward increase. Camins-Esakov and Vandegrift's (2017) study brought into being that open space, park in addition to ride lots can augment ridership in as much as the line is in vicinity where car concentration has been already high. The authors further revealed that, in Trenton, 77% of employees already drive to place work. Hence, it can be established that commuters in Trenton would ascribe greater values and worth to an open space, park and ride (City Data, 2013). In summary, there is quite bunch of studies on real property value increase owing to rail. Nevertheless there has been quite few explorations and research into the impact of a rail line expansion, modification, alteration and improvement on real estate prices (Camins-Esakov and Vandegrift, 2017).

2.3 Newly Constructed Rail Stations and Abutting Real Estate Prices

A concise and succinct early review and analysis by Meyer and Gomez- Ibanez (1981) discovered varied, diverse and assorted results with regard to transit's effect on real property prices. They quote one study of Toronto which uncovered no effect on landed property values the moment development was restricted (Aboucher, 1973). Conversely, they equally cited a further study, this one employing rent and lease gradients, which discovered that land and landed property values for neighborhoods adjacent, adjoining and bordering transit increased above those further than away, following controlling for other effects (Dewees, 1975). The scholars did not advocate the use of transportation as a land use approach, essentially because they uncovered that land use guiding principles, for instance zoning, can do more than transit to influence urban shape and form (Vessali, 1996).

Numerous studies have employed hedonic pricing methods to evaluate and appraise the effect of proximity, closeness and nearness to railway stations on real property prices. However, it is imperative and essential that these studies deem change in excess of time prior to and following station opening. This is for the only reason that railway stations are not stationed and positioned haphazardly. However, instead, they are situated, placed and sited so that they serve up either current centers of movement or designed developments connected in the midst of the station scheme. This means that observed price discrepancy may link to propinquity, immediacy, closeness and nearness to all the facilities, utilities, and services connected by means of railway stations to a certain extent than to the station itself. Hedonic pricing previous studies by Grass (1992) and Dewees (1976) in North America discovered that new-fangled stations could cause housing property prices to rise by around 20%. The main substitute to hedonic pricing is to use a comparison approach, where variations in the catchment surroundings of new stations are compared with variations over the equivalent time in controlled areas as a matter of fact (Blainey and Preston, 2010).

It is essential to consider a quite large sample of location together in order to explore whether the effects of newly established stations on the locale they serve can be generalized. For instance, Cervero and Landis (1993) discovered that commercial development in the surrounding area in a number of stations commanded a small rent premium over residential property in the control areas. Nevertheless, they did disclose that they had been incapable to complete control for outside differences involving control and station areas. These differences may, consequently, have influenced their findings. Alike methods were employed by Du and Mulley (2007) who were incapable to establish any considerable change in real property prices due to the construction of the Sunderland expansion to the Tyne and Wear Metro. Therefore, there is a wide-ranging agreement that stations with a higher level and quality of facilities have a greater impact on the surrounding properties (Debrezion et al, 2007). For example, a study of the effects of the Jubilee Line Extension (a tremendously high quality project) uncovered that it had great and important effects on both residential and commercial property prices abutting its stations (Chesterton, 2002 as cited by Blainey and Preston, 2010).

On the other hand, this does not essentially mean that improved services at a rail station will have a considerable influence on real estate property prices. Forrest et al. (1996) discovered no proof and facts that the replacement of heavy and weighty rail with Metro link services in Greater Manchester had any impact on residential property value in the rail station catchments. A meta-analysis of the more common association between propinquity and closeness to rail stations and property values as established by Debrezion et al (2007) They concluded that, on the whole, stations have a additional positive effect on commercial property worth and prices than on residential property prices contained by a short distance (¼ mile) of the rail station (Blainey and Preston, 2010).

Conversely, all the previous studies in this meta-analysis researched on the effect of railway stations in seclusion and isolation. It is for this reason that Debrezion et al (2007) revealed that when other ease of access modes are incorporated and integrated in the causal studies, railway stations are discovered to have a declined effect on real property prices. Large-scale extension, modification, alteration and expansion to local along with suburban and uptown rail networks can have a huge effect on travel and journey patterns as well as on mode split. Both of which might be as a result of decrease and decline in municipal transport access times (Van Wee, 2002) and of reductions in community transport travel times (Van Wee, 2002; Cascetta and Pagliara, 2008), even though it is not foreseeable and predictable that this will be the eventual outcome (Senior, 2009 as cited by Blainey and Preston, 2010).

Titheridge and Hall (2006) in their study observed that the speed level of rail travel to place of work was greatly influenced by the level and echelon of rail access at the place of work. This indicates that the effect of newly established rail stations on travel and journey patterns as well as mode choice may be determined by the destinations provided by trains commencing from the new rail stations. An additional impact of transport venture can be the broader economic advantages known as agglomeration financial gains, which occur from access to an augmented labour pool, easier proximity to suppliers in addition to 'knowledge spillovers'. Investigation indicates that agglomeration advantages reveal increasing payback and returns to density, getting larger because agglomeration becomes higher (Graham, 2006). Conversely, effectual density of a municipal area (the number of populace who can rapidly access a metropolis) is the vital element to a certain extent than real density. This is where transportation schemes can come in by escalating the effective density as a matter of fact (Marshall and Webber, 2007 as cited by Blainey and Preston, 2010).

Prior and earlier studies on this topic have tended to centered on the impacts of changes to rail infrastructure on property prices, with a particular emphasis on light rail schemes or on network-wide improvements rather than on the opening of additional stations on existing routes (see, for example, RICS Policy Unit, 2002). There has been very little work on the effect of station establishment on population and employment levels, with most studies, as an alternative, exploring on the impacts on residential along with commercial property prices. Some works have been undertaken in this field with emphasis on high speed rail (HST Impact Study Consortium, 2008) but there are foremost dissimilarity between rail stations on high speed lines and other local projects. For instance, there will usually be connected investment in rail station areas with newly established major or high speed rail stations, which is not, more often than not, the case for local rail stations in the United Kingdom (Blainey and Preston, 2010).

A great deal of new and latest research has been conducted into the range, degree and extent of such monetary gains shaped by key transport investments. For instance, a study of the Leeds metropolitan region uncovered that agglomeration impacts could add together to 25% to the fiscal, financial and monetary benefits estimated using conventional appraisal methods (Marshall and Webber, 2007). Nevertheless, the methodology employed for such studies is not appropriate for rather minor change to transportation systems such as the establishment of a single new-fangled local railway station where the agglomeration payback and profit are expected to be minute relative to the entire level of economic or profitable activity, and where the modeling effort needed would far overshadow anything that could be warranted for this volume of project (Blainey and Preston, 2010).

2.4 A Summary and Tabular Presentation of the Reviewed and Analyzed Literature

The previous studies reviewed and analyzed above were built and developed on location theory through investigating the extent, level and degrees to which the situation under which transport development and upgrading essentially influence land use. The earlier studies employed one of two major approaches by means of two dissimilar objects of study (Getz, 1975). The first and more straightforward approach entails comparison and association of the category, form, density and concentration of land use sandwiched between areas with transportation access and those with no. Therefore, questions asked in this kind of study comprise: Is the rate of newly established rail development higher in transit-accessible locations than in non-accessible areas? Is there a switch from one category of land use to another (say, from commercial to residential use) abutting new stations? (Vessali, 1996)

The second approach entails tracing the effect of transit systems on real estate prices, which are assumed, sequentially, to have an effect on the use that the land is subjected to, and therefore, in the aggregate, to describe an area's land use pattern. Nineteen (19) of the thirty-seven (37) studies reviewed and analyzed here directed entirely and solely on the effects of transit-oriented development on real property values, characteristically employing, as a measure of these worth or values, the sales prices for single-family residence. Fourteen (14) other previous studies ignored and missed out landed property value measures on the whole and, in its place, centered on densities, types of land use, the tendency of land uses to change due to closeness or nearness to transit, home residents' or real estate developers' attitudes, and land use strategy/management transformation. Four (4) studies incorporated both" real property value" and "land use type or category" approaches into their researches (Vessali, 1996).

Table 1a: Property Value Studies from 1970-1994

S/N	Author/Study Area/ Study Period	Transit Mode	Property Type/Sample Size	Research Question	Accessibility Measure (s)
1.	Davis (1970, BART (Glen Park) (1960-1967)	Heavy rail-commuter rail hybrid	Single and Multi-family residential within study area (609 home sales)	Does access to transit affect property sales prices?	Within 6 blocks of Glen Park Station vs outer parts of district
2.	Boyce, et at. (1972), Philadelphia/ Lindenwold line (1965-1971)	Commuter rail	Single-family residential (12,000 home sales	Does access to transit affect property sales prices?	Commuter cost savings (associated with accessibility to transit
3.	Lee (1973), BART impact study (1950-1972)	Heavy rail-commuter rail hybrid	Single family residential	1. Was annual price increase faster after BART? 2. Does access to BART increase home values?	1.Study defined "BART affected areas; 2.Straight-line distance
4.	Allen & Mudge (1974), Philadelphia/ Lindenwold line (1964-1971	Commuter rail	Single-family residential (2,400 home sales)	Does access to transit affect property sales prices?	Commute cost savings (from accessibility to transit) in control vs impact corridors
5.	Mudge (1974), Philadelphia/ Lindenwold line (1964-1971	Commuter rail	Suburban residential	Does access to transit affect property sales prices? Does it affect rates of growth of these prices?	1. Commuter cost savings (resulting from accessibility to transit) 2. Presence in "transit corridor"
6.	Tang (1975), Philadelphia/ Lindenwold line (1964-1971	Commuter rail	Suburban residential	Does access to transit affect property sales prices?	Commuter cost savings (resulting from accessibility to transit)
7.	Dewees (1976), Toronto (1961-1971)	Heavy rail (subway)	Single and small multi-family residential (1, 800 sales)	Does access to transit affect property sales prices?	Weighted travel time to Bloor Street (transit=1, wait=1.5, walk=1
8.	Skaburskis (1976) BART impact study	Heavy Rail-Commuter Rail Hybrid	Single Family residential	Does access to transit affect property sales prices?	Linear walking distance
9.	Yang (1976), Philadelphia/ Lindenwold line (1964-1972	Commter Rail	Vacant suburban land	Does access to transit affect property sales prices?	1. Commuter cost savings (resulting from accessibility to transit) 2. Presence in "transit corridor"

Source: Vessali (1996)

Table 1b: Property Value Studies from 1970-1994 (Con't)

S/N	Study Design/Methodology	Results/Findings	Comments/Remarks
1	Cross-sectional (study defined station area vs. non-station areas)/ Non parametric comparisons	Higher average sales prices and annual percent increase within 6 blocks of station, difference is noticeably larger after station site is announced, though study area shows generally faster growing than rest of city even before station site was selected	Impacts are of anticipatory reactions only, since study period precedes station opening; property value study coincides with major recession and weak real estate market
2.	Cross-sectional (control corridor vs. impact corridor); /Analysis of Variance- Hedonic Price Model)	$149 premium for every dollar saved in daily commute costs; the premium more than doubles after completion of construction and seems to be a transfer in values from nearby control corridor	Did not control for detailed housing characteristics; also used estimates of actual travel time as opposed to perceived travel time.
3.	1. Before and After 2 cross-sectional/ 1- Non-parametric statistics, 2- Hedonic Price Model	1- Annual price increases were larger after BART than before 2- No premium was found	
4.	Cross-sectional (control corridor vs. impact corridor); / Hedonic Price Model	$149 premium for every dollar saved in travel costs in impact corridor, Negative premium in control corridor, suggesting that transit line effected an intra-regional transfer in property values	Based on "relative" commute cost savings, not absolute amounts
5.	1- Cross-sectional (control corridor vs. impact corridor); 2- Longitudinal (sales trends) / 1- Hedonic Price Model: 2 Non-parametric statistics (ANOVA)	1- $400 premium per dollar of commute cost savings found in transit corridor. 2- Transit corridor shows faster property value growth after opening of transit line than control corridor	Several important housing characteristics are not included. Commute cost savings (of between $0-$3) bases on straight-line distance. Some input figures were gross estimates.
6.	Longitudinal (sales trends) / Hedonic Price Model	$1,000 sales price premium per dollar of commute cost savings found in transit corridor.	Dissertation written under the supervision of Boyce. Comments same as Boyce (1972) and Mudge (1974)
7.	Cross-sectional/ Hedonic Price Model	$2370 premium per hour of travel time saved for sites within 20 minutes travel tie (e.g. 1/3 mile walk	
8.	Before and After, Cross-sectional/ Hedonic Price Model	Proximate houses approximately 8% lower than distant houses, drop is more after BART than before	Testing different functional forms is good, very inexact distance measure (includes a stochastic error terms), results pertain mainly to construction period
9.	Cross-section (control corridor vs impact corridor; / Hedonic Price Model	$440 sales price premium per dollar of commute cost savings found in transit corridor	Dissertation written under the supervision of Boyce. Comments same as Boyce (1972) and Mudge (1974)

Source: Vessali (1996)

Table 2a: Property Value Studies from 1970-1994 (Con't)

S/N	Author/Study Area/ Study Period	Transit Mode	Property Type/Sample Size	Research Question	Accessibility Measure (s)
10.	Falcke (1978a), BART impact study	Heavy rail commuter rail hybrid	All	Does access to transit affect property sales prices?	Straight-line distance within study-defined "station area"
11.	Damn, et al. (1980) D.C. Metrorail (1969-1976)	Heavy rail	Single and multi-family residential and retail (1, 400 sales)	Does access to transit affect property sales prices?	Straight-line distance to station; "station" vs "non-station" sales
12.	Bajic (1983), Toronto (1971 & 1978)	Heavy rail (subway)	Single-family residential (2,000 home sales)	Does access to transit affect property sales prices?	Weighted commute times (differentiating between travel and waiting time)
13.	Allen, et al. (1986), Philadelphia/ Lindenwold line (1980)	Commuter rail	Single-family residential (1,300 prices)	Does access to transit affect property sales prices?	Commute cost savings (associated with accessibility to transit)
14.	Ferguson, et al. (1988), Vancouver ALRT	Light rail	Single-family residential (13,000 home sales)	Does access to transit affect property sales prices?	Straight-line distance to nearest station
15.	Voith (1991), Philadelphia/ PATCO (1980)	Commuter rail	Single-family residential (678 census tracts)	Census tract medium home values	In or sometimes adjacent to tract with station
16.	Nelson (1992), Atlanta/ MARTA (1986)	Heavy rail	Single-family residential (286 home sales)	Does access to transit affect property sales prices?	Straight-line distance to nearest station
17.	Gatzisff & Smith (1993), Miami Metrorail (1971-1990)	Heavy rail	Single-family residential (6,000 home sale	Does access to transit affect property sales prices?	Within same 1 sq. mi. section as station/ Straight-line distance
18	Al-Mosaind, et al. (1996), Portland/ MAX LRT Line (1988)	Light rail	Single-family residential (235 home sales)	Does access to transit affect property sales prices?	Actual walking distance to LRT stations
19.	Armstrong, (1994), Boston Fitchburg Line (1990)	Commuter rail	Single-family residential (451 home sales)	Does access to transit affect property sales prices?	Location within community with station/ travel time to station

Source: Vessali (1996)

Table 2b: Property Value Studies from 1970-1994 (Con't)

S/N	Study Design/Methodology	Results/Findings	Comments/Remarks
10.	Before & After Hedonic Price Model	Small but statistically significant price premium for residential properties, no effect on residential rents, effect on commercial rents only within 100 ft	
11.	Cross-sectional/Hedonic Price Model	Price elasticities of distance of 0.06 to 0.13; 0.19; and 0.69 for SF, MF, and retail, respectively	Impacts are of anticipatory reactions only, since data do not cover post-Metro period
12.	Cross-sectional/Hedonic Price Model	$2,237 premium for average house, based on reduction in commute time resulting from opening of subway	Use of average commute time savings very imprecise; good housing characteristics but all neighbourhood characteristics are treated as single "zone-specific" dummy variables
13.	Cross-sectional (control corridor vs, impact corridor; Hedonic Price Model	$443 premium for every dollar saved in daily commute costs (average >$4,500 per house; 7.3% of mean sales price)	Model explains only 40% of variability, likely due to exclusion of data on detailed housing characteristics
14.	Cross-sectional/ Hedonic Price Model	C$4.90/ft. premium in 1983 only (authors caution that multi-collinearity in 1983 data preclude meaningful analysis of their coefficient; in 1975, approached significance with C$2.78 premium	Over 50 explanatory variables, very complete but multi-collinearity is a problem for 1983 data
15.	Cross-sectional/ Hedonic Price Model	6.4% premium (average $5,594) associated with accessibility to rail services	
16.	Cross-sectional/ Hedonic Price Model	$1.05/ft. premium in low-income areas; $0.96/ft. disamenity w.r.l. distance in high-income areas (significant only at 10% level	Age and quality of housing not included, neighbourhood variables excluded except race and income, results confounded by proximity of low and high income areas to each other.
17.	Cross-sectional; Repeat Sales Indices/ Hedonic Price Model (n=902)	Repeat sales indices show no effect/ In hedonic models, distance was only significant in some models and some corridors	
18.	Cross-sectional/ Hedonic Price Model	$4,324 (10.6%) premium for homes within 500m walking distance	Controlled for housing characteristics but not neighbourhood characteristics
19.	Cross-sectional/ Hedonic Price Model	6.7% premium for homes located within community with commuter rail station	Very complete, 19 independent variables controlling for structure, site, neighbourhood characteristics and distance to CBD

Source: Vessali (1996)

Table 3a: Hybrid Studies

S/N	Author/Study Area/ Study Period	Transit Mode	Property Type/Sample Size	Research Question	Accessibility Measure (s)
1.	Quackenbush, et al (1987), Boston/ MBTA Red Line Extension (1978-1986)	Heavy rail	All	How were land use types and housing prices affected by opening of new transit station?	Study-defined "station areas"
2.	Cervero & Landis (1993), D.C. Metrorail; Atlanta MARTA (1978-1989)	Heavy rail	Commercial (10 suburban office developments)	Rates of absorption and vacancy, % of regional growth, rent, size of development	"Station" vs "non-station" sites as defined by transit agencies
3.	Cervero & Landis (1995), BART (1970-1990)	Heavy rail, commuter rail hybrid	All types (34 "super-distance", 152 zip codes, 25 station areas, 33,291 parcels)	Population and employment growth, employment density, land use change, development rates	BART corridors vs freeway corridors; station areas vs. freeway interchanges
4.	Landis, et al. (1995), BART, San Diego LRT, San Jose LRT, CalTrain, Sacramento LRT (1965-1990)	Light Rail, Heavy Rail, Commuter Rail Hybrid	Single-family residential, commercial (2,600 SF, >4,500 commercial lots, 13 stations)	Property value, land use change	Street distance "station areas" vs "non-station areas"

Source: Vessali (1996)

Table 3b: Hybrid Studies (Con't)

S/N	Study Design/Methodology	Results/Findings	Comments/Remarks
1.	Before and After/ Non-parametric statistics	Industrial land uses declined in favour of office space, parking and open space. House price trends were mixed and not well explained.	Authors note that areas showing faster price increases started at lowest levels and that many of the land use changes would have occurred anyway.
2.	Cross-sectional (transit- developments vs. highway-developments)/ Matched-pair comparisons using difference of means tests	$2-3.50 (13-18%) rent premium for transit in 3 of 4 comparisons (statistically significant at 95% in only 1); mixed, insignificant results everywhere else.	Quasi-experimental approach does not control for structural, site and neighbourhood characteristics, nor does it account for variations in leasing methods.
3.	Cross-sectional (transit station vs. highway interchange areas, control corridors vs. impact corridors)/ Non-parammetric statistics, matched-pair comparison, logit and linear regression models	Except in CBD, population and employment grew faster in non-BART areas, some employment densification seen around stations. More land use change around BART stations than freeway interchange matched pairs	Overall rich analyses. However, non-parametric statistics and matched-pairings are blunt instruments as no effort was made to control for other variables (such as site-specific characteristics).
4.	Cross-sectional/ Hedonic Price Models, Logit Models, Analysis of Variance (ANOVA)	$2/meter premium for homes in BART and San Diego, none elsewhere, mixed for commercial property, some positive impact on rate and type of land use change.	Very complete. Hedonic and Logit models control for major variables, first study to use quantitative inter-system comparisons, and GIS for distance measure

Source: Vessali (1996)

3. METHODOLOGY ADOPTED BY PREVIOUS STUDIES

Some studies, for example, Agostini, and Palmucci (Undated), measured and calculated the distance from each and every apartment to all, existing as well as future subway rail stations. They kept almost 7,000 observations designed for which the nearby station was on Line 4 or 4A. For the same apartments, the authors also calculated and estimated the distance to the adjoining clinic, hospital, school, and parks.

In Yankaya and Celik's (Undated) study, they attempted to model and replicate the relationship between residential property prices and changes in ease of access triggered by a rail transit venture in public transport in the case of Izmir Subway, Turkey. For the authors to test the research question, hedonic price model was employed to ascertain whether enhanced accessibility owing to a public transport investment has had at all any impact on residential accommodation prices. The effects connected with accessibility have been calculated using distance in addition to travel times. The models show that proximity and closeness to the subway rail stations is a statistically significant indicator of the bazaar and market price of residential accommodation units. Every additional meter further away from subway rail station reduced the price of residential housing units (Yankaya and Celik, Undated)

In the work of Yankaya and Celik (Undated), fifteen independent variables all in all were intergated into the models. Three variables were originally tested in the models by means stepwise as well as backward regression. The correlation and correspondence matrix of the variables gave and offered guidance for getting rid and removing of multi-collinearity problem. The decency of robust and rigorous statistics, R square lies between 0, 71 and 0, 80. White heteroscedasticity test was equally conducted at the $\alpha = 0, 05$ level. It could e understood that there is no heteroscedasticity problem in the models. Some earlier studies such as Bajic (1983) and Dewees (1976) employed travel times as an alternative to distance factor in view of the fact that travel time is one of the major indicators of transport costs. People might be eager and keen to pay more for centrally situated and located residential neighborhoods. People would equally be willing sacrifice more of their income for locating close to transport facilities with the intention of reducing and lessening transport costs (Yankaya and Celik, Undated).

Some previous studies used panel data model approach in determining the relationship between urban rail facility and residential property values. For instance, Zhang et al. (2016) estimated the impact of municipal rail infrastructure on residential accommodation price by means of a panel data model on 35 Chinese cities from 2002 to 2013. The authors stated that previous studies have dwelled extensively on the associations between municipal transit systems and residential housing prices (for instance, between accommodation prices and high speed railway infrastructure (Andersson, Shyr and Fu, 2010), road and light or heavy rail systems (Andersson, Shyr and Fu, 2010), rail proximity levels (Cervero, 1996; Hess and Almeida, 2007; and Golub, Guhathakurta and Sollapuram, 2012) as well as highway or arterial road and light rail proximity levels (Ryan, 2005). Nevertheless, virtually all of the studies reviewed and analyzed above are case studies. According to Zhang et al. (2016), no city-level panel data have been employed to appraise and evaluate urban rail transit system effects on residential housing prices. Zhang et al went further and disclosed that n the study during their estimation, various independent variables chosen based on the available literature were included to control and measure rail transit impacts (Zhang et al., 2016)

It has been uncovered as observed by Vessali (1996) in his review that, in addition to employing different objects of study, two major techniques were incorporated throughout the studies that were critically reviewed. The first entails the use of cross-sectional data to either: 1) compare the land use attributes of transit-accessible built-up areas to those lacking transit access (whilst holding as many other factors as possible constant); 2) create hedonic price models intended and planned to capture the effect of transit proximity on real property values; or 3) compare the market in addition to policy conditions adjoining "successful" as well as " unsuccessful" combined improvement and development efforts. The second technique and method involves the use of longitudinal (or time-series) data to conduct before-and-after comparisons of real property values and/or land use patterns in the area neighboring a transit improvement or development (Vessali, 1996).

In general, the studies that dwelled on land use patterns employed a qualitative case study approach. Even though these case studies depend entire on quantitative data in addition to interviews and surveys, they did not incorporate statistical techniques to "control" for intending and confounding factors. Quite the opposite, the property value studies characteristically use quantitative methods. They include multiple regression analyses by means of price as the dependent variable and estimating the relationships between these values and numerous independent variables (such as distance or proximity to transit and housing accommodation characteristics). They subsequently utilize the left behind independent variables as experimental "controls" (Vessali, 1996).

(Zhang et al.'s (2016) study came up a panel data model to assess the impact of rail transit amenities on residential housing prices quantitatively. A correlation test disclosed significant correlations connecting housing prices with rail transit amenities. Empirical results indicate that rail transit infrastructures can obviously bump up real estate prices. Quantitatively, a 1% increase in rail transit mileage increases housing prices by 0.0233%. Vessali's findings highlight the significance of other indicators (for instance, investment in real estate, land price, per capita GDP and population density) in estimating residential accommodation prices. Zhang et al. also assess the impacts of expectations of proposed new rail transit lines on residential housing prices, and the findings show that anticipation effects are insignificant and trivial (Zhang et al., 2016).

4. MAJOR FINDINGS FROM THE PREVIOUS STUDIES

Most of the previous studies discovered a mutual and positive relationship between light rail extension and nearby property prices For example, Camins-Esakov and Vandegrift, 2017) revealed that an expansion and improvement to a light rail leads to higher real property value. Properties adjacent to the newly constructed station demonstrate the major increase in value. Employing a specification in which real property price appreciation is a linear function of distance or proximity from the newly established light rail station, Camins-Esakov and Vandegrift discovered that a one-minute decline in walking distance to the light rail station generates about a 0.21% to 0.25% increase in annual price appreciation compare to the unaffected or impervious properties in Bayonne (that is, properties further away from the rail station).

In order estimate the gradient impact of this association, Camins-Esakov, and Vandegrift run further specifications that assess the influence of the reciprocal of distance from the rail station on real property price upward increase. These calculations and measurements means that a property four (4) minutes away from the light rail station indicates 0.72% to 0.77% more yearly appreciation than a property five (5) minutes further away from the rail station. This property value upward increase diminishes every minute further away from the rail station until at twelve (12) minutes (0.6 miles) where the effect mostly disappears and vanishes. (Camins-Esakov, and Vandegrift, 2017)

Employing gradient approach, Camins-Esakov and Vandegrift (2017) discovered that a bigger area would be affected by the new rail station compare to some related studies. Kim and Lahr (2014) uncovered that the effect dissipated and diminished after ¼ of a mile. On the other hand, Camins-Esakov and Vandegrift's research findings are still below the five miles that Chatman et al (2012) found. Camins-Esakov and Vandegrift buttressed that these differences can be described since Kim and Lahr (2014) were testing on the greatly urbanized areas of the HBLR (with close up transit alternatives), while Chatman et al (2012) were looking at the River Line which has a less opaque route (and consequently higher car proliferation). Camins-Esakov and Vandegrift's study, nevertheless, examined the extension into southern Bayonne, an area with less transit options than other neighborhoods beside the HBLR. They believed that their increased range of impacts is an offshoot of the more lightly built-up area that is southern Bayonne as a matter of fact.

As in the case of Agostini and Palmucci (Undated), their results indicated that the apartments sold following the announcement of the new rail Line 4 were sold at prices 5.2 percent higher on average. Moreover, the apartments sold subsequent to the announcement of the rail stations location were sold at prices 7.4 percent higher on average. Apparently, these effects might be as well due to alteration, modification and adjustment in apartment characteristics and not merely to the continuation of a future subway line that would offer better access to people residing in these apartments. Hence, it is imperative to empirically incorporate all the other indicators of residential housing prices that might have influenced the price over this epoch of time. Particularly, it is essential to control and manage for changes in apartments' physical attributes and the entrance to local community goods (Agostini and Palmucci, Undated).

Several reviewers have arrived at similar and alike conclusions to those of Knight and Trygg (1977). Specifically, they have, by and large, discovered the existence of land use impacts occurring from the establishment of rail transit, but to generally anecdotal degrees and in broadly varying ways. Most significantly, they all admit and recognize the various other factors influencing urban form. They further noted that rail transit is incapable to affect obvious land use impacts devoid of the presence of at least some of these other indicators (Vessali, 996). In recently developing neighborhoods with rail transit service, augmented and high land values are expected to be attributable in great part to the procedure of subdivision more willingly than to rail transit access (Damm, Steven, Lerman and Young, 1980).

4.1 Discovery of Significant Effect on Residential Property Value

Property value studies have a tendency to demonstrate greater impacts than the intensity or hybrid studies, although these findings differ even more broadly. On one extreme is a before-and-after investigation of the Miami Metrorail system (Gatzlaff and Smith, 1993), which discovered that residential property values were, "at most, barely slightly affected by the pronouncement of the new rail system." On the other extreme, a hedonic price study of the Portland light rail system uncovered a greater than ten percent premium in the worth of residential property connected with access to the rail transit line (AI-Mosaind, 1994). Likewise, a new BART study, exploring on multi-unit suburban projects, revealed that rental fees for one and two bedroom units contained by 1 /4 mile of a BART rail station averaged $1.20/sq. ft. /month, while those farther away averaged $1.07/sq. ft. month, a disparity of over ten percent (Cervera, 1994b as cited by Vessali, 1996)

Nearly all property value studies investigating on single-family dwellings have discovered premiums for proximity or closeness to rail transit which are in the six to seven percent range. Allen et al. (1986) uncovered a $443 premium for each dollar saved in actual travel costs (which was 7.3 percent of the normal sales price of a house). Armstrong (1994) discovered a 6.7 percent upward increase in the price of a house "by virtue of being situated abutting a community having a commuter rail station. Additionally, Voith (1991) unearthed that houses situated within or adjacent to a census tract having a rail transit station enjoyed and benefitted, on average, 6.4 percent increased or higher sales prices (Vessali, 1996).

Camins-Esakov and Vandegrift's (2017) findings revealed that a one-minute decrease in walking distance to the light rail station generates about a 0.21% to 0.25% increase in yearly price appreciation compare to unaffected real properties in Bayonne (That is, properties further away from the rail station). By means of the reciprocal of distance to determine the gradient impact, Camins-Esakov and Vandegrift realized that the effect of the newly established station on residential accommodation price appreciation mostly disappears at distances further than or beyond a 12 minute walk (0.6 miles) to the rail station. These results are consistent with other works of scholars on the effect of light rail on the whole, which came to a conclusion that the efficacy and usefulness of increased transit alternatives is expressed as revealed preferences (RP) in residential accommodation prices adjoining rail stations with the nearby properties experiencing the greatest and huge impacts (Camins-Esakov and Vandegrift, 2017).

4.2 Inconsistent, Varying and Mixed Results for Commercial Developments

As a matter of fact, it is essential to note that the empirical facts and substantiations on these predictions in the preceding studies are mixed and assorted for commercial developments. In one perspective, Bajic (1983) measured a positive effect of 3.9 percent of the Toronto subway station on average commercial property prices; Voith (1991) and Al-Mosaind, Dueker, and Strathman (1993) calculated premiums for proximity to public transports of 6.4 percent as well as 10.6 percent intended for the Philadelphia train system along with the Portland transport system, respectively. Cervero (1996) discovered a 10-15 percent positive effect of the BART in San Francisco on commercial development situated within a one-quarter mile of the rail stations. On the contrary, Armstrong (1994) observed a 20 percent negative effect of the Fitchburg Line in Boston on rented houses situated within 120 meters of the rail stations Moreover, Bowes and Ihlanfeldt (2001) discovered a 19 percent negative impact of the MARTA in Atlanta on commercial developments situated within 400 meters of the rail stations (Agostini, and Palmucci, Undated).

However, two different studies exploring commercial property value impacts of transit in Washington, D.C. as well as Atlanta (Callow 1992 and Cervero and Landis, 1993) arrived at mixed and varied conclusions concerning the effects of transit. As part of a wider nationwide inventory of combined development projects, Cervera and Landis used a quasi-experimental approach evaluating and comparing four pairs of office developments, with each one pair having a transit-accessible development plus a highway-accessible control. In each scenario, the transit-accessible case was part of a rail station "impact zone as described by the rail transit agencies or else local planning authorities.

The controlled sites were those well thought-out as contenders of the transit-accessible sites by indigenous property developers. The authors observed that transit-oriented developments had upper rent premiums in three of the four commercial developments They further observed higher assimilation rates in addition to growth rates in two of the harmonized pairs. An extensive analysis of these mixed and varied results prompted, Cervero and Landis (1993) to eventually conclude that those transit-oriented developments which ascribe rent premiums and indicate higher growth as well as absorption rates are in neighborhoods with stable real estate markets and where complementary or matching land use policies and regulations are in place (Vessali, 1996).

A rational and logical elucidation for the varied results in the existing literature is owing to the presence of two compounding effects connected to a newly established mass transport facility: the positive effect of a better access along with the negative impact of noise and effluence (Chen, Rufolo, and Duecker, 1997 as cited by Agostini, and Palmucci, Undated).

4.3 Less Significant and Minor Effects with Light Rail Station

The most important results of the review of related studies established that the rail transit infrastructures have appreciably positive impacts on residential housing prices. For instance, Zhang et al. (2016) uncovered that, quantitatively, every 1% increase in rail transit mileage improves residential housing prices by 0.0233%. Just as one might expect, such impacts are minor, negligible and lesser compare to some other variables such as land price, per capita GDP, population growth and real estate investment, which are known as fundamental determinants of residential housing price (Zhang et al., 2016).

It is essential to note that a good number of the systems reviewed above were heavy rail systems. Knight and Trygg (1977) pointed out the significance of studying other types of rail systems (such as light rail) However, there study was limited and restricted by data availability from exploring in that aspect. Based on location theory, the degree of land use effect depends to a great extent on the marginal or trivial improvement in proximity afforded by the rail transit system. Consequently, lower-performance systems such as bus ways, light rail, and people movers should demonstrate even lesser impacts.

Succeeding research has buttressed this assertion, with the most direct substantiation coming from Landis, et al. (1995), who compared land use effects transverse five transit systems in California (BART, CaiTrain, Sacramento LRT, San Diego LRT and San Jose LRT) and uncovered that system features mattered. In essence, price premiums within $2/meter were observed for single family residential houses in areas with what the authors called regional, high performance rail transit systems (such as BART in addition to San Diego) but the authors found no significant effects for the other three systems (Vessali, 1996).

Other scholars have hypothesized that rail transit's effects would be reduced to the bearest minimum in high income neighborhoods for this dire reason. One early research (Boyce, et al. 1972) disclosed that land use impacts differed both by distance as well as income, with lower along with middle income areas indicating higher price effects, signifying that rail transit proximity is less significant to higher income households. Other outcomes of empirical studies were even more severe, extreme and intense. For instance, in a hedonic price study of 286 residential houses in Atlanta, Nelson (1992) discovered that the sales prices of single family residential homes in low as well as moderate income neighborhoods were on average $1 .05 greater for each foot the house was nearer to a MA RTA transit rail station, while sales prices were $. 96 lower per foot of rail station proximity in high income neighborhoods (Vessali, 1996).

The implication and substantiality of these findings, especially the change starting from an increase on the way to a decrease in residential property values, must be affected by information concerning three facets of the study. Firstly, straight-line distance, and not some more precise and correct quantification, assessment, and evaluation such as walking distance or else time, was employed as the measure of accessibility or proximity. Secondly, housing distinctiveness, attributes and uniqueness (such as age as well as quality) and neighborhood qualities and feature (with the exception of racial and income distributions) were excluded from the regression equations as well (Vessali, 1996). Third, the comparisons were made sandwiched between high as well as low income neighborhoods which frequently bordered the same rail transit station, and hence, bordered each other. For that reason proximity to rail transit in the high income vicinity as well meant propinquity or closeness to the low income locale. Declining and diminishing house prices could have been as a result of increasing proximity to the adjacent and adjoining low-income neighborhood, and not the rail transit station (Vessali, 1996).

4.4 Response of House Prices Due to Real Estate Speculation

There is some substantiation that real property value impacts at least are tentative and speculative. More so, these effects are visible, detectable and noticeable in the early hours of the planning and construction phases of a rail transit system. For instance, one case study, which was a component of the BART impact study, established through interviews with real estate developers that BART had brought some, though not widespread or broad, speculation in some rail station areas (Falcke, 1978b). This generalization is weakened, conversely, by the authors' proposition that those rail station areas which indicated speculative activity might have been the substance of unconnected market demand at the point in time. More compelling and persuasive evidence could e seen in a case study of the Miami Metrorail (Ayer and Hocking, 1986), which discovered, by means of interviews and comparative statistics that price, value or worth assessments for real estate contained by 1,000 feet of Metrorail stations upardly increased by an average of 30 percent for the period of the construction only (Vessali, 1996).

4.5 Developments Within Transit Stations Due to Intra-Regional Shift Effects

Beginning from the earliest studies, the facts have pointed out that improvements and housing constructions abutting rail transit stations was the outcome of intra-regional shifts. As far back as 1972, studies of the Lindenwold line established positive effects on residential accommodation prices (Boyce, et al. 1972). Nevertheless, the authors deduced that there existed a number of proofs signifying that these upward increases were at least partly shifts from un-served neighborhoods. Knight and Trygg (1977) arrived at similar conclusion in their study. None of the consequent and later studies reviewed and analyzed here critically refutes this assertion, and the majority did not even talk about it. Furthermore, none of the aforementioned studies has uncovered any evidence signifying that rail transit investments can lead to net new profitable or populace growth for a area or county as a whole (Vessali, 1996).

5. CONCLUSION

Possibly, the most generally quoted study in the literature is the work of Spengler (1930). Through investigating assessed values of land in the vicinity of virtually every rail transit line constructed in New York during the early 20th century, Spengler, as asserted by

Damm, et al. (1980), came to several noteworthy conclusions:

a) New transit lines tend to shift value rather than to create increased aggregate value. While owners of land in the vicinity of a new transit line may benefit, owners of land elsewhere may be disadvantaged.
b) Rail transit lines are only one of the numerous factors influencing land values, and they often cannot outweigh the effects of other factors which are acting to depress land values.
c) Transit acts to enhance land values in centers of concentration at the expense of outlying areas.
d) Areas already developed do not generally show a marked increase in

land value when new transit lines are opened.

e) In areas already supplied with a number of transit lines, addition of another one will have only a mild simulative effect compared with the effect it would have in an area not already supplied with rail transit.

The main finding of Yankaya and Celik's (Undated) study is that distance from subway rail station is negatively correlated amid price. Given that Ucyol station is underground, negative and depressing externalities such as noise or sound are not apparent. Subway system offers a higher level of ease of access and convenience for residential housing units situated within Ucyol district.

The general result of Yankaya and Celik's study validates and confirms that proximity to light rail transit stations create higher real property values one more time in heavily populated residential housing units of a developing or third world country in a short time interlude subsequent to 4 years the subway station was opened. Additionally, positive impacts of accessibility are more evident than negative effects. Distance from adjacent light rail transit station as well as size of apartment houses are the most powerful factors in estimating house prices in the impact precinct or zone. As a general rule, the models provided high levels of elucidation and clarification (Yankaya and Celik, Undated).

Therefore, it can be concluded that public rail transit systems play a crucial role in measuring residential housing prices impacts (Zhang et al., 2016). The opening of a new subway rail line might also have an effect on housing accommodation prices. The findings of the current literature revealed that those impacts are not insignificant. For example, Agostini, and Palmucci (Undated) uncovered that the announcement of the establishment of new Lines 4 along with 4A in Santiago uplifted the price of apartment buildings 3.3 percent, on average. Moreover, the announcement of the rail stations' scenes eventually increased the price or worth of apartments 4.6 percent as well on average. These effects are greater the nearer the apartment house is to the subway rail station. It equally decreases with distance at a rate of 0.09 UF for the first announcement and at a rate of 0.065 UF for the second announcement (Agostini, and Palmucci, Undated).

Estimating the economic valuation of community investments is imperative and essential for appraising tax policies in decision-making process and individuals' marginal readiness or willingness to pay or offer for environmental amenities, so that in the conurbations of emergent countries, metropolitan rents from numerous investments are afforded to return into community. If earlier studies had fine-tuned recorded data, before as well as after analysis would have been completed. This analysis may have presented comprehensive and meticulous information, although this is an essential matter for developing countries.

6. PRACTICAL IMPLICATION OF THE FINDINGS OF PREVIOUS STUDIES

This review and analysis of related literature is of practical implication, as it offers relative information for government policy makers to employ when executing authoritarian or regulatory powers to enhance urban functions at the same time stabilizing real property prices (Zhang et al., 2016). The findings of the extensive review of past studies persuade government policy makers to take rail transit infrastructure into cognizance in achieving sustainable growth and development of land and landed property markets (Zhang et al., 2016).

One of the fascinating and appealing implications of the positive effect of a new subway line on residential housing prices is the connected increase in real property tax revenues. Previous researchers' assessment, evaluation and judgment entail a tax revenue increase of at least 7.5 percent and could potentially be allotted or earmarked for investment in subway rail lines (Agostini, and Palmucci, Undated).

7. OPPORTUNITY FOR FURTHER RESEARCH

Based on this review and analysis of related literature, a small number of suggestions for future research could be made.

Comparisons should be made both across regions as well as across system types (e.g. bus ways, heavy rail and light rail and the likes). Quantitative along with qualitative methods should both be employed. Regression as well as logit models are most excellent in separating the impacts of other perplexing and confounding variables from those of the variables of concern. However, they are least able to offer rich elucidation of multifarious relationships, such as those between transit ease of access in addition to land use patterns as matter of fact.

A serious effort should be made to control for as many confounding factors as possible, either by including data on these factors in quantitative models, or by broadening the scope and deepening the analysis in case studies. In addition, case study approaches must seek to be more comparative and critical in their attempt to explain the nuances of the land use-transit relationship.

In this variable control exertion, thorough emphasis should be placed on restricting or controlling for variables that have not been captured in the research to data. These are: 1) the strength of the regional economy as well as real property market, and 2) the types of land use along with combined development policy practices usually found in a number of regions (Vessali, 1996).

To tackle or take care of some of the questions that previous scholars' analysis raised, future research is essential. For instance, does the expansion story vary when detailed home characteristics are incorporated? Chatman et al (2012) discovered that low income dwellings close to the rail station had the biggest appreciation and such feature only becomes obvious when detailed knowledge concerning the properties is known. Moreover, further research should be carried out to perceive if the impact differs depending on the distinctiveness, individuality and uniqueness of the area in which the improvement is made. More research into the interaction of all obtainable or accessible rail transit options along with consumer favorite is an essential step to enhance understanding consumer preferences (Camins-Esakov and Vandegrift, 2017).

Additionally, there are still more areas which would deserve and necessitate further investigation if appropriate data became obtainable, especially the effect of new rail stations on the echelon, extent or degree of business undertaking contained by their catchments. It could equally be useful to compare the impacts of newly established local rail stations amid those opened somewhere else in other areas where the condition may be to some extent different. Rail transit-oriented improvement as well as land use policies are more or less unknown in several countries, but yet have been pursued and practiced in quite a number of areas in other countries. This could mean that the population and employment-related effects of newly constructed rail stations are much more momentous, considerable and important.

The employment of standard grid-based rail station catchments by means of re-aggregated census data is a ground-breaking future work. Furthermore, the application of such methodologies to other fields of research where rail station catchment description is significant could create and produce improved results, for instance in rail demand modeling (Blainey and Preston, 2010). In view of the fact that rail transit investments are new field of research and exploration, determining the long term effects with regard to changes in density employment, land use and population will be imperative in the future and upcoming studies (Yankaya and Celik, Undated).

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