Sustainability framework for transit oriented development in South East Queensland

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Introduction

Transit Oriented Developments (TODs) are higher density mixed use residential and commercial developments set within walking distance of key transit nodes such as rail or bus stations or around activity centres such as major shopping centres or offices. While higher densities are promoted closer to the transit nodes, lower density development is allowed further away from the transit nodes. TODs aim to encourage increased use of public transport, to efficiently integrate land use and transport, and to create integrated liveable communities (Calthorpe and Fulton, 2001; Dittmar and Ohland, 2004; Denphy et.al, 2004).

Transit Oriented Development (TOD) is currently being advocated as an effective land use planning strategy to manage metropolitan growth in South East Queensland (SEQ). Recently, the Regional Plan for South East Queensland has proposed to develop a series of TODs in the region as a way to manage its rapid growth (OUM, 2004, 2005a).

In view of the current developments that are taking place in SEQ, this paper sets out to:

1) discuss the strengths and weaknesses of the TOD concept;
2) examine the merits of the idea of TOD being proposed for SEQ;
3) highlight some planning issues associated with TOD development in SEQ; and
4) propose a holistic conceptual framework to integrate key planning and urban design principles related to the implementation of sustainable TOD in SEQ.

**Strengths and Weaknesses of the TOD Concept**

Extensive literature exists on case studies of TODs around the world (Newman and Kenworthy, 1999; Dittmar and Ohland, 2004; Gilbert and Ginn, 2001). Some of the TODs discussed in the literature are located in cities like Stockholm, Vancouver, Toronto, San Francisco, San Diego, Portland, Singapore, and Tokyo. Many of these cities have in place a policy of developing higher density mixed use development around major public transit nodes.

In the context of Australia, Subiaco Bay development in Perth, Bondi Junction and Green Square in Sydney may be seen as some of the local examples. In Brisbane, while there is no definite example of TOD seen as yet, some potential sites being identified for TOD development are South Bank, Bowen Hills, Wynnum and Albion. The area around Toowong village may also be seen as possessing some elements of TOD.

A review of the literature on TODs identifies current debates on strengths and weakness of TOD concept. Proponents of TOD argue that it can contribute to sustainable cities by minimising urban sprawl and creating more compact cities (Bernick and Cervero, 1996; Denphy et al., 2004; Gilbert and Ginn, 2001). Reducing car dependence through TOD can play an important role in energy conservation and improved air quality by causing reduction in greenhouse gas emissions (Newman and Kenworthy, 1999; Newman, 2005). TODs can also contribute to a better utilisation of cities’ huge investments in rail and bus systems by creating higher residential densities and thereby increasing use of public transport. It can also promote creation of attractive walkable communities with quality urban spaces which would enhance the liveability of cities (Bernick and Cervero, 1996; Katz, 1994).
The promotion of TOD may also be justified from a social perspective. TOD provides opportunities for housing diversity with the provision of a wide range of choice for affordable housing (Dittmar and Ohland, 2004; Calthorpe and Fulton, 2001). There is an emerging niche market for transit village living among certain demographic groups such as university students, young professionals and empty nesters. With structural changes to the economy in recent years and a significant growth of service sector jobs, TODs could prove to be good locations for new service sector jobs as well as new incubator businesses (Kaufman and Morris, 1995; Gilbert and Ginn, 2001).

The TOD concept is not without its limitations and criticism. The first issue is the peoples’ preferences and perception in relation to housing and transport. A common preference for cars, low-density suburbs and single-family dwellings in a society such as ours, makes the TOD concept difficult to implement in a real world context. There are also concerns that increased densities in TOD could result in more conflict, noise, overcrowding and loss of privacy for residents. These concerns are often exaggerated due to a lingering perceived connection between high densities and overcrowding and high crime rates. There is also the community perception of residential areas along railway lines as being low-income suburbs.

Bernick and Cervero (1996) have pointed out that TOD and transit village concepts are criticised as leading to “boutique planning”—with much focus on the physical design without understanding social behaviour. They argue that a preoccupation with physical design could take away focus from the impacts of physical form on social processes such as community engagement.

The object of designing neighbourhoods and communities should be to create liveable places with a sense of identity rather than to merely influence travel behaviour. There is a range of measures that could be taken to effect a reduction in traffic congestion and its harmful effects, such as, fuel-efficient cars, car parking restrictions and toll charges to list a few. While TOD
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may be seen as only one of the many tools to manage urban congestion, it should also fulfil the objectives of good neighbourhood design.

It may also be pointed out that there is higher risk involved for developers in implementing new types of developments such as those associated with ideas of TOD due to difficulty in assessing the market demand for these types of developments (Gilbert and Ginn, 2001). This could lead to hesitation on the part of the developers to invest in building TODs.

Transit Oriented Development in South East Queensland

South East Queensland (SEQ) is one of the fastest growing regions in Australia. Being an attractive destination for interstate migration (and international migration in recent years), the region has to cope with increasing pressure of population growth on land and infrastructure. This has resulted in urban sprawl and traffic gridlock which has begun to adversely affect the quality of life in the region. The Queensland Government has produced a number of documents outlining its plan for managing growth of the region as well as to address transport related issues (Queensland Government, 1998; Queensland Transport, 1997; Translink, 2005; OUM, 2004; OUM, 2005a; OUM, 2005b).

The Queensland Government recently released a statutory planning document South East Queensland Regional Plan 2005-2026 to manage the rapid growth of its south east region. The plan will limit ad hoc ‘greenfield’ development at the urban fringe by identifying an urban footprint and setting dwelling targets (for ‘greenfield’ and infill development) for each local government area. A more compact form of development will be promoted by increasing net residential density of major new urban development and by focusing higher density residential development within and around regional activity centres and public transport nodes and corridors (OUM, 2005a). As a part of managing growth in SEQ, the newly released regional plan has
proposed the promotion of TOD. The regional plan proposes to increase residential densities around both existing and proposed public transit nodes. It also argues for development of two types of TOD – larger regional activity centres and smaller local transit oriented communities.

The selection of TOD sites need to be made based on consideration of local demography, stakeholder interests, context analysis and site characteristics (Bajracharya and Khan, 2005). The SEQ regional plan suggests that local councils will be actively involved in identifying potential TOD sites. The regional plan proposes that the specific scale, intensity and land use mix of each TOD will be determined through ‘local growth management strategies’ and detailed structure planning processes. Local growth management strategies will seek to identify opportunities for infill and redevelopment; review land and infrastructure availability; accommodate targets for dwelling types, jobs etc.; and propose planning scheme amendments to ensure effective local growth management.

Transit Oriented Development Issues in SEQ

While there is considerable merit in the TOD concept in terms of supporting public transport and creating liveable communities, there remain concerns within society about conflicts that the implementation of TODs may create. Some major issues relating to the TOD concept are outlined below.

Community Perceptions

In the context of SEQ region, people generally associate increasing densities with issues related to overcrowding such as a compromise on privacy and life-styles. Promotion of higher density development is often seen as contrary to people’s preference for a detached house with a garden. A few years ago, attempts by Brisbane City council to engage the community in Holland Park to develop higher density developments around the bus way station in the area met with considerable community
opposition. Phil Charles (2005) rightly points out that one of the barriers to TOD implementation is the NIMBY forces that impede multifamily housing and infill development. Other reason for this negative perception about high density housing within the community is the existence of badly designed walk up apartments built in 1960s, with flat roofs and minimal consideration of the local climate (often referred to as ‘six packs’ in Brisbane Figure 1, page 37).

The virtues of higher urban densities are still a matter of debate among planners, developers and communities in SEQ. The prevalence of negative community perceptions about higher density development and its potential to translate into similar perception of TOD may be seen as investment risk by developers.

**Conflict with Character Housing**

The regional plan has identified inner city locations such as South Bank, Bowen Hills and Albion as potential TOD sites. However, many of these suburbs contain ‘character’ housing including old ‘Queenslander’ type structures. In addition to ‘Queenslanders’ featuring large verandas covered by curved corrugated iron sheeting, more recent adaptations of the Queenslander style reflecting old character housing are also found in these suburbs (Figure 2, page 37). These old residential structures built before 1946 are protected by the city plan (strategic plan) of Brisbane. Localities that feature these structures are declared as ‘Demolition Control Precincts’ to maintain the historic character of the area. The introduction of TOD into such areas with the objective of increasing residential densities creates the potential of conflict between new development and the character housing.

**Technical Issues—Land Assembly**

In realising TODs, the assemblage of sufficiently large parcels is likely to figure as a major issue in cases of infill development or ‘brownfield’ TODs, particularly in the inner suburbs of Brisbane. The existing land ownership in established suburbs
Figure 1. “Six-Packs” can negatively affect community perception of higher density developments in Brisbane. *Source:* Bhishna Bajracharya

Figure 2. Potential conflict between old character housing and new higher density development in inner suburbs. *Source:* Bhishna Bajracharya
may be too fragmented to allow assemblage of sufficiently large land parcels. Special provisions may be need to allow the assemblage of land parcels for creating a viable and appropriate scale TOD development. The concepts and techniques of land pooling or land banking may be required to facilitate the consolidation of small land holdings under different ownership into larger tracts of land suitable for TOD development.

**Creation of Employment Centres**

Most TODs will require employment centres and associated infrastructure to be extended into ‘greenfield’ sites. The feasibility of creating such new employment centres has to be carefully worked out against the overall economic potential of the region and population projections. A mismatch could easily result in an oversupply or undersupply of commercially serviced land. There also needs to be a consideration of the kind of employment generated at each TOD location so that it can match with the type of work demanded by the current or future local population.

**An Integrated Conceptual Framework for Implementation**

In view of the issues raised above, it is clear that the government and its regional plan should promote the concept of TOD in SEQ in a systematic way. First and foremost, issues relating to community perceptions need to be acknowledged and tackled seriously. In addition to dealing with community perceptions, TOD also needs to be promoted in holistic terms within a tight conceptual framework so as to ensure that its implementation results in the degree of integration between various aspects of development essential to the successful implementation of the TOD concept.

The TOD concept is deeply rooted in the broader concept of sustainability and sustainable development. Planning and urban design principles for TODs must, therefore, strive to promote social, environmental and economic sustainability. However,
attention to physical design aspects, on its own, will not suffice to effect the realisation of the sustainability objectives of TOD. Indeed, TOD is being relied upon as a means or mechanism for effective regional planning and growth management in SEQ. This paper argues, therefore, that principles of sustainability in physical planning and urban design of TODs require to be integrated into a regional planning approach that focuses on the regional context, the spatial structure and governance mechanisms.

An integrated framework for TOD implementation is proposed to ensure a strong focus on planning and urban design principles, as well as regional context and governance issues. The adoption of such a framework would ensure the creation of sustainable TODs that would be responsive to the larger regional context and spatial structure (Figure 3, page 40).

The Regional Context and Spatial Structure

To ensure a compact and transit supportive pattern of growth at the regional level, each individual TOD site needs to be selected and designed so as to fit into the regional and metropolitan contexts.

Regional Considerations

In the case of SEQ, the Regional Plan has identified an urban footprint for the region which will determine the designated boundaries for the region’s growth over the next twenty years. The plan proposes to create more compact cities, encourage infill development in the metropolitan areas (e.g., Brisbane City Council) and establish a new growth corridor in the western region (e.g., Ipswich area). This broad regional planning context will influence the nature of TODs and their location.

The majority of proposed TODs in metropolitan areas, such as Brisbane, will have to address issues of land consolidation and redevelopment in existing built up areas. TODs in new growth corridors, however, are less likely to encounter problems of land constraints as they are located in areas with limited development or greenfield sites. For example, one of the inner
urban TOD sites identified in Brisbane is Albion where it is proposed to convert the old industrial land around the railway station into high density housing. Land assemblage on an
appropriate scale is likely to figure as a major issue in this case. On the other hand, a proposed TOD in the new master planned community of Springfield in Ipswich city council will be developed as a Greenfield TOD with extension of a new railway line to the development. Here land assemblage problems will be less difficult.

**Land Use and Transport Integration**

In the implementation of the TOD concept, transport nodes represent potential sites for the siting and development of various land uses. The nature of the transport node and its surroundings also determine the type and scale of TOD that is feasible at the location. It is crucial, therefore, to analyse the existing and proposed regional transportation corridors, networks and hubs. Similarly, regional planning considerations such as growth boundaries and catchment ranges for various urban services and facilities, should also guide the identification of future transportation corridors and types of nodes.

**Scale of TODs**

Calthorpe (1993) refers to two types of TOD—‘Urban TOD’ and ‘Neighbourhood TOD’—according to the type of function they are required to perform. Whereas the former would entail the creation of employment centres that could serve as relatively self-contained sub-regional centres, the latter could have predominantly residential function. Likewise, the larger ‘Urban’ TODs would help shape the overall urban form and the metropolitan spatial structure but the smaller scale neighbourhood TODs could play an important role in strengthening the integration of land use and transport within existing built up areas.

Along similar lines, the South East Queensland Regional Plan has proposed ‘activity centres’ and ‘transit oriented communities’ as two types of TODs for the region. Higher density mixed developments with densities of 30 to 120 dwellings per hectare are proposed around all regional ‘activity centres’ and in close proximity to high capacity public transport nodes. Meanwhile, ‘transit oriented communities’ with densities ranging
between 30 to 80 dwellings per hectare are proposed in appropriate lower order centres and neighbourhoods.

**Infrastructure Planning**

As part of TOD development, it is important that there is a proper analysis on current infrastructure capacity to accommodate the increased population density around TOD sites. There is also need for coordination between different infrastructure providers from the state, local governments and the private sector to ensure timely and cost effective provision of infrastructure such as water, sewerage, and transport for TOD sites.

At some ‘greenfield’ locations on the outskirts of the cities, the current demographic, financial and infrastructure constraints may not favour TOD development from the outset. Prospects of developing such locations first as ‘park and ride’ facilities to later develop into TOD should be considered. This will allow the earmarking of potential locations for the staged implementation of TODs over a time schedule. In turn, it will facilitate the planned and timely provision and extension of infrastructure into the area.

**Governance**

**Institutional Framework**

There is a need for clear and well-defined institutional framework to facilitate the implementation of transit oriented development in SEQ. The Office of Urban Management (OUM) has accordingly been entrusted to provide guidelines to local councils for the preparation of local growth management strategies (LGMS) as well as TOD guidelines. A task force has also been set up by the Queensland Government to provide advice to the Office of Urban Management (OUM) for implementing transit oriented development in SEQ.

This task force needs to coordinate activities of the various government agencies and be sufficiently representative of a wide range of stakeholders in the development of TOD. Currently, it draws membership from representatives of state and
local government departments, academia and the development industry. This high level committee will undoubtedly be instrumental in providing strategic advice on TOD at the regional level.

There will, however, be a need to further establish sub-regional TOD implementation groups at the local level to facilitate the task force. These sub-regional groups would play a vital role in coordinating and integrating the various aspects of TOD projects at the local level. These groups should comprise representatives from the local communities, local business groups, developers, community organisations and the local councils. To ensure effective implementation of TODs there should also be adequate commitment of resources by the State government to build capacities at local level.

**Land Assembly**

There is need for proper institutional framework and mechanisms to identify and assess appropriate sites for TOD. The ability to assemble sufficiently large parcels of land is likely to figure as a major issue in identifying potential sites in the case of infill development or ‘brownfield’ TODs, particularly in the inner suburbs of Brisbane. With the exception of large institutional landholders, the existing land ownership in established suburbs may be too fragmented to allow assemblage of sufficiently large parcels. While the extent of the TOD Taskforce’s role in land assembly is unknown at this stage, the need for the Taskforce or some similar entity to play a role in land assembly for creating viable TOD projects is obvious.

The main task for a specialised organisation within such an institutional framework, be it the Taskforce or some other set-up, should be to facilitate the negotiation and execution of land assembly projects. It would also need to investigate possible impacts of TOD development on the local and regional property markets. In addition to land assembly, it should provide guidance in developing strategies to create attractive liveable places for the local community. For this purpose, the organisation could be empowered to facilitate land development and
decide the type and timing of infrastructure provision. It should also explore the possibility of public/private partnership in land assembly projects so that costs and benefits of development can be shared with the development industry and the community.

**Community Engagement**

Community engagement is an integral part of the framework for implementing the principles of TOD in the context of the real world. The establishment of a formalised forum for state/local government cooperation and dialogue can facilitate community involvement. Such community forums are all the more important on account of the negative perception towards high density development prevalent within the residents of the region. They could provide a wider consultation/education campaign to sell the merits of TOD to the communities which are likely to be affected by this type of development. They could not only lead to a shared vision of TOD ideals to address problems of perceptions related to high density development, but could also allow local communities to participate in vision setting. This would produce individual TOD designs that are better adapted to local situation and creating a place that the community can own and relate to.

An awareness campaign comprising community visioning exercises with supporting media coverage could, ideally, culminate with demonstration projects to convince the community, as well as potential developers, about the merits and feasibility of TOD. Such forums could also help identify and specify community facilities/services to be included in community incentive packages to promote TOD in the local area. These community engagement mechanisms need to be formalised and their existence continued even after the TODs are completed and inhabited for monitoring purposes.

**Sustainability**

The framework is guided by an integrated and holistic approach to sustainability with consideration given to social, economic and environmental sustainability in the physical planning and urban design of TODs.
Social Sustainability

Housing Diversity:
The TOD concept could be used to promote access and equity. Developments should be designed to feature a mix of densities, housing types and price ranges. By providing a variety of housing types, working environments and their mixes, it could not only cater to needs and lifestyles of the different groups within the community but also ensure housing affordability. TODs could, therefore, contain development such as shop-top housing, apartments of various heights, town houses as well as single detached housing as part of a unified development.

Public Realm:
At the heart of the TOD concept are activity centres built around a transit station which serve as points of focus for the neighbourhood or ‘urban village’. In addition to commercial activity such as offices and retail, these activity centres should contain accessible public spaces and community facilities to serve as a focal point for the community function. Activity centres should encourage civic activity and social interaction not only in the day time, but also extending it into late evenings.

Walkability:
The design of TOD, therefore, whether in ‘greenfield’ or built up locations, should exploit every opportunity to pursue the ideals of creating a sense of community by striving to create safe and walkable communities. The design should focus on creating pedestrian friendly streets and public spaces networks, accessible community facilities and public transport nodes. The design should also incorporate the principles of Crime Prevention through Environmental Design (CPTED) such as promoting casual street surveillance and avoiding the creation of blind spots and entrapment locations.

Public Transport:
One of the key objectives of TODs should be to increase public transport patronage in the area. For this, TOD locations should be developed as major public transport nodes along key transport corridors linking activity centers with residential areas.
TODs also need to be easily accessible to the community, whether they are walking, cycling or using cars. Barrier free, level approach to transport nodes by pedestrians, conveniently located and safe bicycle storage facilities and ample provision for ‘kiss-and-ride’ and/or ‘park-and-ride’ facilities for cars should be incorporated into the design of the public transport nodes wherever possible.

**Place Identity:**
Each of the TODs should be designed to have a distinctive character reflecting the local context to promote a strong sense of place identity for the resident community. The Urban Design Alliance of Queensland (UDAL) has put forward a number of ideas which are relevant for developing TODs in SEQ (UDAL, 2003). The alliance (UDAL) argues that good urban places must be connected, accessible, meaningful, legible and humane. It also suggests that cities and towns must be sustainable, liveable, viable, responsible and memorable. Many of these ideas can be integrated in the TOD designs to create strong place identities. In essence, the TOD concept seeks to create connected and accessible spaces with its focus on public transport and walkability.

Urban design principles developed along the lines of the above ideas need to be adapted to exploit the local climate of the region. These urban design principles can be applied to a variety of TOD types based on their scale and location (such as ‘greenfield’ or ‘brownfield’; ‘activity centres’ or ‘transit oriented communities’). This will allow for the development of a range of design concepts for different types of TODs. Adaptation to particular local conditions of individual TOD sites would yield a variety of design outcomes that could reinforce local identity of the place.

**Environmental Sustainability**

**Protection of natural habitat:**
The design of TODs, particularly in ‘greenfield’ sites should be seen as an opportunity to ensure the protection of natural environment. In addition to putting in place effective measures to
look after the preservation of sensitive habitat, riparian buffer zones and high quality open space, the design should seek to capitalise on the positive aspects of the natural surroundings. Healthy lifestyles could be promoted by integrating park and open spaces systems with walking trails. The natural resources including bushland and natural landforms should be inventoried and managed in the same manner as built assets. They could be capitalised on to enhance the land values of residential properties and offices as well as promote local tourism and recreation industry.

**Subtropical Design:**
TODs in SEQ should take advantage of the sub-tropical climate by incorporating more open spaces into the architecture of the built environment. Opportunities for creating open air commercial activity such as sidewalk cafes, weekend markets, kiosks and recreational open spaces should be explored. At the same time, the appropriate shading devices are essential in the local climate to protect from the strong summer sun.

**Energy efficiency:**
Effective planning and design standards established for at lowering energy consumption and reducing greenhouse emissions need to be put in place to regulate the anticipated development. Councils could identify regulatory mechanisms and design solutions in consultation with building industry representatives to ensure their acceptance and compliance to effect energy efficient and environmentally friendly development. Passive solar design principles could be applied at the early stage of subdivision for site planning and orientation of lots to take advantage of the local climatic conditions. Examples of development control mechanisms from other states and overseas should be studied for possible adoption in light of the region’s particular environmental conditions. Progressive regulatory mechanisms such as the ‘BASIX’ (web-based tool) employed in New South Wales should be examined. This would ensure energy efficient residential design that could significantly reduce energy consumption required for heating and cooling houses and the release of greenhouse gases.
**Water sensitive urban design:**
Water conservation measures could also be built into the site development and building approval stages to ensure the consideration of water recycling and rain water storage as well as selection of vegetation requiring less water for its growth. With the current water shortage and a rising awareness of the need to conserve the water resource, this aspect of development control cannot be overemphasized. As suggested above, the involvement of building industry representatives by local councils in the search for feasible controls and design solution would be crucial to ensure compliance.

**Economic Sustainability**

**Local Economic Development:**
TODs should be developed as hubs of local economic activity. Their ability to stimulate economic growth and creating local jobs in the area should be exploited, where possible, by including a mix of land uses at a sufficiently large scale. TODs should play the role of employment generators both locally and within the region. Local employment could be promoted by locating shops, cafes, offices and markets around transit stations, adding vitality to the area. For ‘urban’ TOD the economic function is paramount as it is aimed to serve as an employment centre. These could entail the creation of business parks or ‘clean industry’ parks or other major employment sources. Some TODs may also be designed to serve as regional or sub-regional centres. Whereas these may attract commuters into the area using the mass transit system, the main focus should be to create local employment. A supporting retail function in relation to the scale and function of the TOD also needs to be incorporated in the design.

**Financial Viability for Developers:**
Property Council of Australia has identified some of the barriers to TODs as fragmented land ownership, high construction costs, lack of market demand and lack of government leadership (James, 2005). Ultimately, the success of TOD will depend on market acceptance in terms of tenancies, rental returns and
capital growth of residential, commercial and office developments at transit nodes. To achieve the goals of TODs, the state governments may need to consider incentives to developers to make it more viable. Some examples of incentives could be facilitation of land assembly, streamlined development approval, and density bonuses to promote TODs (Bajracharya, Khan and Longland, 2005).

**Overlaps between Social, Economic and Environmental Sustainability**

**Liveability, Community Vitality and Resource Productivity**

In pursuing the three aspects of sustainability, the overlap between their respective planning objectives signify areas where the true potential of TOD design may be realised. These are *liveability* as intersection between social and environmental goals, *community vitality* as overlap between social and economic goals and *resource productivity* as intersection between economic and environmental goals of sustainability (see Figure 3, page 40).

**Liveability:**
A sub-tropical climate such as that found in SEQ can further facilitate the achievement of overlapping planning objectives of liveability by allowing substantial interaction between indoors and the outdoor environment. On the level of individual building and open space design, for example, sub-tropical architecture could help integrate the natural environment of the outdoors through architectural design elements such as balconies, terraces and verandas. Similarly at the level of neighbourhood design, the sub-tropical climate would allow multiple uses of open and semi-covered public places by using design elements such as colonnades and arcades. The adoption of TOD in the regional plan for SEQ, therefore, represents an opportunity to promote sustainable lifestyles while managing regional growth.

The pursuit of social sustainability could focus on creating safe walkable neighbourhoods that encourage community
interaction. Aiming for environmental sustainability would help to integrate the settlement into its surrounding natural environment and foster a healthy lifestyle. The combination of the two sets of planning objectives should lead to liveable communities that foster community spirit as well as healthy living.

**Community Vitality:**
Similarly, the overlap between planning objectives for social and economic aspects of sustainability can lead to the realisation of community vitality. The facilitation of local economic development opportunities requires the provision of a good mix of retail space, offices and residential options in the activity centres around transit nodes. Combining planning objectives for social sustainability would require that activity centres also accommodate social or community functions. An interaction between the commercial and social function will not only enhance opportunities for retail activity and local employment, it could also serve a social function by encouraging partnerships between residents and local businesses yielding community cultural development initiatives.

**Resource Productivity:**
Lastly, the overlapping concerns for environmental and economic aspects of sustainability would require TOD design to realise resource productivity for the community. Pursuit of environmental sustainability requires TOD design to focus on environmental protection measures. Combining economic objectives with environmental planning objectives would lead to ways of capitalising on the surrounding environmental resources. The implementation and management of TODs in ‘greenfield’ locations could provide us opportunities to try out integrated approaches to biodiversity management linked to generation of economic benefits through initiatives such as eco-tourism. Likewise, TODs in infill and redevelopment sites in inner suburbs could convert under-utilised ‘brownfield’ industrial sites into places with more productive cleaner industries and integrated mixed use housing developments,
generating new employment opportunities and healthy communities.

In short, a properly designed TOD could create a place that is liveable, that is inhabited by an economically sound and vibrant community and set in an environment where surrounding natural resources are valued and wisely exploited.

**Conclusion**

This paper has reviewed the strengths and weaknesses of the TOD concept, with reference to SEQ. It has identified key issues relating to implementing TOD development such as negative perceptions in the community towards high density development, difficulties of land assembly and developer risk, lack of well defined employment centres in the suburbs and lack of coordination between various government agencies. The paper has outlined a strategy for implementation of TOD that could address these issues effectively. This requires changing community perception through wider community visioning workshops, integrating community needs in TOD development and building demonstration projects that have the ingredients for success.

The paper has also developed an integrated conceptual framework for TOD development, taking into consideration the regional context, existing spatial structure and a governance system for the implementation of TOD. It is important to be aware of the regional context, including spatial structure, while dealing with a range of issues such as those relating to the need for diversity within TODs and related infrastructure planning.

TODs in SEQ need to be adaptable to local context, to taking advantage of the subtropical climate in the planning and design of buildings and public spaces. Similarly, there needs to be flexibility in setting TOD density targets. It is likely that the Regional Plan’s density targets may need to be lowered to gain community support. There may be ‘greenfield’ sites with sufficient potential to develop ‘park and ride’ facilities that could serve as rudimentary TODs. A flexible approach would allow their development into full-fledged TODs at a later stage.
The real strength of the TOD concept is its potential to provide less car-dependent and more sustainable lifestyles by focusing on transit nodes and connected activity areas rather than the private car. As the paper illustrates, by applying a framework guided by social, economic and environmental sustainability, TOD designs can integrate sound planning and urban design principles and potentially achieve the goals of liveability, community vitality and resource productivity.

**Note.** An earlier version of paper was presented at the *QUT Research Week Conference* held at the Faculty of Built Environment and Engineering, Queensland University of Technology in July 2005.

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