midf INVESTMENT midf RESEARCH

KDN : PP 10744/05/2013 (033520)

31 JANUARY 2017

MALAYSIA EQUITY

# THE FUTURE OF TRANSIT-ORIENTED DEVELOPMENT

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# EXECUTIVE SUMMARY

## THE FUTURE OF TRANSIT-ORIENTED DEVELOPMENT

- We wonder how the city of Angkor in Cambodia fell to decay. Angkor in its peak in the early 12th century had a population of more than 750,000 compared to London's 50,000. It employed the best craftsmen, one of men's largest construction endeavours since the Pyramids of Giza and served as the capital of the Khmer Empire. What went wrong with Angkor serves as a backdrop and reminder of how society collapses. Klang Valley or Greater Kuala Lumpur, as an urban agglomeration has a population in excess of 7.1m; years to come, as the population swells to 10.0m, the public transport dependency will be paramount for the city dwellers. The urban public transport system in Klang Valley is vital to manage the growth of the nation as Malaysia positions itself into a developed nation by 2020. Hence, urban public transport could be regarded as a vital method of the managing resources of Malaysia's main engine which is its human capital. In Collapse: How Societies Choose to Fail or Succeed, the rise and fall of a society is influenced by 5 key points;
  - Damages or preservation to the environment
  - Is there any climate change which the city it is not designed to accommodate?
  - Foreign relations (influx of migrants/refugees)
  - Trade opportunities within the city to the rest of the region
  - How the city responds or commits to maintain its resources

- Transport-oriented development (TOD) sets the centre stage for urban development and concentration of construction projects in Malaysia through the roll-outs of various land public transport initiatives such as the KVMRT2 and the upcoming LRT3 by the government. But it is effectiveness of TOD and its design efficiency will really test how well the national urban transport policies are performing and affect the rakyat. In order to assess the effectiveness and the efficiency of various transport projects sprouting in Greater Kuala Lumpur, there are several criteria that can be applied as a starting point to; (i) define, (ii) distinguished and, (ii) identify outcomes, challenges and recommendation for TOD projects in Malaysia. We favour TOD as a positive trend affecting the city's development and as a mean for the government to efficiently manage its resources. In that respect, we reckon that TOD as one of the ways to balance between Kuala Lumpur's population growth and constant development needs to ease the impact of mass urbanization and consequently reverse automobile-dependent patterns of urban growth; illustrating it as a way to manage human capital in Greater Kuala Lumpur.

- Additionally, our focus is to assess whether TOD is an effective way on how a city such as the Greater Kuala Lumpur should respond to its growing population and relatively, main lessons to be learned from completed and on-going projects that could serve as a reminder on how future TOD projects should be rolled-out. We take cognizance of trends affecting urban planning theories to crystallize our observation of TOD's performance;
  - Location efficiency
  - Value Recapture
  - Liveability
  - Financial Return
  - Choices of Housing Types
  - Efficient Regional Land-use Patterns

# A. TRENDS CHARACTERIZING KUALA LUMPUR'S CURRENT DEVELOPMENT

- The first trend is; a) entrance of urban policies to develop Kuala Lumpur as a global metropolis with public amenities comparable to cities such as Tokyo, Sydney and London. Kuala Lumpur's demographics are coloured through a diversity in race, ethnicity and income, which have increasingly experienced the struggles of rapid growth. These challenges include land diversification guidelines or policies to build more solid revenue bases for transit investments, the need to create urban centres by implementing TODs, ameliorating traffic congestion within urban and suburban arterials, and the grim backdrop of the availability of affordable housing.
- The second core influential trend is the emergence of transit-oriented development (TOD). We are seeing a surge in mixed development within or near public transport systems. Data from the Prasarana Negara and Department of Statistics, Malaysia/Urban Institute show that TOD is a function both of construction of mixed development and transit stations within the same vicinity catering to the ridership growth from the effects of rising population. TODs are appealing and seen as attractive for investments because it is a convergence of lively places to live and work, and also coupled as centres for commercial activities.
- The third trend is the risk appetite for transit investments through public finance initiatives (PFI) or public private partnership (PPP). The government of Malaysia is planning and building high-speed rail, light and monoline forms of urban rail or rapid bus system in Kuala Lumpur, Penang, Johor, Putrajaya, Kuantan, and Kota Kinabalu. In fact, substantial system expansions are already underway for the

**Figure 1: Map of Kuala Lumpur Sentral**


Source: MRCB

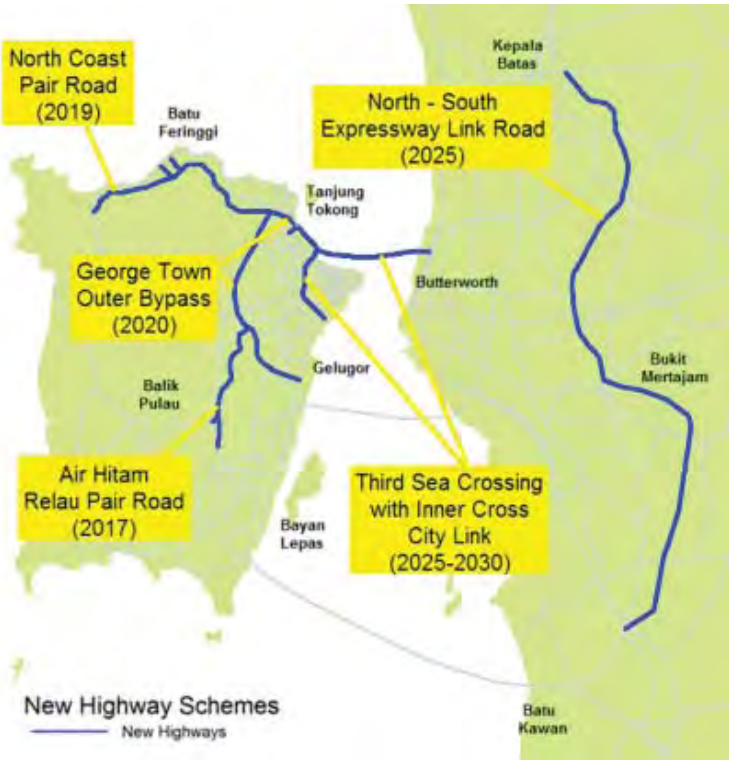
Peninsular Malaysia's railway line. Funding for mass transit is executed mostly through PPP/PFI such as for the new rail or rapid bus systems such as Sunway BRT Line and KVMRT1/2. The design of KL Sentral illustrates the interplay of public transit stations and mixed development (Figure 1) whilst the upcoming High Speed Railway project displays potential stations within developed urban areas (Figure 2).

- Malaysia facing intense agglomeration trends. At the convergence of these trends is the realization of an emerging market in a form of walkable, mixed-use urban development around these new rail, rapid bus and transit stations. Shifting demographics produces a need for a diversification of real estate projects and the type of developments known as transit villages such as KL Sentral. These transit-oriented developments have the potential to provide residents with improved quality of life and reduced household transportation expenses while providing the agglomeration with; (i) constant mixed income localities and (ii) real alternatives to reducing traffic congestion such as the aspiration of Penang Transport Masterplan to ease the traffic woes and increase tourist influx to the island (Figure 3).

**Figure 2: High Speed Rail Alignments**


Source; SPAD

**Figure 3: Penang Transport Masterplan**




Source; Penang Transport Masterplan

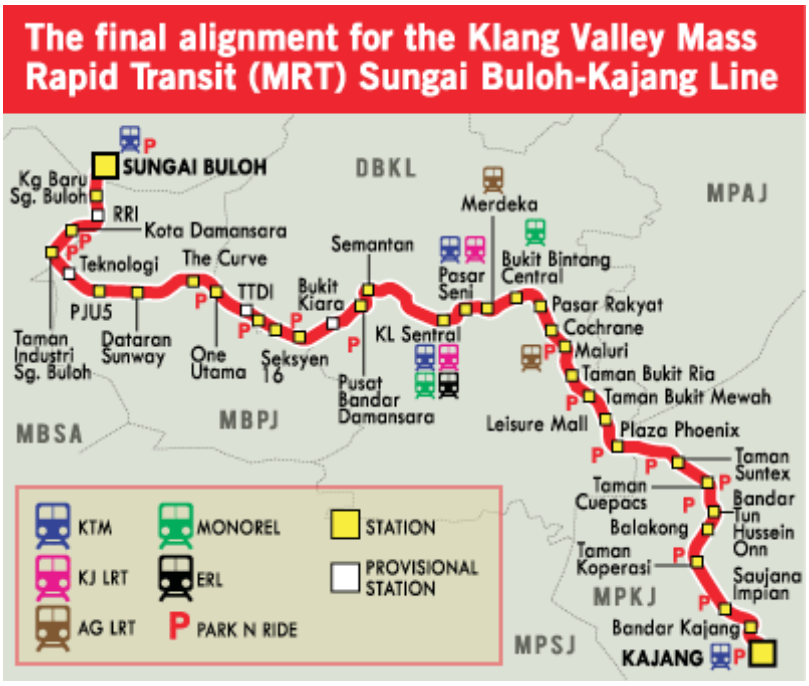
# B. WHAT IS TRANSIT-ORIENTED DEVELOPMENT?

## I. TRANSIT-ORIENTED DEVELOPMENT

- Transit-oriented development (TOD) is the planning and building a mix of housing, business and other amenities close to transit stations. When clustered around a station, this development intends to maximise ridership by making it easier for people to use the transit system, supporting local businesses and making neighbourhoods a place to live, work and spend time. Secondly, it maximizes access to public transport, and often incorporates features that encourage transit ridership while dissuading the ownership of automobiles by promoting the design of a mixed-use residential and commercial. TOD focuses on land usage around a transit station or within a transit corridor. The rule of thumb is that TOD is built within one-quarter mile, or a five to seven minute walk, of a transit station or along corridors that provide key connections to the regional transit system.
- Typically, it is characterized by:
  - A mix of uses
  - Moderate to high density
  - Pedestrian orientation/connectivity
  - Choice of different modes of transportation
  - Reduced parking
  - High quality design
- Apart from that, we can infer that it is a land development pattern that integrates transit and land use by promoting transit ridership while supporting community land use and development visions. TOD typically consists of public and private development projects that create dense, pedestrian-oriented environments with a mix of land uses and activities at and around transit facilities. The objectives of the design, configuration and mix of buildings and activities around the transit facility, as well as the location and design of the transit facility, should encourage people to use transit and foster a healthy, liveable environment. KVMRT Sungai Buloh – Kajang Line is one example on the dynamics of integrated land and transit use (Figure 4).
- Furthermore, TOD strategies focus on urban growth around transit facilities and leverage on transit investments to help produce regional and local benefits, such as increases in transit ridership, development of walkable communities, improved access to jobs and economic opportunities, and reduced household driving and thus lowering regional congestion, air pollution and greenhouse gas emissions. Beyond that, TOD encourages convenient, safe multi-modal access to the transit system, with an emphasis on non-motorized access; supporting economic development efforts and encouraging creation of housing options including market-rate and affordable units. It also increases the value and effectiveness of transit by increasing transit ridership supports the implementation of state, regional and local growth plans, policies and strategies. TOD also fosters close relationships with local jurisdictions, regional agencies, private developers, local residents, businesses, community groups and other stakeholders to facilitate
- Government agencies can implement strategies to facilitate or create TOD on properties that have been acquired for a transit stations. It may include joint development and other partnerships. For example in Malaysia, Suruhanjaya Pengangkutan Awam Darat (SPAD) has been taking the lead role in identifying and implementing government agency-based TOD strategies.

- Private companies can support community-based TOD strategies by promoting it within the larger area around a transit facility (generally 800m or a 10-15 minute walk, around a transit facility and along corridors that provide key connections to the regional transit system such as KTMB and Bus Transits for example in KL Sentral.) Community TOD strategies may be identified and implemented by government or by others and may include partnerships. Private companies may take either a lead or a support role in identifying and implementing Community TOD strategies. Coordination and cooperation will seek to: Identify and preserve right-of-way for transit facilities, develop regional and local policies and plans that support TOD, assess whether plans and policies are leading to achievement of the adopted regional and local growth strategies. In addition, it will also seek to develop and implement financial, land use and other strategies and tools to encourage and implement TOD and to develop and implement stakeholder involvement and advocacy strategies.

**Figure 4: Alignment of KVMRT1**




Source; Prasarana

- Transit facility physical elements, includes: (i) physical needs of footprints and profile (at-grade, elevated, tunnel) of each transit facility , (ii) construction staging and operation of the transit facility and transit support facilities, (iii) transit support facilities to provide multi-modal access to the facility, (iv) transit system performance measures including transit ridership and (v) adopted and formally proposed regional and local plans and policies, including: Regional transportation and land use plans.

## II. PROBLEMS OF TRANSIT-ORIENTED DEVELOPMENT

- Rail systems generally create value for bordering land, and transit agencies and the federal government see large-scale real estate development on transit agency owned property as a way to "capture" some of that value (ref land value LRT Kelana Jaya/ LRT stations). While this return is not necessarily sufficient to pay the total cost of the rail investment, it represents at least a partial reimbursement of public money. For this reason, transit agencies and the federal government in particular have vested interest in promoting intense development around transit stations.

- This form of transit-related development is problematic because it almost inevitably leads to a narrow definition of the relationship between transit and development. The emphasis of most joint development projects – which until the 1990s were virtually the only form of "transit-oriented development" that was pursued – has generally been on dense, profitable real estate development aimed at generating revenue for the transit agency and the federal government.

- Projects were predicated on a purely financial rationale rather than a broad vision of how transit could work in tandem with surrounding development. As later sections will explain, the goal of maximizing revenue from ground rents often works at cross-purposes to other goals of transit-oriented development. In other words, the highest returns in financial terms are not always the best in transit or neighbourhood terms.

- Recently, interest in TOD has broadened beyond the possibility of financial return that may involve the securitization of assets through infrastructure real estate trusts. Increasing evidence now exists that transit-oriented development can yield many more benefits than merely increased land value. The last decade saw subtle but promising shifts in the landscape of transit and development, with the convergence of a number of trends: growing transit ridership, increased investment in transit systems, the smart growth and new urbanism movements, and a generally greater recognition of the advantages of linking development and transit.

- Transit-oriented development can realize its full potential only if it emerges as a new paradigm of development rather than a series of marginal improvements. TOD cannot be and should not be a utopian vision; it must operate within the constraints of the market and realistic expectations of behaviour and lifestyle patterns. However, the market and lifestyle patterns can and do change as a result of both policy choices and socio-cultural trends. The automobile was not always the dominant form of transportation, and suburban living was not always the lifestyle of choice. These changes in Malaysian life have been fostered in part by government policy such as the easily available credit to purchase personal vehicles and generous subsidies to road infrastructure projects at the expense of alternative forms of transportation.

- Kuala Lumpur population relied heavily on personal vehicle as the primary mode of transportation. Having said that, bus systems compliment the motorcycles and cars, using the same streets and experiencing the same congestion, hence bus service had less impact on land-use patterns than fixed-rail transit. With the exception of some of the commuter suburbs around older localities along the Kelana Jaya-Gombak PUTRA LRT Line and Masjid Jamek Sri Petaling STAR line which sustained to operate reasonably well as transit-based communities, most transit is not a reliable transportation option attached to any mixed-use development or suburban communities. But the transit system were built primarily to relieve congestion, funding was provided entirely by the public sector, and additional land was purchased by the transit agencies to ensure that there would be any link between current transit investments and future development patterns.

- These systems were also designed explicitly to work with the automobiles, with the assumption that most people would still drive to suburban stations rather than walking, biking, or riding feeder-bus systems. In this case, these systems were viewed as primarily serving a regional purpose and the stations were considered nodes within this larger system, with little regard for the local place where each station was located. Because of the philosophy with which they were built, many stations are now characterized by large amounts of entrenched parking rather than intimate connections to vibrant neighbourhoods. Large expanses of surface parking or parking structures create barriers between the station and the surrounding community.

- Although these systems undoubtedly can claim real successes, they fall short of providing the full range of benefits that a transit system can potentially stimulate. In general, they do not contribute to neighbourhood revitalization along all its stations as much as they should, reduce automobile dependency

to the extent that they could, or encourage more efficient regional land-use patterns as well as they might. Land-ownership patterns remain fragmented, and the idea that development should be linked to transit does not generally prevail, even when transit infrastructure is already present.

## II. SOLUTIONS FOR TRANSIT-ORIENTED DEVELOPMENT

- Definitions of transit-oriented development often focus on built form. For example, Bernick and Cervero (1996) emphasize the role of the "three Ds" (density, diversity, and design) in the success of TOD. Although proper built form is a necessary element, that alone is not sufficient for achieving all the benefits of TOD. For example, units per acre are a measure of physical form that tells us very little about the way a place functions: a high-density area can easily be less pedestrian-friendly than a low-density one. In contrast, the ability of residents to make fewer trips, own fewer cars, breathe cleaner air, and enjoy more parks are all functional outcomes that can be measured.

- Because most definitions of TOD focus on built form, many projects that are billed as successful transit-oriented development don't function very well. They may have overcome the main barriers to creating dense mixed-use development next to a transit station, but they fell short when measured by performance rather than physical characteristics. A focus on desired outcomes allow a better benchmark of success and a better measure of the trade-offs that most projects had. It permits a subtler assessment of projects that judges them as more or less successful in different areas rather than simply built or not built. A pragmatic solutions is to integrate various methods of railway transport, forming a cross-grid such as the Klang Valley Integrated Rail System envisioned to be the backbone of urban public transport in Greater Kuala Lumpur (Figure 5).

**Figure 5: Klang Valley Rail Map**


Source: Prasarana

# C. HOW TO EVALUATE TRANSIT-ORIENTED DEVELOPMENT

- **How to evaluate Transit-Oriented Development.** This section presents a definition in the form of six performance criteria that can be used to evaluate TOD project function and outcomes. The major departure from previous thought on TOD is not so much the novelty of these performance areas, since many have been addressed in one way or another, but rather the emphasis on their use as a planning tool.

- The six performance areas contain overlaps, but have been separated in order to emphasize the core principles that organize this vision of TOD. Probably no single project can excel in all these areas. Complex projects involving multiple participants often generate conflicting and irreconcilable goals, and are subject to the constraints of the particular location and circumstances. However, with this comprehensive and ambitious definition as a starting point, it will be possible to distinguish necessary trade-offs from sub-optimal outcomes that result from other causes, identify other challenges confronting TOD, and formulate a meaningful set of recommendations that will truly impact the future of TOD in this country. The key performance metrics of TOD are as follows;

## I. LOCATION EFFICIENCY

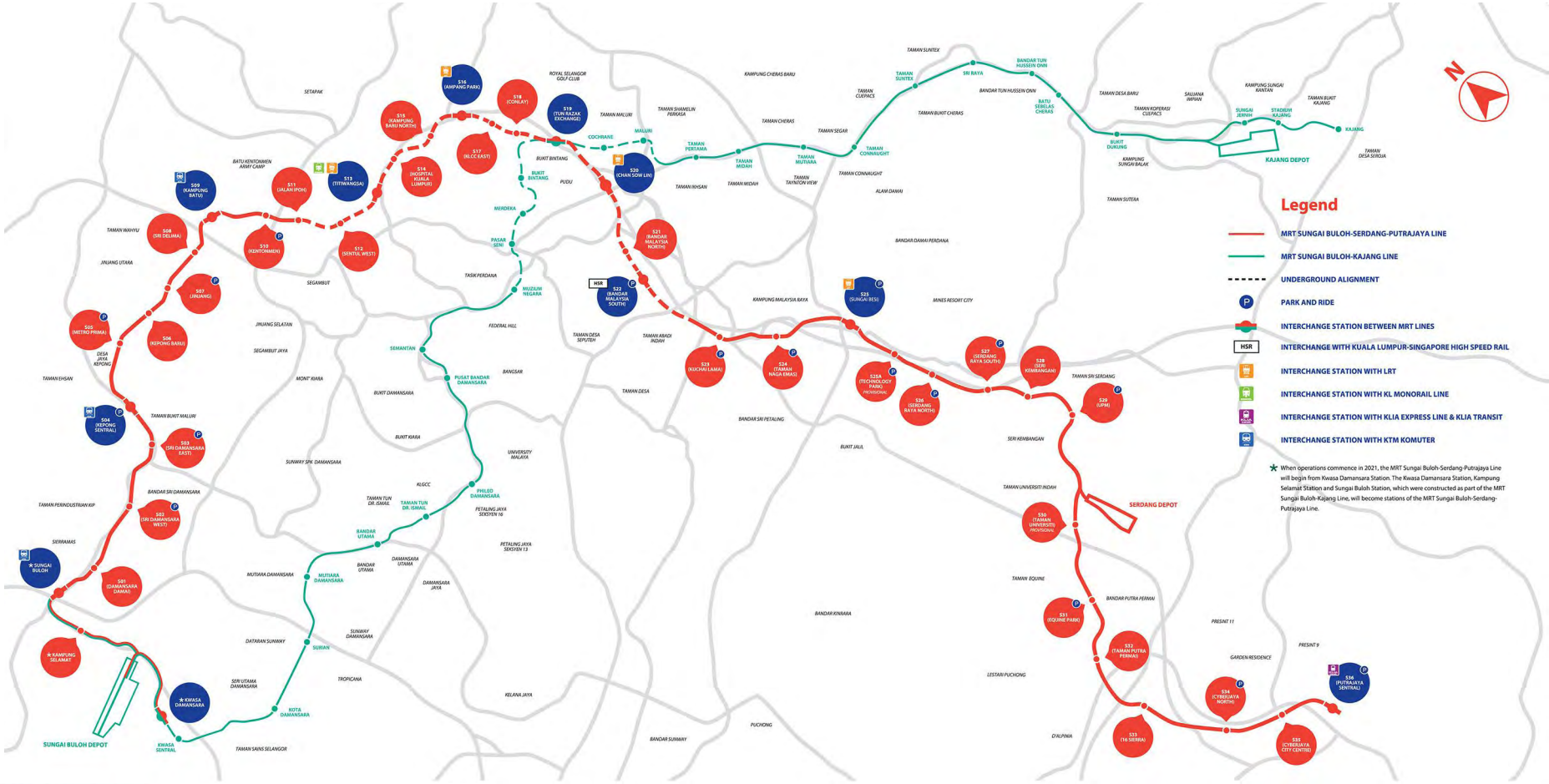
- Ample evidence demonstrates that, on average, residents of denser urban neighbourhoods own fewer cars, drive less, and walk and ride transit more than residents of suburban areas (see “Travel Patterns and Behaviour” subsection of Appendix). This is true even when controlling for income. This suggests that reduced auto dependency will result from an effective blending of convenient and efficient transportation links (node functions) with enhancements of the ability to carry out most everyday tasks close to home (place functions).

- This connection can be captured in the concept of location efficiency. Simply put, location efficiency converts driving from a necessity into an option, permiting households that take advantage of the characteristics of the neighbourhood to spend less on transportation by driving less or even by owning fewer cars. The concept of location efficiency has been incorporated into the location-efficient mortgage program, which allows homebuyers who spend less on transportation by choosing a location-efficient neighbourhood to borrow more money than they would qualify for under conventional mortgage lending practice.

- Location efficiency requires neighbourhoods that provide high-quality transit, a mix of uses, and pedestrian-friendly design. Proximity to transit is just one of several key variables that determine the location efficiency of a neighbourhood. Other critical factors include net residential density, transit frequency and quality, access to community amenities, and a quality pedestrian environment (e.g. good sidewalks, safety, reasonable topography). Location efficiency can be enhanced by the introduction of additional mobility choices such as car sharing, which makes it even more feasible for residents not to own a car.

- Even with all these features, however, it is probably not realistic to expect suburban residents to develop the same travel patterns as urban residents no matter what type of neighbourhood they live in. Although there has been little comprehensive research on the ability of location-efficient design to affect overall travel behaviour, a number of studies have focused on retail behaviour. These studies make clear that not all residents of location-efficient neighbourhoods will own fewer cars per family or give up car ownership entirely. Not all will work within walking distance of home or do all their shopping locally.

## Figure 6: The MRT Sungai Buloh-Serdang-Putrajaya Line




### Boosting Integration

The SSP Line will integrate with existing and future rail services at 11 stations. This will make it much easier for commuters to transfer from one urban rail service to another.

The interchange stations are:

| | |
|---|---|
| Kwasa Damansara | MRT Sungai Buloh-Kajang Line |
| Sungai Buloh | KTM Komuter |
| S04 Kepong Sentral | KTM Komuter |
| S09 Kampung Batu | KTM Komuter |
| S13 Titiwangsa | LRT Ampang Line, LRT Seri Petaling Line and KL Monorail |
| S16 Ampang Park | LRT Kelana Jaya Line |
| S19 Tun Razak Exchange | MRT Sungai Buloh-Kajang Line |
| S20 Chan Sow Lin | LRT Ampang Line, LRT Seri Petaling Line |
| S22 Bandar Malaysia South | Kuala Lumpur-Singapore High Speed Rail |
| S25 Sungai Besi | LRT Seri Petaling Line |
| S36 Putrajaya Sentral | KLIA Transit |

Source: MRT Corp

- However, none of these findings undercut the logic of transit-oriented development or the desirability of building location-efficient neighbourhoods. The key idea remains choice: Location-efficient neighbourhoods make these choices possible and even encourage them whereas most standard development types do not. The very presence of this choice is a positive contribution of this development type, and many residents in walkable or location-efficient neighbourhoods cite the existence of mobility choices as a quality of life feature and an important factor in their choice of neighbourhood such as the KVMRT Sungai Buloh Kajang Line (Figure 6).

- Location-efficient neighbourhoods can provide the following types of outcomes:
  - Increased mobility choices (walking and bicycling as well as transit)
  - Increased transit ridership
  - Good transit connections to the rest of the city and region
  - Reduced auto use and reduced auto ownership
  - Reduced transportation costs to individuals and households
  - Sufficient retail development (quantity, quality, and diversity) to satisfy the basic daily needs of residents and employees working in the area
  - Ability to live, work, and shop within the same neighbourhood

## II. VALUE RECAPTURE

- The benefits of location efficiency can translate into direct savings for individuals, households, regions, and nations. It seems intuitive – and it has been demonstrated – that residents of denser, transit-rich neighbourhoods spend less on automobile transportation than people in auto-dependent areas. This same effect is visible at the metropolitan level. Overall, residents of denser, more transit-rich metropolitan areas pay less for transportation than their counterparts in auto-dependent metropolitan regions – even when the cost of public investments in transit is included in the calculation. Every amount invested in transit can move far more people-if land use is supportive, than the amount spent on automobile transportation. Remember that the full cost of automobile transportation includes not only household expenditures but also public spending on roads and bridges, public and private spending on parking or example, the construction of free parking spaces for example at a shopping centre. Despite high spending on automobile transportation, households only pay a portion of the total cost of driving directly; the rest is paid for indirectly through public funds for highways and road maintenance. This calculation does not even include the cost of externalities such as the public and environmental health issues such as effects of air pollution and the economic impact of traffic accidents. Thus, reduced automobile dependence could yield significant savings for individuals and for society as a whole. The question is not just how to reduce that spending, but also how to capture the value of the savings.

- The disparities in transportation spending among different locations have been recognized in the form of a new financial instrument called a location efficient mortgage (LEM) in the United States. The financial instrument allows people who live in location-efficient neighbourhoods and who take advantage of that fact to reduce their spending on transportation by owning fewer cars or no cars at all. Savings on transportation allows qualified borrowers to obtain a larger loan than they would be eligible for under the standard underwriting formula. For many, this can make the difference between affordability to buy a home or not, or at least the difference between an adequate home and one that is too small for the family's needs. Perhaps, Malaysia can introduce such instruments through policies, especially for purchasers for TOD projects

- The location efficient mortgage is the most explicit way of capturing the value by reducing automobile dependence, but there are others. Parking is a significant but generally under-recognized component of high spending on transportation. However, the cost of parking is not always reflected in the cost of driving; rather, parking is often paid for indirectly. While it is not feasible in most cases to eliminate parking altogether, individuals can still reap benefits if they can choose whether or not to purchase or rent a parking space. This involves unbundling parking from housing and creating a separate market for it. In Hong Kong, this practice is widely used by developers to woo more investments for properties due to lack of spaces.

- These savings from reduced parking costs can be captured by households, developers, and local municipalities. They can be invested in assets such as public housing that appreciate in value over time and allow for individual household wealth accumulation as implemented by. Collectively, there can be investment in better design and place-making amenities, parks, and other elements that improve the quality of development and the built environment overall.

- Measurable outcomes associated with value recapture include:
  - Increased homeownership rates or more adequate housing, especially among borderline income groups. This can be accomplished through:
  - Increased use of location efficient mortgages
  - Creation of housing units with lower-than-average parking ratios where the cost savings from parking reductions are passed on to consumers
  - Reduced individual and community spending on transportation and therefore greater discretionary individual and community spending. This can include spending a portion of the collective savings on enhanced public amenities such as street landscaping, parks, or better transit.

## III. LIVEABILITY

- At its core, transit-oriented development strives to make places work well for people. While to some liveability may conjure up the idea of vague and unimportant concepts irrelevant to “nuts and bolts” issues such as prosperity; in fact livability and quality of life are increasingly viewed as closely connected to economic development. Moreover, much evidence indicates that many people are increasingly frustrated with air pollution, long commutes, traffic congestion, and the difficulty of running errands. Quality of life has emerged as a critical concern on its own.

- Liveability is subjective and defies easy definition. No definition can be completely “objective” or value free. Nevertheless, it is possible to arrive at a definition of livability that is based on collective subjectivity rather than the values of a particular individual. Numerous attempts have been made to define, measure, and track the livability of places over time using indexes defined by citizens on the basis of what they feel is important. These indexes focus on livability or quality of life generally rather than TOD specifically. Nevertheless, they usually contain a variety of criteria that are directly or closely related to land use and transportation issues

- Measures of liveability that relate directly or indirectly to transit-oriented development include the following:
  - Improved air quality and gasoline consumption
  - Increased mobility choices (pedestrian friendliness, access to public transportation)
  - Decreased congestion/commute burden

- Improved access to retail, services, recreational, and cultural opportunities (including opportunities for youth to get involved in extra-curricular activities within the neighbourhood)
- Improved access to public spaces, including parks and plazas
- Better health and public safety (pollution-related illnesses, traffic accidents)
- Better economic health (income, employment)

## IV. FINANCIAL RETURN

- Successful TOD projects are typically a mix of public and private development projects. The public sector generally builds the transit station and the surrounding streets and public spaces, while private development may include housing, office buildings, and retail. Parking garages may be built by either the public or private sector. In some instances non-profits or other quasi-public entities can also own facilities such as day care centers; and both public and private landowners can lease spaces to private and non-profit tenants.

- All investors, whether public or private, expect some type of return. While the public agencies, including transit agencies and local and federal government, may not require full or even direct monetary return on their investment, no private sector project will get anything built unless it yields an appropriate return on investment or receives a public subsidy to compensate for underperformance. Thus, planning for TOD projects requires understanding on the type of return each of the public and private participants expects and ensures that certain return thresholds can be met.

- But, while this means that TOD projects must be responsive to the discipline of market and financial realities, it does not mean that all developments at transit-oriented locations should always strive to achieve the "highest and best" use for the site. This approach often tilts a development program away from a diverse land-use mix and towards more office and commercial products. Assuming that each use within the program yields an acceptable rate of return, a mixed-use strategy can be more advantageous for the developer than a single-use project because it allows for greater flexibility in responding to various market cycles, protects against market volatility, and holds value over time. In addition, it may be easier to finance smaller increments of different development products than one large single use because the project risk is spread among a wider variety of lenders and equity investors.

- While TOD projects may require more complex financing strategies, the potential exists for increased return, particularly if projects are designed to take advantage of the benefits provided by location efficiency. Evidence abounds that under the right circumstances (i.e., in a strong real estate market) light rail can lead to rent premiums in surrounding commercial properties (e.g., Weinberger 2000). Higher potential return can be used as an incentive for developers and it can also be captured for public benefit in various ways, either by requiring that developers spend a portion on place-making amenities or through taxes.

- The public sector – governments and transit agencies – can also reap financial rewards from TOD, although they may have different objetives than private investors. The public sector can and should be patient and willing to wait longer for investments to yield a return. Moreover, these participants should not necessarily define return in a narrow financial sense. Although all public investments should be justifiable, that justification can be based as much on notions of social return (greater equity, better affordable housing, better quality of life) as on financial return.

- Even businesses that choose to locate at TOD sites may receive a return in some cases. They may be willing to pay somewhat more to locate at transit stops, or they may subsidize their employees' transit

passes, but the benefits may outweigh the costs through reduced costs of providing parking or less time spent in traffic and long commutes, not to mention better employee morale. BellSouth's decision to consolidate its facilities at transit stops in Atlanta reflected this rationale.

- All TOD projects should be evaluated in terms of the total return to public as well as private investors so as to assist in making decisions about the trade-offs involved in the provision of public subsidies. Financial outcomes should include:
  - For local governments: higher tax revenues from increased retail sales and property values
  - For the transit agency: increased fare box revenues and potential ground lease and other joint development revenues. It is possible that in some cases increases in land value could cover a significant portion of the cost of transit investments
  - For the developer: higher return on investment
  - For employers: shorter and more predictable commute times, easier employee access
  - A balance between financial return and other goals of TOD so that projects are not judged purely on their monetary return

## V. CHOICE (ANOTHER PERSPECTIVE OF TRANSIT-ORIENTED DEVELOPMENT)

- One of the problems with standard suburban development is the lack of choice. Residents have few options in terms of housing types, places to shop, and modes of transportation. Meanwhile, people in a broad range of different contexts have emphasized the desire to have more transportation options in many of the livability indexes cited above. In other words, to many, the idea of a good place includes the notion of choice.

- Those who don't understand TOD sometimes describe it as an attempt to "force" people to live in high-density apartments and take transit. This is simply not the case. TOD involves function far more than form, meaning that no particular housing type needs to dominate TOD projects. In fact, most projects will work better if they include a range of housing types, from apartments to townhouses to single-family detached houses (albeit on relatively small lots). Although a certain minimum overall density is required to make TOD work, it is not true that TOD will necessarily require everyone to live at higher density buildings than they already do. In many parts of the country, notably in California, there has been a proliferation of medium-density housing (apartments, condominiums, townhouses) that is not connected to transit, but still incorporates some of the mixed-use or internal mobility of TOD. These projects function as high-density auto-oriented suburbs, with all of the disadvantages of density and none of the advantages of choices that TOD can offer. Yet they are fully viable in the marketplace. TOD does not necessarily require higher densities than many projects already being built; it requires instead that projects be built differently.

- What leaves few options for residents in terms of housing type or mode of transportation are current patterns of suburban development, not just TOD. TOD is intended to supplement, not replace, the current choices. Transit-oriented development projects can provide a much broader range of options by offering internal diversity and by simply adding a new type of development into the metropolitan area. Rather than leaving residents with no choice but to live in a single-family house, shop at auto-oriented retail centers, drive to work, and drive their children to activities, transit-oriented development can provide a wide variety of options to local residents. TOD can make available apartments, townhouses, and single-family homes to accommodate most family structures, income levels, and life stages It can offer a choice of small, unique specialty shops and larger retail outlets; the opportunity to get around

on foot, by bicycle, or on transit; and greatly enhanced mobility for children and seniors. Even studies that cast doubt on the ability of traditional neighbourhood design to significantly reduce driving for shopping purposes (e.g., Handy and Clifton 2000) find that residents of walkable neighbourhoods with nearby retail value the option to walk and, in many cases, have chosen their residence in part because they want that option.

- TOD is about expanding rather than replacing choices. Lower-income people with less money to spend on transportation, first-time homebuyers, and others inadequately served by most currently available housing options may particularly value the location efficiency offered by TOD. For that reason, a commitment to providing high-quality affordable housing in TOD projects seems particularly important. While this can involve public subsidies of various kinds, housing affordability can also be enhanced through other tools, such as density bonuses that allow developers to build at higher densities in exchange for the subsidization of some of the units. Removing parking from the cost of housing, as noted above, can also make market-rate projects more affordable. Finally, the use of location-efficient mortgages can expand homeownership opportunities. All of these tools in conjunction can increase housing choice.

- Enhanced choice may entail:
  - A diversity of housing types that reflects the regional mix of incomes and family structures
  - A greater range of affordable housing options
  - A diversity of retail types. Diversity will necessarily be limited by the market area and the particular desires of the residents; however, this outcome could be measured in terms of how well the retail mix meets the needs and desires of the residents as they themselves define them
  - A balance of transportation choices

## VI. EFFICIENT REGIONAL LAND-USE PATTERNS

- Most metropolitan areas in the United States have been urbanizing new land at a faster rate than they have added new residents. Some areas have continued to consume land even as their populations have shrunk. The causes of this trend are complex, but the results are quite clear: less open space, more area given over to roads, longer commutes, significantly unequal provision of services such as education across the metropolitan area, more air pollution, and so forth. Not all of these ills can be blamed exclusively on sprawl, but sprawl is a factor in all of them.

- Transit-oriented development can foster much more efficient patterns and cut down on traffic generation. For example, near the Pleasant Hill BART station in suburban San Francisco, residential development generates 52 percent fewer peak period auto trips than ITE Trip Generation Manual projections of typical residential development. Equally importantly, those trips are shorter since services are immediately at hand and the station is located immediately adjacent to a regional freeway. Office development at the station generates 25 percent fewer trips than typical office development. These trips are also shorter. The fact that this development is concentrated around a transit station means that it consumes less land, generates less traffic, contributes much less to congestion and air pollution than more typical suburban development.

- Yet the efficacy of such projects is limited by the fact that they remain relatively isolated examples that are not necessarily tied into a cohesive regional system. When a significant number of origins and destinations in the region are well-linked to a station, transit becomes a much more viable option. At the same time, transit-oriented development is one of the most important tools for creating more

efficient regional land-use patterns. The more growth that can be accommodated in station areas, the fewer sprawls will be the automatic result of growth.

- Smart growth measures such as the ones that have proliferated in recent years must do more than simply curtail growth if they are to be truly effective. They must channel growth to the places that are best suited for it. As frustration with sprawl and its consequences grows, more and more regions will look to a coordinated set of land-use policies and transportation investments to alleviate some of the problems. Transit-oriented development embodies these goals. Neither transit nor transit-oriented development promise a panacea for the problems associated with accommodating future growth, but both are important components of creating healthier, more livable cities, towns, and regions.

- Outcomes of these efficient regional patterns;
  - Less loss of farmland and open space
  - More suitable regional and sub-regional balance between jobs and housing
  - Shorter commutes
  - Less traffic and air pollution
  - Station areas as that can serve as destinations as well as origins

- The factors that keep TOD projects from succeeding, meanwhile, are rarely examined. This is because, as noted earlier, TOD is normally declared successful or unsuccessful without comparing the actual outcomes or functional aspects of a project to a fixed performance standard. If the project is built, it is deemed successful, and if it is not built, that is generally attributed to any one of a variety of problems. In this fashion, the literature focusing on the difficulties of building TOD projects tends to focus on a limited number of barriers to success. These barriers include: local neighbours' fears new TOD will harm the character of their neighbourhood or depress property values, developers' and lenders' perceptions that TOD entails higher risks and costs, the failure of existing land-use patterns to support TOD, a lack of a market for it, difficulties of financing, poor transit design, and an unsupportive regulatory framework.

- These barriers suggest the range of factors that can stop a project from being built. They are less useful for explaining why many of the projects billed as transit-oriented development fall short of their potential. Moreover, although all of these barriers represent significant issues, few are specific to transit-oriented development. Most apply to any form of urban infill and as such they do not necessarily reflect the special challenges and opportunities of transit-oriented development. Finally, they reflect a focus on built form (e.g., dense mixed-use projects adjacent to transit) rather than outcomes, such as the level of internal trip capture, increased mode splits, and so on. Thus, the barriers people associate with TOD tend to parallel the barriers associated with building all types of high-density infill projects, regardless of proximity to transit.

- This approach ultimately does not explain why many of the projects billed as transit-oriented development fall short of their potential. Even if all of the above barriers were removed, it is highly likely that future TOD projects would still fail to capture the full range of benefits offered by a transit-oriented location. A project that achieves high densities does not necessarily achieve the outcomes of TOD described above. To discover why, we must look beyond the barriers to building high density.

- Consider the following example from Miami. A developer bills his project as transit-oriented development. The development is next to a Miami-Dade Transportation Authority (MDTA) rail station, buses come right into the property, and the developer has taken advantage of the location to build

at a higher density than would be possible elsewhere, given zoning laws. In other words, the project has some of the attributes of transit-oriented development, and certainly is different than standard suburban development.

- When asked about the barriers his project had faced, the developer was hard-pressed to name any: His overall sense was that the project had gone smoothly. This may be true, but upon closer inspection it turns out that the project resembles transit-related development more than the comprehensive transit-oriented development as described in Section 2. Parking standards have been reduced slightly, but there are still 3.3 spaces per 1,000 square feet of development – a fairly typical level for suburban development that reflects what the developer felt the market would demand for any office development. The development contains a supermarket with 200 surface parking spaces, clearly intended to accommodate heavy automobile traffic. Moreover, the project puts a lower priority on housing than on office or retail and therefore does not constitute a truly location-efficient neighbourhood. In other words, using even moderately ambitious performance standards, we can see the project's shortcomings, but the developer cited an absence of barriers to building TOD because his definition was based more on a physical definition (density next to transit) than a functional one. The barriers were minimal and the project was built, but ultimately the project must be viewed as only a modest improvement over standard development. We must look deeper to find the reasons why.

- By shifting the emphasis from the physical characteristics of a project to its functional outcomes, a somewhat different list of major "challenges" to implementing this development emerges. Barriers to TOD constrain projects subtly by making it difficult for them to live up to their full potential: A project may still get built, but may be less effective as a result of the challenges faced. This is important to keep in mind when thinking about the challenges discussed below. Their impact has been not simply on the existence of projects, but also (perhaps more so) on their quality. If all the barriers to TOD were overcome, there would still be no guarantee of having high-quality projects. However, if these challenges can be dealt with and overcome, it is likely that both the overall number and quality of such projects would be greatly increased.

# D. HOW TO MAKE TRANSIT-ORIENTED DEVELOPMENT WORKS

## I. CLARITY IN POLICY

- It should come as no surprise that any project that brings together the range of participants typically involved in transit-oriented development will engender disagreement. Typical TOD project for the public sector builds the transit in partnership with multiple agencies, while local governments try to control the development, and developers look for opportunities to make profits. Transit agencies also become involved as property owners in joint development projects. All of this entities and not to mention transit riders, neighbours, and the public at large-have different ideas about what the project should accomplish.

- This lack of clarity in the definition of TOD may exacerbate legitimate disagreements about what constitutes "good" TOD and whether TOD should aim to maximize revenue to the transit agency through lucrative ground leases or seek to minimize the use of automobiles? Should TOD be designed to maximize ridership or to help revitalize the station area? Should it try to maximize economic success or urban values? All of these are legitimate concerns but sometimes also mutually incompatible goals that may result in policies that work at cross-purposes to one another. And resolving them is made harder by the lack of comprehensive framework for assessment.

- For example, in the Miami case the MDTA placed a greater emphasis on maximizing its revenue stream from ground leases than on creating a location-efficient place. Because location efficiency is not a universally recognized goal of TOD, not all participants involved in a project consider the impact of their priorities on location efficiency.

- Table below shows a number of possible goals associated with each of the actors involved in TOD projects. Many of these goals-such as maintaining a high level of station parking and maximizing pedestrian access to the station-conflict. Even a single actor may have goals that are incompatible, or at the very least, that require careful balancing if they are to be reconciled. Many of the incompatibilities reflect the basic tension between place and node.

- A transit station's role as a node can be strengthened if it also becomes a viable place. But interviews suggest that disparate goals, and divergent definitions of TOD, are often not recognized explicitly, and the actors do not necessarily think through the impact of a particular goal. More often than not, projects are implemented without a clear vision of the desired outcomes, the different goals of the actors, and the ways in which those goals may work at cross-purposes and lead to a project that, while perhaps superior to traditional development, falls short of the potential of TOD.

**Figure 7 TOD Actors**

| Actor | Possible Goals |
|---|---|
| Transit Agency | • Maximize monetary return on land and value<br>• Capture value in the long term |
| Riders | • Create and maintain high level of parking<br>• Improve transit service and station access<br>• Increase mobility choices<br>• Develop convenience mix of uses near station |
| Neighbour | • Maintain increase property values<br>• Minimize traffic impact<br>• Increase mobility choices<br>• Improve access to transit, services and jobs<br>• Enhance neighbourhood liveability<br>• Further redevelopment |
| Local Gov't | • Maximize tax revenue<br>• Foster economic vitality<br>• Please constituents<br>• Redeveloped underutilized lands |
| Federal Gov't | • Protect 'public interest' and sets limits on how federally-funded that can be used |
| Developer/ Lender | • Maximize Return on Investment<br>• Minimize risk and complexity<br>• Ensure value in the long term |

Source ; Strategic Economics (2002)

## II. FUNCTIONAL INTEGRATION OF TRANSIT AND THE SURROUNDING USES

- The need for transit-oriented development to function as both node and place affects virtually every aspect of the station area, from physical layout and design to the appropriate development program. Yet as the discussion of the first challenge becomes clear, the multitude of actors and goals to be found in any TOD project make integration of node and place extremely difficult. Some actors see their interests as closely connected to the role of a station area as a node while others are more concerned about the quality of the place. All too often there are few or no advocates (and little or no money) to keep the idea of place on the agenda.

- Over and over again, actors involved in TOD projects complain that the attitude of many transit agencies is that "they run the trains" and no more. Most transit agencies have little interest in stations as anything but nodes. As discussed above, even when transit agencies participate as property owners, they are generally working within a narrow agenda. Other actors may be more divided, but they too have trouble balancing these different needs. Citizens who clamour for more parking spots at stations (a node function) may be at odds with others who complain about increased traffic in their neighbourhood (a quality of place concern).

- Car park is perhaps the clearest illustration of this. The way in which the seemingly mundane issue of parking is handled turns out to be one of the most crucial issues in transit-oriented development. Parking is tied to a station's role as a node in a larger regional system, and there is tremendous pressure on transit agencies to provide ample parking for riders. Parking can become a political, financial, and design issue, and the goal of providing parking conflicts with place-related goals in many ways.

- In addition to the financial burden and its effects on the development program, parking and the associated access roads present a design issue, since it is difficult to accommodate large numbers of cars and create a pedestrian-friendly environment. Higher density development around transit stations will largely be offset by high parking lots ratios, since all the additional square footage will also require parking and roads to accommodate additional cars. In this way, parking, whether it serves the transit station itself or the surrounding uses, reduces the efficacy of transit-oriented development as a place.

- Because transit-oriented development provides an alternative to automobile travel for commuters, shoppers, and residents alike, development should not be expected to provide parking at the same level as elsewhere. Both the local government and the transit agency have the ability to try to limit parking, but this is not always a priority. For example, in United States despite the fact that Dallas Area Rapid Transit (DART) has been in operation for a number of years now its Dallas parking code is only now adding a credit for mass transit accessibility. Even if such a provision exists, developers, financial institutions, or the public are sometimes reluctant to see the level of parking reduced. Currently, rebates are given by users of Light Transit Rail (LRT) in Malaysia are given to commuters during specific period of rush hours but not credit for parking. This is a good move to ensure that parking is used optimally but not to maximize its application.

- In the case of a system undergoing rapid increases in ridership, such as the LRT or upcoming KVMRT1 and KVMRT2, the public perception on the need for parking is even stronger given the difficulty of finding a parking space at the station. Not only is any proposal to reduce the number of spaces seen as unworkable, but strong pressure exists to increase the amount of parking with the introduction of Park-n-Ride in stations such as in Glenmarie, Asia Jaya, Taman Paramount, Taman Bahagia, Gombak and Kelana Jaya station. In the planning process for transit-oriented development at these stations,

we can see that parking facilities is a crucial factor for increasing ridership. But this is paradoxical because as we mentioned that TOD is a form of solution but not total solution.

- Many of the shortcomings of TOD projects can be better understood when those projects are viewed through the lens of location and node. There is not necessarily a single correct way to balance these two roles; however, achieving the best possible outcomes in any given case requires an understanding of the way in which this tension shapes projects and forces trade-offs such as Park-N-Ride and BRT stations

## III. CODIFICATION OF GUIDELINES

- The previous challenge dealt with the tension between node and place. Making the place work is another challenge. All too often there are few or no advocates (and little or no money) to keep the idea of place on the agenda. Furthermore, little information exists about how to make good places.

- Effective transit-oriented development cannot be defined by physical form alone. For example, while residents of dense urban areas like San Francisco clearly drive less than suburban residents, those of many relatively high-density areas do not achieve particularly good outcomes in terms of reducing driving. The difference lies in the way that many San Francisco neighbourhoods combine density with appropriate street patterns, access to transit, neighbourhood amenities, and an adequate mix of retail in close proximity, as well as in the demographic composition. This contrasts housing developments in many other cities (parts of San Diego or Fremont, California are prime examples) that, while achieving similar densities, sit behind walls with only one entrance. Residents have no choice when they leave home but to travel on major arterials and shop at auto-oriented retail centers. Density is clearly not the only important factor.

- Although a fairly rich literature probes the individual elements that determine location efficiency, little work has been done to integrate these individual lines of inquiry. The impact of density on transit use, retail viability, and auto use has been studied, but it is not clear to what extent density must be accompanied by other features in order to provide mobility choices, nor what role a neighbourhood's socioeconomic status plays. Likewise, even research that suggests that a grid street pattern encourages walking more than a system of dead end and major arterials in Kuala Lumpur such as the Federal Highway does not necessarily offer much insight into how that layout interacts with factors such as street design, proximity to transit, and the mix of retail offerings. Thus, although many planners and TOD advocates have a clear conceptual understanding of the factors that contribute to the desired outcomes, little understanding-and even fewer guidelines–exists about how to turn those concepts into plans. This infers that Malaysia needs a comprehensive TOD guideline that is applicable to all urban development.

- Another problem is the retail elements to generate returns and rentals. In contrast to other mixed-use projects, which do not necessarily attempt to satisfy all needs, TOD projects aiming to maximize location efficiency must, by definition, strive to serve as many of the daily needs of the residents as possible. Designing a project to serve those needs requires precise information on the services that shoppers (residents, employees, visitors) need and want, the way people choose where to shop and how to get there, and the conditions (e.g. demographics, retail mix) necessary for different retail services to be viable.

- While much of the work that has been done on retail services is excellent and sheds light on particular questions, little research exists to guide planners making decisions about the most desirable retail mix

for transit-oriented development projects. What types of retail services are least likely to generate car trips, and do this match the services that are most important to making a neighbourhood location efficient? How do density, mix of uses, and demographics interact? Residents' propensity to walk to retail varies not only with distance, density, and street design but also with the age, number of children, and income of shoppers. Affluent older parents are less likely to forgo driving than young, middle-income singles. Given a particular location and feasible density, it needs to be asked what mix of retail uses is most suitable, what density of population is needed to support that, and what demographics are most compatible with transit-oriented development. The picture grows even more complicated when planners begin to look beyond retail. Different types of employers and occupations are likely to generate different levels of transit use. What types of employers or real estate types are best suited to being located near transit? Can the role of a station area as an employment centre be reconciled with its role as a neighbourhood? What types of employment mesh best with retail?

- This general problem of information shortfalls is made more acute by the fact that most of the research in these areas does not focus on transit-oriented development specifically. But mixed-use represents less a particular species of mixed-use development than a special case entirely. Finally, the appropriate density, mix of uses, amount of parking, level of bus service, and other aspects of station area program and design will necessarily vary depending on the scale and type of place in question, as well as the particular characteristics of the place. Yet again, there are few guidelines for planners.

## IV. SYNERGY AMONG MANY DIFFERENT USES AND FUNCTIONS OF LAND

- Because of their need to fulfill both place and node functions, TOD projects require all their component parts – the transit system, station access routes (buses, taxis, cars, bicycles, and pedestrians infrastructure), and the surrounding development – to interface with each other. While it is the synergism among these functions that allows TOD to achieve location efficiency and other desired outcomes, the process necessary to link all these parts together into a single well-functioning place remains extremely complex. Even if a successful strategy is devised to finance all the basic components of the project a clearly identifiable funding source rarely is available to pay for many of the extra "place making" features that smooth the transition between place and node and encourage location.

- As a relatively new real estate product that is still largely undefined and still outside the mainstream, TOD lacks a standard approach. Most TOD projects are experiments that try to negotiate unfamiliar regulatory, physical, political and financial terrain simultaneously. This fact, combined with the inherent complexity of good TOD projects, often means greater delays, conflicts, confusion, and costs. Even when developers are not deterred by this prospect, they and the other actors may not succeed in maximizing the potential synergies of the project.

- The challenges are particularly acute given that, with few exceptions, no single agency can completely set the agenda. Transit agencies run the trains and have some control over development on their land, but they are still subject to constraints from local governments, and they have no control over the larger station area. Local governments often have to push transit agencies to make their station designs more accommodating to surrounding development. Developers may be reluctant to build appropriate buildings, or if willing, they may have problems getting financing or even getting the necessary assistance from the local government.

- Not all problems result from such an obvious lack of coordination. The cost and complexity of good TOD projects is greater in part because of the very nature of the projects. In order to achieve the goals laid out above, TOD projects must have a complex mix of uses. This is even true within any given real estate type: Ideally there should be a choice of housing types (single- and multi-family, rental and ownership), retail choices, and so on. Yet different real estate types have different levels of risk and require different financing strategies. Different lenders, investors, and financing parameters may be necessary for each real estate type, which requires "parsing" the different components of the project. Yet this can require significant expertise and technical knowledge outside the realm of experience of most developers and transit agencies.

- The problems can be seen especially clearly in suburban locations where land is relatively inexpensive. There, neither local governments nor transit agencies have an incentive to build expensive parking garages even though structured parking might make for better and more efficient places. Other features, such as attendant-operated bike parking stations, small urban parks, community facilities, or even small-scale retail might all contribute to location efficiency in a TOD. Equally importantly, truly functional TOD depends on high-quality design and planning. However, place-making amenities and high-quality design are too often viewed as secondary or irrelevant. Even when this is not the case, there is usually no source of financing to pay for these important components of the project. None of the actors necessarily see it as their role, and although the local government is usually in the best position to create the conditions for good planning and design, there is often a lack of understanding or leadership on that front.

## V. LEADERSHIP GAP IN TOD POLICY DEVELOPMENT

- Given the inherent complexity of transit-oriented development and the need for synergy among many disparate elements, the lack of an overall vision and a streamlined regulatory structure is an enormous challenge. Projects must move forward in an environment of complex and sometimes contradictory regulations, lack of coordination among different actors, and the absence of a clear vision and the leadership necessary to implement it.

- While TOD requires the coordination of many participants, local governments occupy the best position than any of them, in creating and sustaining the vision necessary for TOD and assisting with critical aspects of the development process such as entitlements, land assembly, investment in key infrastructure and place-making amenities, and so on. Unfortunately, many local governments – even for some that view TOD as a desirable goal – do not understand well the benefits of planning or clearly envision the role that they can play as facilitators. When these are lacking, projects can fall short. Provision of infrastructure and amenities is another key role for local government activism. Without a visible program of investment in basic infrastructure, street landscaping, and so on, developers may lack the confidence that the public sector is making a commitment to the area. Unfortunately, the two most critical actors in the TOD process – transit agencies and local government – often fail to work together effectively to establish a unified and comprehensive vision for TOD.

- Developers nearly unanimously stress the importance of a good plan for providing a predictable environment for development. Without such a plan, no guarantee exists that the community will accept a proposed development, or that there is any agreement on the future evolution of the area. Delays and uncertainty can be higher and as a result, the cost of pre-development work may increase. If this

is the case, the developer will require a higher return-on investment and the scope and creativity of the project will be constrained.

- Finally, the local government can play a key role in land assembly by purchasing land, facilitating deals, coordinating different entities, and so on. True transit-oriented development cannot occur on a single parcel of land, but ownership of land is nearly always fragmented and assembly of multiple parcels can be difficult. If the local government does not play a leadership role then the development program surrounding the transit station is unlikely to be of sufficient scope to be truly effective as TOD.
- Market forces are not always strong enough to support good TOD by themselves. When they may not, local government becomes an even more critical actor in the TOD process and strong public policy provides and important tool for overcoming a neighbourhood's disadvantages and creating a place that is suitable for high-quality development. A local government that plays an active role in developing an area plan, providing infrastructure, and ensuring land supply can significantly alter the perceived market conditions in an area. In the end, the most successful TOD projects will be those which involve a partnership between the public and private sectors.

## VI. PROPERTY MART MUST BE CONDUCIVE

- Much evidence confirms that transit can have a positive impact on land values, commercial rents, and development trends. Still, transit agencies and policymakers sometimes overestimate the impact of a transit line on development.
- Part of the problem lies in the confusion between, on the one hand, increased land values stemming from transit investments and, on the other hand, market demand for particular real estate products close to transit. In economic terms, the impact of transit on land values follows from the fact that transit renders the land effectively less "distant" from key locations (i.e. the "cost" of transportation, whether in monetary or non-monetary terms, decreases). Given that, all other things being equal, users will be willing to pay more to locate there. From the developer's perspective, the value of what can be built on the land increases, and therefore the market value of the land increases.
- Even with transit, however, any given site must still compete with every other site in the region for development. Since transit is only one of many factors driving development, many other sites may prove more attractive to developers. To be sure, the public sector – most notably local government – can elevate market demand at a site by working to create more of the necessary conditions for development. But without strong existing demand or coordinated policies to help create it, transit alone will not drive appropriate development even if it leads to increases in land costs.
- This can make transit-oriented development a particular challenge in low-income areas, where the real estate market is usually weak. Real or perceived problems such as crime, social problems, and deteriorated physical conditions deter investment; either investment will simply not occur or the quality of the development will be compromised. As a result, new development in transit-rich low-income neighbourhoods is very difficult to achieve and often lacks the full set of features, such as appropriate site design and pedestrian connectivity that would maximize location efficiency. Under these conditions well-planned transit investments can constitute a key piece of an economic development or revitalization package, but a host of supporting policies, incentives, and investments are also necessary.

- In addition to the site's location within the region, local factors also shape market conditions. Some places may be more amenable to high density development than others. The demographic composition surrounding a site may be more or less favourable for TOD. Even when real estate investment occurs, it is not necessarily supportive of the goals of transit-oriented development. For example, the construction of suburban style housing in neighbourhoods with good transit connections may undermine the location efficiency of those neighbourhoods. While in theory development parameters can be set with zoning and other tools, there is no guarantee that the market will provide the desired development. Buyers may want something different in that location, and lenders and developers may balk at providing a product of which they are uncertain.

- In short, real estate investment decisions are made on the basis of many criteria, and although transit can help catalyse development, transit alone is not sufficient when market conditions are not supportive. Node – as defined by the connection to the transportation system – and place – as viewed by the market and defined by other qualities and policies – must work together to generate investment.

- The core opportunity of transit-oriented development is for people with a wide range of incomes to reduce their dependency on the automobile for their transportation needs. By living and/or working near a transit system, individuals have greater choices about their transportation options, enabling them to reduce the amount of money and time they spend on travel. The potential of TOD can be enhanced through the design and development of dense, walkable, multi-use neighbourhoods that can support a mix

- The core opportunity of transit-oriented development is for people with a wide range of incomes to reduce their dependency on the automobile for their transportation needs of land uses: housing, workplaces, stores, and restaurants. The diversity of land uses provides greater access and connectivity to local services, and allows people to take care of some of their daily needs by walking or biking to various destinations.

# E. CONCLUSIONS

- People are often confused about the individual development projects and the area that lays within the walking radius of any given transit station. A plethora of research shows that commuters are willing to walk on a regular basis to transit if they live within a half-mile of a fixed-guideway (rail or bus rapid transit) station that connects to their workplace or school. For buses and streetcars, the average walking dimension is a corridor roughly ¼-mile on either side of the line, while light and heavy rail transit walking areas extend to about ½-mile radii. Thus, the area of influence for transit is much larger than simply the station and the buildings immediately around the station that may constitute a TOD project.

- TODs may incorporate a variety of land uses and can take many forms. Not all of the places that touch a transit system should be expected to serve the same functions, provide the same mix of uses, or be built at precisely the same densities. Indeed, when a new transit line is built, it often extends through a combination of existing neighbourhoods – some of which have the potential for significant new development and others may not. Some of the neighbourhoods near transit have very hot market conditions, while others are relatively weak market areas. While the classic "hub and spoke" pattern of many transit systems typically funnels rail lines into a city centre, there is an increasing recognition that the highest performing transit corridors link up a variety of destinations and station areas, including downtown core areas, near-in urban neighbourhoods, hospitals, colleges and universities, sports and entertainment facilities and suburban town centre.

- Households in transit-rich locations have increased access to jobs, services, educational and health institutions, social networks, and most of all, can reduce their cost of living by paying less for transportation costs. Development linked with transit has the potential to deliver many benefits, including; (i) cost savings to households and communities, (ii) connections to regional employment opportunities (iii) mixed-income neighborhoods and, (iv) environmental benefits such as lessening carbon footprints.

- However, household expenditure on transportation is also tremendously important for affordability. This is especially true for lower-income households, for whom transportation costs are a heavier burden. The location of housing is therefore critical to enhancing affordability and quality of life for low- and middle income households. Today's transit zones can provide important mobility opportunities and the economic benefits that accrue from this allowing people to live with fewer cars. In three-quarters of transit zones in United States, households have one car or less. In some of the small transit systems, fully 100 percent of transit zones house a majority of households with one car or less. Transit zones offer a way for households of modest means to keep in check their household expenses by reducing car ownership and transportation expenses. Living near transit can also greatly improve the quality of life for low- and moderate-income people by allowing them to get to work, school, medical appointments, and other destinations more reliably and reducing the stress of the daily commute. We can observe such impact in neighbourhoods in Singapore such as Punggol where the MRT station and retail spaces converge with multiple accesses to central business districts through taxis and buses.

- All global best-case examples of transit and land-use integration had a cogent land-use vision that shaped regional transit investments more than vice versa. Transit was one of several important tools, along with supportive zoning and creative financing, used to make urban visions a reality. For example, the introduction of transportation demand management measures in government policies, including congestion charges and streetscape enhancements that promote non-motorized transport modes, have also been important. Cities like Hong Kong SAR, China and Tokyo reveal that successful transit and land-use integration can generate revenue and capture value through the development of property and air rights.

- Cities like Singapore have benefited from cogent regional visions that ensure that high-capacity transit investments produce desired urban-form outcomes Experiences from these and other cities suggest that station area planning needs to be carried out selectively and judiciously. In many instances, planning efforts should be devoted to development or redevelopment no more than a handful of rail and BRT stations, in order to allow resources to be effectively concentrated. Doing so increases the odds of a "win-win" arrangement in which both public and private interests can co-participate in the benefits new transit investments yield. Demonstrating that positive land-use changes are possible in conjunction with transit investment is important for producing models that the larger development community can emulate as well as for convincing lenders that investing in station area projects can be financially remunerative.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