# Vertical mixed use communities in Australia: a compact city model?

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## ABSTRACT

Cities have advocated more compact development patterns to address the need to accommodate a burgeoning urban population. One such compact model is the vertical mixed use (VMU) development. However, its development and implementation are generally perceived to be complicated in terms of unfavourable regulatory and development controls, higher construction cost, staging as well as funding complexities.

We examine the growth patterns and development trends of vertical mixed use developments in Australia with a focus on Brisbane, looking for evidence that the vertical mixed-use model can help realise sustainable futures for Australian cities.

We also reviewed existing urban policies, codes and regulations. Here, our results indicate a slow but growing trend towards the development of VMUs within Brisbane CBD as a result of statutory policies which encourage the integration of mixed use zones within activity centres. Using Hoppenbrouwer and Louw's (2005) framework we identified and profiled thirteen VMUs. Our results strongly suggest the rampant presence of single function vertical structures (86% of 418) within Brisbane CBD. Only 1.7% of the vertical structures identified accommodated three and 11.9% two uses. Based on these findings, we develop policy recommendations to facilitate the implementation of the VMU model in the Australian context.

## 1. INTRODUCTION (includes problem statement, objectives, paper's structure)

City centre regeneration is seen as an important urban development strategy to address the twin challenge of a burgeoning population and urban sprawl. Further fuelled by baby boomers entering the empty-nest stage and opting to downsize and settle in more convenient urban locations, governments, at various policy scales, are now pursuing the development of more compact and integrated settlements within its major urban centres (Department of Infrastructure and Planning, 2009; Brisbane City Council, 2011). The aim is to re-invigorate these urban centres through initiatives that would bolster economic development while also tempered by the need to address society's social and environmental objectives. These developments generally employ a mixed use development concept, which, according to Freestone (2008), has become a vital urban revitalisation tool. In addition, Niemira (2007) declared that the mixed use concept, while gaining greater significance as an important public sector strategy to regenerate urban environments (Kelly, 2001; and Harbatkin, 2005), also has growing appeal to respond to the needs of a more diversified demographic, and presumably, to support their sustainable development targets and outcomes. While traditionally, mixed-use developments have been typically horizontal because of ease in development and, regulatory and development controls seem to favour this (Rowley, 1996), nevertheless, mixed use developments that take on a vertical dimension, or vertical mixed use (VMU) developments, is also gaining popularity as a feasible compact development model (Hoppenbrouwer and Louw, 2006). This is especially true when considered within the context of an increasing lack of urban lands to develop, the need to diversify risk, the high cost of available sites and the premium value associated with CBD lands (Aygoren, 2004). However, the development of vertical mixed-use structures is perceived to be more complicated in terms of higher construction cost, staging and phasing and funding complexities (Rabianski, et al., 2009a), among others. VMU developments have also met uneven success. While some VMU developments seemed to work well, for example, the Honeysuckle Development in Newcastle and the showcase Subi-Centro project in Perth, other examples were seen to be more problematic, especially in many of the newer blocks in master-planned brownfield and infill older centre sites. These areas have high vacancy rates for the non-residential floorspaces with numerous for lease/sale signs (Freestone, 2008). To date, there is renewed interest in VMUs as potential urban development alternative but there has been, ironically, limited examination on its feasibility and viability.

The paper is exploratory in nature. We examine the vertical mixed use developments within a specific locality in Australia, seeking evidence that the vertical mixed-use model can help realise sustainable futures for Australian cities. The purpose of this paper is to undertake an evaluation of MUDs, and VMUDs in particular, within Brisbane by profiling and auditing a number of MUDs utilising an evaluation framework as well as a review of local codes and regulations.

This paper is structured in the following manner: Chapter 2 attempts to develop the concept of vertical mixed use developments and the evaluation framework; Chapter 3 discusses the methodological design of the study; Chapter 4 discusses major findings of the study; and Chapter 5 concludes and recommends some way forward.

## 2. A FRAMEWORK FOR VERTICAL MIXED USE DEVELOPMENT

The concept of developing communities with a mix of uses is not new. Mixed use development is said to date back to the Greek agora and medieval market squares, at a time when the major mode of transport was by walking, and where people had to "live, work, and play" within the same locality. In addition, it has been ascribed as a key tenet in planning paradigms, including compact cities, smart growth, new urbanism and transit-oriented developments (TODs). The mixed use concept has been experiencing a renaissance of sorts from the middle of the twentieth century as Jane Jacobs (1961), under the premise of creating more liveable and diverse city spaces, called upon the need to develop districts that have sufficiently dense concentration of people, accommodate a variety of age and condition of buildings, short blocks with frequent intersections and corners, and districts which accommodate more than two functions, thus, a mix of uses. Encouraging a mix of land uses seemed like a plausible and practical strategy to densify city centres (Bell, 2004). To date, while various projects are claimed to espouse the concept of mix land uses but there has been no consensus on how a mixed use development is defined nor what it comprises.

The introduction of mixed use developments may take on a vertical rather than horizontal dimension. Within the context of achieving more compact city centres, however, vertical mix use developments seem to be the preferred option, especially given the shortage of developable urban land, the high cost associated with CBD land and property and the need to accommodate commercial and residential development by intensifying existing developments (McLaughlin, 2005). While it is claimed to be an effective strategy to achieve a more integrated and sustainable urban form, such approach is considered to be complex and therefore difficult to implement. Its viability and feasibility is also highly dependent on various perceived and actual barriers and challenges (Rabianski et al., 2009a). This section, therefore, attempts to explore the multiple definitions of VMUs and develops an evaluation framework based on a set of criteria which characterise VMUs. This framework is utilised to assess various vertical structures within an identified case locality within Australia.

### 2.1. What are mixed use and vertical mixed use developments?

Because of varying and, sometimes, competing definitions of mixed use and vertical mixed use developments, various authors and researchers described them based on their specific attributes.

- Rowley's (1996) conceptual model of mixed use developments essentially shows that it is a combination of urban texture (how fine the grain, density, and permeability), setting or scale (building, block, street, district), and location (town center, urban, suburban, greenfield) that includes a time dimension. Because different uses occupy various parts of the mixed-use development, people come and go on varying time schedules.

- In addition, Rowley (1996) discussed the mixed use concept based on its horizontal dimension (e.g. the mix of uses between buildings). This concept was then adopted but also expanded by Hoppenbrouwer and Louw (2005) in generating their typology of mixed uses. The aim of the typology was to assist researchers in examining mixed-use developments in a more systematic way. Hoppenbrouwer and Louw's typology (2005) is organized by function (land use), dimension, scale, and urban texture.

- Hoppenbrouwer and Louw's (2005) four dimension-based typologies include: point (e.g. a single space utilized as a shared premises with two functions; a particular facility may also be shared by a variety of activities and users on a regular basis), vertical (e.g multiple uses in one structure), horizontal (multiple uses on the ground), and time (e.g. sequential use, different uses of a space throughout the course of the day and week).

- Aygoren (2004) suggests that as long as there are two main uses, it can already be classified as mixed use. This definition is also followed by the Adelaide City Council (n.d.) which

defines vertical mixed use developments as developments which comprise a mixture of [at least] two or more land uses comprised within a single vertical building.

- However, according to Urban Land Institute (ULI), a development can be considered as mixed use development when it only integrates three or more significant revenue-producing uses (Witherspoon, Abbett, and Gladtone, 1976; Bell 2004; Grant 2002; Rabianski et al 2009a).

- On the other hand, the Draft Brisbane City Plan emphasizes residential use when defining mixed use developments (BCC, 2012). It defines mixed use developments refer as referring to uses of premises that integrates residential activities with commercial, retail or industry activities where a minimum of 30% of the total gross floor area is used for residential purposes.

- Mixed use concept, according to ULI (1987), extends beyond 'use' and into the realm of planning, design and lifestyle. According to Rabianski et al (2009), developers consider developments as mix use if they are planned, includes three or more compatible uses, pedestrian scale and public transport-orientated design, and developed with a clear image of a sense-of-place.

- Furthermore, mixed use development can be described based on the degree of mixing (texture) or grain, density, and interweaving of functions. Results of a survey on various developers, defined mixed use development as that which accommodates a combination of retail, office, residential, hotel, recreation or other functions in an integrated and planned development (Niemera 2007; Witherspoon, Abbett, and Gladstone, 1976). On the other hand, mixed use developments can be described as when at least one floor is allocated for a non-residential use, say retail or commercial, while another floor accommodates residential use (Anonymous 2009). Nevertheless, there is a general agreement among these authors that the physical components of mixed use developments must be coherently planned, and functionally and physically integrated (Witherspoon, Abbett, and Gladtone, 1976; Bell, 2004; Rabianski 2009a; Sussna, 1991).

- The scale of mixed use developments can either be at the building, block, district, or city level. For example, Jacobs (1961) discusses mixed use at a neighbourhood scale, Grant (2002) and Anders (2004) state that mixed use is typically assessed at a local scale, whereas Coupland (1997) regards that a building complex can be mixed use. While some experts categorised mixed-use according to scale (e.g. single unified development on a specific site, single building, neighborhood or district), the discussion on the scale of VMUs limits it to the scale of a single building. Urban Land Institute (ULI) classifies VMUs according to mixed-use towers and integrated multi-tower structures (Bell 2004).

- O'mara (2007) describes a vertical market as a specialty niche application or specific customer segment. These include but are not limited to: education, healthcare, government, utilities, hospitality, resorts and gaming, public/cultural, financial, retail, corporate offices and mixed-use developments.

- According to Rabianski et al. (2009), buildings which typically house a retail space on the ground floor of an office building or flats located above shops, or an area that has organically evolved into a neighborhood containing a variety of land uses cannot be considered as mixed use (Goodchild, 1998). They are considered as multi-use (ULI, 1987).

- For the purposes of this paper, the following definitions will be used. Horizontal mixed use developments are those with two or more revenue producing uses or land use activities in a physically and functionally integrated horizontal precinct. Vertical mixed use developments

are those with two or more revenue producing uses or land use activities in a single vertical building or development.

### 2.2. Why are VMUs important?

- According to Rabianski et al. (2009), VMUs support the need for a strong local economy. However, they suggested that there is a need for market analysis to determine demand and supply for each use, and should also examine trends and forecasts to capture the influence of changing economic, demographic and psychographic factors of demand.

- According to Aygoren (2004), VMUs can assist to diversify risk, support the lack of urban lands to develop, an alternative development model to address high cost of available sites, and for suburbs, to bring vitality to places where otherwise, activity has been drawn out.

- According to Piell (2009), VMUs encourage the efficient use of land. Diversification of uses in mixed-use facilities aids greatly in efficiency. This facet of mixed-use buildings is seen as an opportunity for many developers and owners. Sustainable and green efforts are especially appealing to owners because improved energy efficiency can save on costs and draw renters.

- drivers of mixed use developments include: automobile traffic congestion and commuting costs, reduced presence of polluting industrial employers in urban areas, changing consumer demographics, and a longing for community and a sense of place'.

- According to Northedge (2005), "mixed-use development provides a more resilient income stream." "Retail could be let on a different cycle from the offices." he adds, "When you get it right, there is stronger correlation between all elements and it does work better," says Perry. "If you can create a wonderful atmosphere, you will get better performance - and that means higher value."

- According to Mclaughlin (2005), the fundamentals of sustainable high-rise design must be founded around the concept of building for change, durability and energy efficiency. They have to be of good design, integrate into the city masterplan and add positively to the skyline.

- Some of the reasons being put forward are as follows: to diversify risk, lack of urban lands to develop, high cost of available sites, just one set of site issues in terms of infrastructure, utilities, zoning (Aygoren 2004).

- It maximizes space usage, provides amenities and architectural expression, and mitigates traffic and sprawl (Niemira, 2007).

- Cahill (2005) - Vertical mixed use developments provide huge environmental benefits. For example, offices produce a lot of heat and that can be used to create energy for the residential element or the hotel.

### 2.3. Evaluation framework for VMUs

- While it is possible to consider a complex set of attributes to be used to evaluate VMUs, the authors have decided to adopt the expanded model of Hoppenbrouwer and Louw (2005), which can provide an easier initial analysis.
- From a spatial perspective, the most common considerations when discussing VMUs are: (1) the number of land uses it accommodates, the scale (number of floors – high rise; medium rise or low rise vertical structures), type of land uses, spatial structure of land uses within building, internal grain, age of structure, among others. This will also evaluate the design – building design, active frontage, green building rating, diversity of residential units,

- Hoppenbrouwer and Louw (2005) suggests four dimensions of mixed use developments. These are illustrated in Figure .

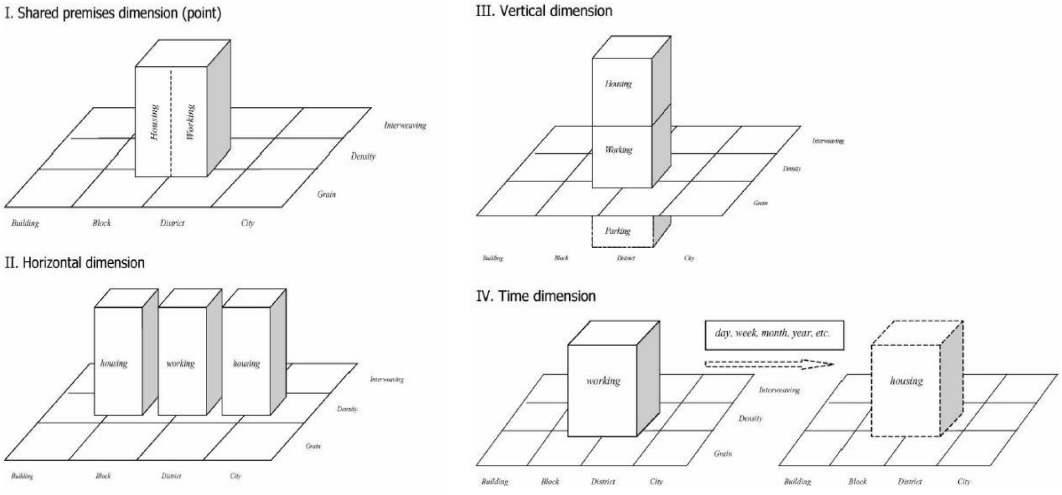


Figure 1. Evaluation framework

## 3. DATA AND METHODOLOGY

At the policy level, Southeast Queensland is geared towards developing more compact centres in order to develop its land more efficiently and to cater for the anticipated population growth. This means that its identified activity centres, including Brisbane CBD, should be further densified. One strategy that is being promoted to assist in constructing a more compact centre is to employ vertical mixed use developments. Understanding the trends and patterns of VMUs provides useful information of how these types of developments can further be advanced. The investigation of vertical structures, including VMUs, was undertaken within Brisbane CBD. The aim was to gather information on the distribution of single use versus mixed use developments within Brisbane's CBD. Based on a set criteria, an evaluation framework was developed. This tool was use to systematically assess, profile and audit vertical structures, including VMUs. Primary and secondary data were collected as inputs to the evaluation framework.

### 3.1. Case Study: Brisbane CBD

Brisbane Central Business District (CBD) is an appropriate case example for this study. The CBD is considered as the premiere regional centre activity centre for the Southeast Queensland region (SEQ). It houses the most diverse land uses as well as accommodates the largest concentration of activities. Activities include statewide functions as well as the premiere retail and commercial hub, and also provide specialised personal and professional service. In addition, the CBD is considered as the highest trip attractor and generator in SEQ while also serving as the point of origin for its radial public transport system Its primacy is further emphasized as it also serves as a cultural and entertainment core, and provides health and education facilities of state, national and international significance (SEQRP 2009). Bounded to the northeast by the Fortitude Valley suburb and to the west by Petrie Terrace, its southern boundary is restricted by the winding Brisbane River. Its urban form represents a concentration of medium to high-rise structures laid out in a typical grid fashion. This urban form is typical of Australian cities. It has a 2009 resident population of 12,800 individuals covering a land area of 0.7 sq.km. In 2008, it contained approximately 1.7 million square metres of office space. However, this has declined partly as a result of the global financial crisis that happened a year after.
Under the South East Queensland Regional Plan 2009-2031, SEQ, by 2031, is expected to add approximately 754,000 dwellings with 156,000 in Brisbane. This is to accommodate the expected rise in resident population within the region. There is no identified growth areas within Brisbane. Instead, infill redevelopment is expected to make up the bulk of residential provision by providing 138,000 additional dwellings in Brisbane (Department of Infrastructure and Planning 2009). The South East Queensland Regional Plan 2031 has set out a number of desired regional outcomes (DRO) wherein DRO 8.1 prescribes a compact urban structure of well-planned communities, supported by a network of accessible and convenient centres while DRO 8.8 encourages mixed use activity centres or the development of a range of land uses in a street scale format (Department of Infrastructure and Planning 2009). One attribute of a compact model is developing a mixed use development. In addition, Brisbane City Council is currently developing a new City Plan for Brisbane. The City Plan, once approved, is a statutory document that sets out a vision to guide the growth of Brisbane City. One important aspect of this is the integration of mixed-use zones. Mixed-use zones will focus in the inner city where there will be a greater focus on commercial, office, retail, administrative, and some residential developments (Brisbane City Council 2012). Brisbane City Council (2012) has defined mixed use development as a structure that integrates residential activities with retail, commercial, or light industry activities.


Figure 2. Brisbane, aerial perspective. Source: Predella (established local developer) http://www.canvassouthbrisbane.com.au/sites/all/themes/canvas/images/location_widget/brisbane-city-location-map.jpg, accessed 26 June2013, copyright.

Key
1. Marketed development
2. Roma Street Parklands
3. Suncorp Stadium
4. CBD
5. QUT
6. Southbank
7. Go Between Bridge
8. Kurilpa Bridge
9. William Jolly Bridge
10. West End Shopping & Restaurant Precinct
11. Gallery of Modern Art (GOMA)
12. State Library
13. QLD Museum
14. Performing Arts & Cultural Centre
15. Convention Centre
16. Treasury Casino
17. Victoria Bridge
18. Goodwill Bridge
19. Southbank Institute of Technology
20. The Gabba

## 4. AN EMPIRICAL ANALYSIS ON VERTICAL MIXED USE DEVELOPMENTS

This section discusses the results of the analysis and is comprised of two sections. Initially, it systematically analyses the developments within Brisbane CBD according to use. Then, it will evaluate mixed uses, barriers and facilitators of mixed use within the context of Brisbane CBD. Defining mixed use developments and vertical mixed used developments: current status

### 4.1. Categorizing mixed use developments according to use/function

A total of 415 vertical structures were identified to be present within Brisbane CBD. By classifying these developments according to the number of uses/functions, approximately 358 structures or 86.26% of all the structures were of single use, 50 structures or 12% of the total number of structures were of two uses and only 7 or 1.7% accommodated three or more functions (see Figure 3).

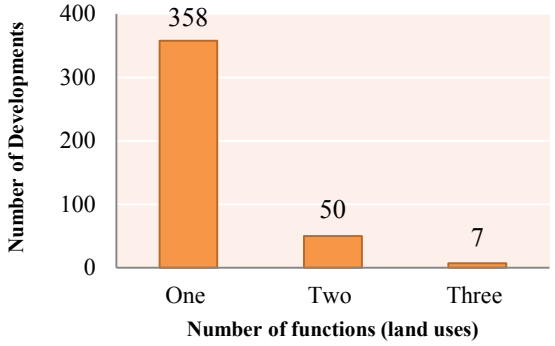


Figure 3. Vertical structures in Brisbane

While current state- and local- level policies are advocating for more compact development patterns (SEQRP, 2009; BCC, 2012), majority of the developments within Brisbane CBD are still of single use. This places a challenge on both the public and private sectors on coming up with strategies that would encourage the development of more compact structures. In a number of cities/jurisdictions, policies that support VMUs are already in place. In Singapore, the owner of a 'white site', for example, is given maximum flexibility within the stipulated guidelines to develop the site to any mix of permissible uses. 'White sites' which refer to sites that owners can change the use or mix of uses whenever he deems fit without the need to pay a differential premium – a tax for changing existing use of land, and does not require the approval of Urban Redevelopment Authority (URA) – the planning authority of Singapore (Addae-Dapaah, 2005). While in Hongkong, major policies that support mixed use development include: two-tier bonus plot ration system and similar initiatives; categorization of development areas into local, district and metropolitan zones and prescribing core community facilities for them; granting of 100% site coverage up to podium level and ability to house various activities and amenities w/in the podium; emphasis on providing multiple pedestrian links from MILU developments; and facilitation for cross-subsidies from commercially profitable uses towards social facilities (Lau, Giriddharam and Ganesan, 2003).

In Brisbane, the development of VMUs is still not as common as current policies would like to pursue. A number of challenges have been identified which has limited their development. Northedge (2005) surmised that the diversification of risk is VMUs' strongest feature, however, developers are convinced that it is generally difficult to obtain finance or funding approval for mixed use projects. This is because most investors' attitudes to mixed-use developments continue to be negative (Bell, 2004). Compared to single use buildings, it is believed that VMUs are less attractive, harder to redevelop, do not attract superior rents or rental growth, and unable to provide better total returns (Bell, 2004). In addition, vertical markets were considered as specialty niche. VMUs were assumed to only cater to a specific customer segment (O'mara, 2007).

### 4.2. Where are VMUDs located within Brisbane CBD?

It was also important to examine the spatial distribution of vertical structures according to use/function within Brisbane CBD. The map in Figure 4 visually represents the extent to which VMUs are distributed within Brisbane CBD. It shows that single use developments (in yellow) are the most prevalent types of development across the CBD. Mixed use developments which accommodate two uses are fewer (in blue) while those with three uses/functions are scarce (in red). Of the seven structures that accommodate three uses, two can be classified as horizontal mixed use development while the remaining five are VMUs.

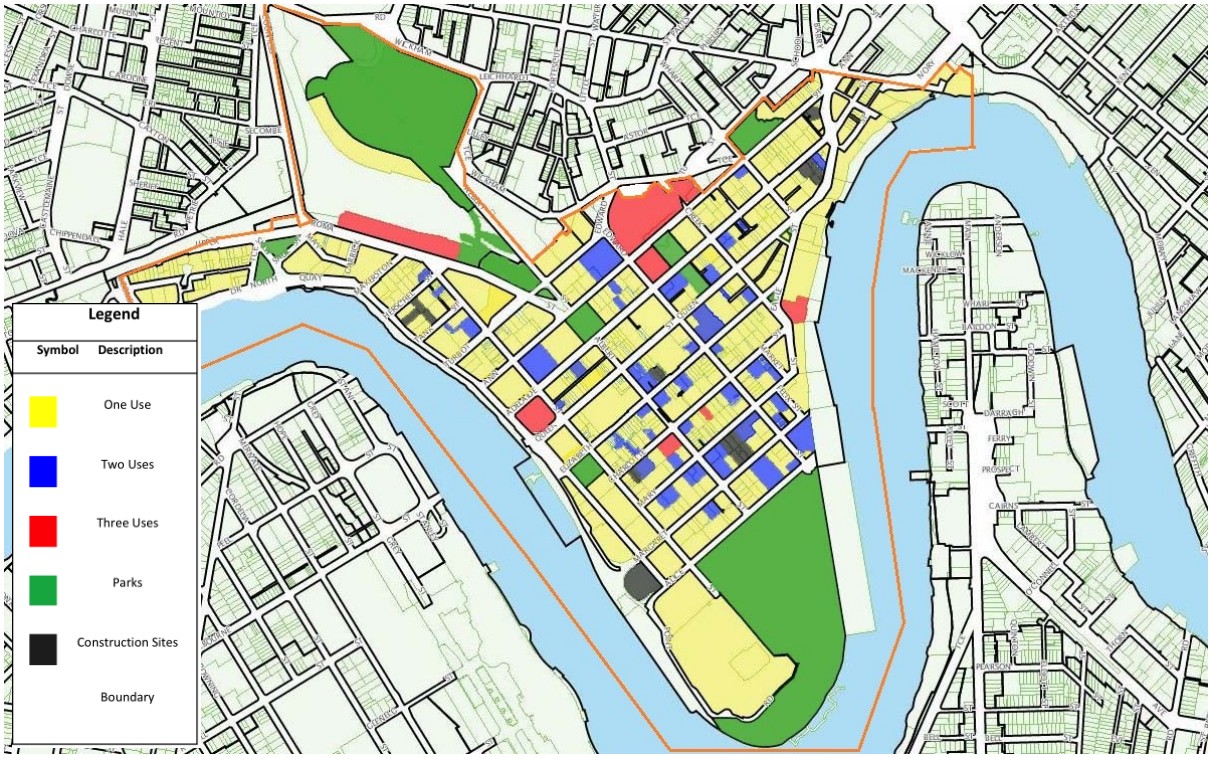


Figure 4. Mixed Use Developments within Brisbane's CBD are those in red.

### 4.3. Mixed use developments in Brisbane CBD

Thirteen mixed use developments within Brisbane CBD were chosen for profiling. These included: Anzac Square Buildings, Brisbane Square Building, Brisbane Transit Centre, Oaks Festival Towers, Riparian Plaza, Central Station, The Midtown, The Bostonian Apartments, 201 Charlotte Street, Primac House, 400 George Street, 141 Queen Street, and 140 Elizabeth Street. Seven developments were of three uses/functions and the remaining six have two uses/functions. Of the seven, two were horizontal mixed use and five were vertical mixed use developments. Their spatial distribution within Brisbane CBD is shown in Figure 5.

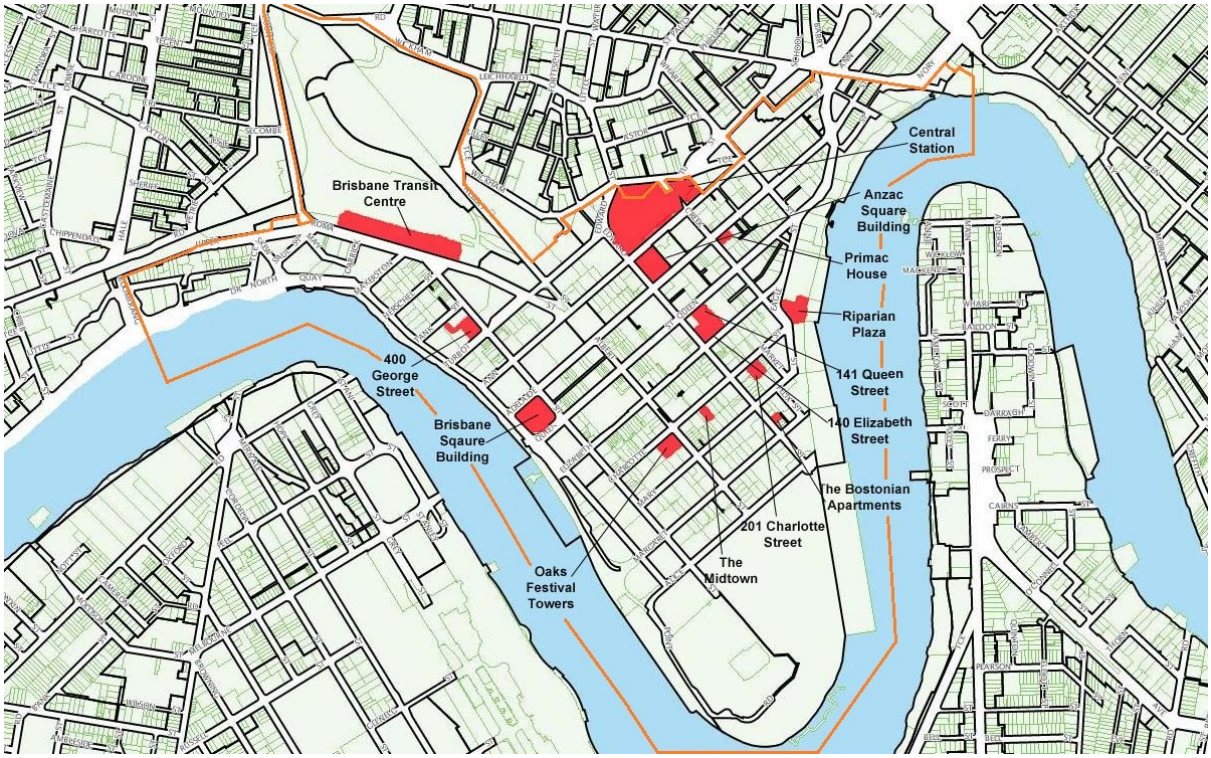


Figure 5. Location of mixed use developments which were evaluated within Brisbane CBD

### 4.4. Examples of horizontal and vertical mixed use developments

This section picks two types of mixed use developments within Brisbane CBD. The Brisbane Transit Centre is one example of a horizontal mixed-use development while the Riparian plaza is an example of a vertical mixed use development.

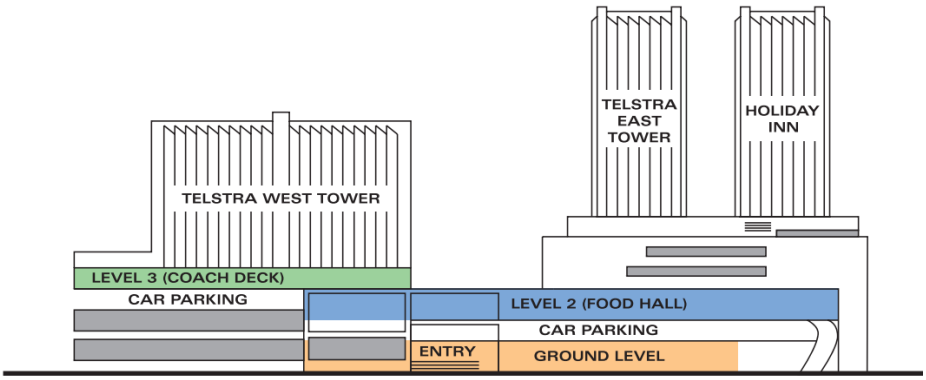


Figure 6. Illustration of Brisbane Transit Centre displaying 3 towers (Colliers International n.d.).

As shown in Figure 6, the Brisbane Transit Centre consists of three towers that accommodate different uses. Two towers are designated for commercial use, the 16-storey East Tower and the 11-storey West Tower, while the third tower houses a hotel accommodation. The low-rise structure is predominantly zoned as retail with public transport access and car park, which connects all of the three vertical developments together (Colliers International n.d.).

Figure 7. The Riparian Plaza (Harry Seilder & Associates n.d.)

The Riparian Plaza at 71 Eagle Street (as seen in Figure 6) was developed by Bloomberg Incorporated Limited and the architect is Harry Seilder (Riparian Plaza, 2013). Constructed in 2005, it consists of 53 levels. The first 11 floors are devoted to car parking space, floors 14-38 are for commercial space, and floors 41-52 comprise of residential space. The retail component is constructed outside the building but still within the development site (Riparian Plaza, 2013). In 2008, the Riparian Plaza won the National Award for Innovation and Excellence in Mixed Use Development for its outstanding design (Property Council of Australia, 2010).

### 4.5. Built form

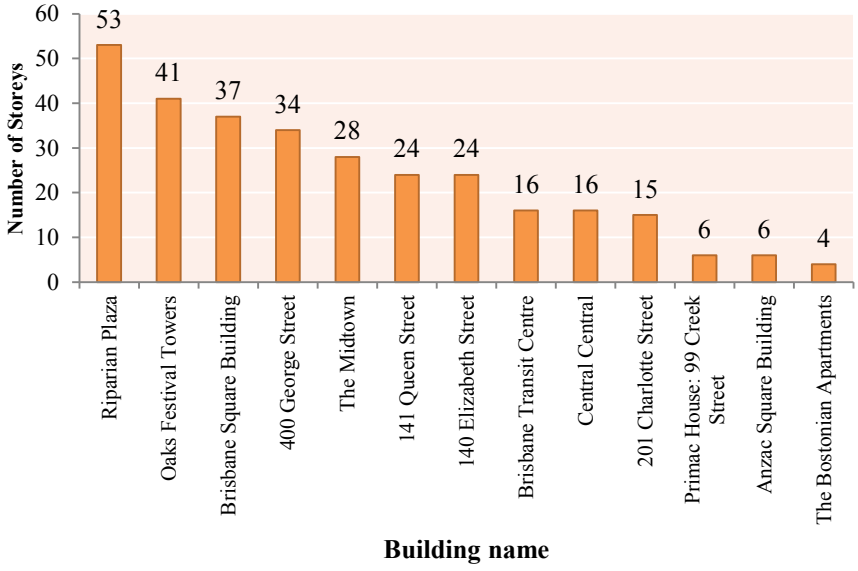


Figure 8. Number of storeys of the development

The thirteen mixed use structures were of varying height, ranging from low rise buildings (4~6 floors) to midrise buildings (10~20 floors) up to high rise structures (above 20 floors). Older, historic structures, built in between the late 19th century to early 20th century (e.g. The Bostonian Apartments) were generally low rise while the recently constructed buildings (e.g. Riparian Plaza) were generally high-rise ones.

### 4.6. Common land uses/functions within mixed use developments

The temporal base function of a vertical mixed use development is affected by the type and number of uses (Piell 2009). Examining the types and degree of diversity of land uses, it was determined that across the 13 mixed use structures, the most common use was retail and residential. This confirms what Grant (2002) identifies as some of the common uses that are predominantly integrated into mixed use developments which are: residential, retail, office space, commercial, and institutional (Grant 2002) in which the physical components are functionally, physically, and commercially integrated (Sussna, 1991). In addition, this also reinforces the goal of "having activity and energy close to 24/7 as possible," according to Kass which can be achieved by providing for entertainment and shopping (Aygoren, 2004). All throughout the week, retail use can drive day to night time traffic while residential encourages evening traffic. However, according to Matthews and Turnbull (2007), commercial land uses generate both positive and negative externalities. Thus, there is a tradeoff and perhaps, an optimal distance at which the benefits outweigh the costs.

With the 13 assessed structures, only 7 out of 13 were open 24 hours, one was open after 5PM, while the rest were generally open on weekdays during regular office hours (8AM and closes at 5PM) (see Table 1). If the aim is to encourage both day and night time traffic as well as a 24 hour vitality within the development premises, more activities, those typically undertaken after office hours, should be accommodated.

Table 1. The temporal function of the mixed use developments

| Development | Before 8am | Working Hours 8am-5pm | After 5pm-late | 24 hours |
|---|---|---|---|---|
| Anzac Square Buildings | | ✓ | | ✓ |
| Brisbane Square Building | | ✓ | ✓ | |
| Brisbane Transit Centre | | ✓ | | ✓ |
| Oaks Festival Towers | | ✓ | | ✓ |
| Riparian Plaza | | ✓ | | ✓ |
| Central Station | | ✓ | | ✓ |
| The Midtown | | ✓ | | ✓ |
| The Bostonian Apartments | | ✓ | | ✓ |
| 201 Charlotte Street | | ✓ | | |
| Primac House | | ✓ | | |
| 400 George Street | | ✓ | | |
| 141 Queen Street | | ✓ | | |
| 140 Elizabeth Street | | ✓ | | |

### 4.7. VMU design and development

In their assessment for ULI, Witherspoon, Abbett, and Gladtone (1976) identify internal dynamism as the essential quality experienced in the best mixed-use developments. This dynamism is derived from concentration and diversity, physical configuration and design, and internal circulation and external access. In addition, sufficient density (floor area ratio of at least 3) allows for diverse economic and social activity to take place within an integrated physical configuration.

A mix use development must be developed relative to its wider urban context. If its design and density relative to its surrounding setting and neighbourhood is considered at the outset, this can assist in winning community approval. It is also critical that while the development of VMUs must sufficiently allow placement of uses on the land in a way that integrates uses, it must also ensure that it does not result in overcrowding nor compromise security. Thus, access to different uses must strictly consider who can or cannot gain access to a particular space. For example, retail needs to be easily accessible for customers, whereas the residential component should only allow residents and their visitors to gain access to the said space (Cahill 2005). In addition, Jacobs (1961) mentioned that street activities contribute to community vitality. Thus, it is also essential not to overlook the role of street features within mixed use developments, including the inclusion of active frontages of developments. In terms of the 13 assessed structures, all were generally observed to have active

frontage designs. Active frontages not only improve ground level attractiveness but also encourage pedestrian vitality and overall vibrancy of the place.

Bell (2004) also mentions the four-point approach (Bakke): You need a visionary "guiding light" type of developer, the right location, good demographics and community support.

Cahill (2005) states that VMUs must be designed with flexibility in mind. The key to buildings in the future is that they will be adaptable, so you don't have to demolish a building when it no longer makes sense for one use.

### 4.8. Real estate perspectives

- The success of a mixed-use project in terms of financial return to the developer/operator and social benefits to the community is partially dependent on the market value of the property and its influence on the value of surrounding parcels.

- According to Niemira (2007), the most important factors for financial success are having a major draw (employers, a university and/or entertainment facilities) and developing the project as part of a master-planned site in an urban location.

- According to Niemira (2007), - It is important to conduct a separate market analysis for each of the proposed uses on the site. Each use on the site must attract an adequate or threshold demand independently of the other uses in case the development is not completed or a use later closes.

- According to Mark Wilson of JLL, "Mixed-use provides a more resilient income stream." He continues, "Retail could be let on a different cycle from the offices." In the same interview, Perry say, "When you get it right, there is stronger correlation between all elements and it does work better, if you can create a wonderful atmosphere, you will get better performance - and that means higher value."

- According to Bell (2004), the development of mixed uses can be guided by these six-step blueprint. 1)Market dynamics are first. Get a market in which you can compete. 2)Get a locale with an enlightened local government for ease of approvals. 3)Debt and equity capital must be available for financing. 4)Traffic patterns in the development should flow. 5)Parking must be sufficient and integrated with the traffic flow to prevent bottlenecks. 6)A series of cross-easements are required, assigning responsibility to each of the owners if the development has multiple ownership.

- Gose (2004) identified threats to mixed use development momentum. These include financing wherein he mentioned that xixed-use poses particularly vexing challenges for REITs in general. First, publicly traded companies must answer to shareholders, who usually demand that the REIT focus on a single property type. Second, the firms strive to keep their equity/debt ratios more or less in balance, which requires them to dump more cash into a project than private developers.

- According to Rabianski et al. (2009), there are various economic and market factors to consider when developing mixed use developments. A well-prepared environment which includes a strong local economy should be a prerequisite. Undertaking market analysis to determine demand and supply for each use, and should examine trends and forecasts to capture the influence of changing economic, demographic and psychographic factors of demand.

- Financial factors and issues include Lenders' willingness to lend which is attributable to: financial success of completed mixed-use developments across the nation; Increased lender sophistication; Profusion of mezzanine capital and other unsecured debt; Municipalities providing cash subsidies, property tax abatements or tax increment financing.

- Primary lending criteria used: Adequacy of the developer or the financial partner to deal with any cost overruns; Unleveraged yield on cost; Economic environment of the location—adequacy of consumers' and the project's ability to achieve market thresholds;Risk profile of the development—preleasing, sales and absorption time; Developer's history and track record—ability to complete the job on time and according to budget.

- Increased Costs attributable to initial planning costs are much larger for mixed-use developments because of the complexity and need to integrate varied uses; project may require multiple approvals from local regulators under a variety of zoning, conditional use permits and variance requirements; complying with different building codes for each use, adding to the complications, costs, and the time required to build the project; Residential uses in mixed-use buildings often have to be designed and constructed to meet commercial standards for handicapped accessibility, fire safety and mechanical requirements; Special design and construction features may be required to reduce incompatibilities between uses; featuring a pedestrian-friendly design with automobiles relegated to parking structures would also increase cost beyond that of surface parking lots; and cost of land that is suitable to serve a range of uses is generally higher than sites suitable for just one land use.

- Decision-Making Process also becomes more complication. Lenders, investors and developers have asked if mixed-use project development changes the decision-making process. Mixed-use development is much more complex and complicated than single-use development. The development model has changed from the situation in which one person was the expert on all facets of the single-use development to the need for a committee, group or organization of experts to plan and execute the project. Mixed-use development generally moves the industry away from specialization in a property type to a more sophisticated consortium of planning and development.

## 5. Summary and conclusion

In this paper, we investigated the notion of VMU and conducted a brief scoping study of Brisbane, Queensland Australia. Our results have a global relevance, where densification is viewed as necessary for sustainability. We found conflicted definitions for VMU and a sparse uptake by developers. When we surveyed developers to find out the constraints hindering VMU development, the response rate was disappointing. We do not advocate generalized rollout of VMU without due consideration of specific urban and institutional contexts. In any event, further investigation is necessary to clarify the pros and cons of VMU solutions for various stakeholders in idiosyncratic cities.

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