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Procedia Engineering 142 (2016) 2 – 9

**Procedia
Engineering**www.elsevier.com/locate/procedia

Sustainable Development of Civil, Urban and Transportation Engineering Conference

Planning and Design Elements for Transit Oriented Developments/ Smart Cities: Examples of Cultural Borrowings

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Abstract

Cultural borrowing is about creative ideas that are driven forward by key people to help transform urban settlements into better places. Evidence-based planning, access to information, and globalisation are defining characteristics of contemporary practice. There are other important influences including: the antecedents of policy and guidelines for green public transport planning - especially transit oriented development (TOD); and the closely aligned “smart city” movement. Adaptability of exogenous ideas to local circumstances is paramount. A generic planning and evaluation process is proposed that has been derived from the TOD/smart city investigations and professional practice undertaken by the authors. The meaning of cultural borrowings is explained using a case study of the history of urban planning and transport in Japan. Transit oriented development (TOD) and cultural borrowings are linked with examples from Sydney, Australia, and from selected Japanese cities. Fieldwork and interviews in Japan has led to the formulation of five elements (accessibility, amenity, access, affordability and ancestry), together with their associated planning objectives and (site-specific) issues.

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Peer-review under responsibility of the organizing committee of CUTE 2016

Keywords: Cultural borrowings; transit oriented development; planning and assessment; design elements

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1. Introduction

“Cultural borrowing” means how creative ideas are driven forward by key people to transform society. In the context of urban planning, the individuals who drive urban development should aim to transform urban settlements into better places. These people may be politicians travelling on study tours to iconic architectural sites or planning exhibitions to bring back ideas for their cities or professional planners attending international conferences, reading planning case study reports or searching the literature for new ideas to apply in their field of professional practice. Nowadays, many of these creative ideas can be accessed conveniently through information technology search engines. Accessing information through social media is another source of creative ideas in planning, although this is beyond the scope of this paper and a potential area for further research on cultural borrowings.

When the surface of the history of urban planning is scratched cultural borrowings are everywhere. Here, “cultural borrowing” (Hooker [1]) is taken to mean how creative ideas are driven forward by key people to transform urban settlements: their built form, activity locations and transport infrastructure. “Cultural borrowing” is a term used here because such ideas are not protected as intellectual property or patents and are in the “public domain” to be borrowed, massaged and deployed in some other cultural setting. These ideas might include planning philosophies (“garden cities” or “transit oriented development”) or specific pieces of legislation (London’s “green way”, “green-belt” and “Garden city” model in the UK). These “exogenous” planning ideas gain a local foothold by key individuals (politicians or consultants to government or developers) and are translated into local legislation with indigenous adaptations, and become statutory documents that help guide urban development in that very specific cultural environment. Cultural borrowings in urban planning - and the closely-related concepts of technology transfer and adaptation - are all moderated by key individuals, power relations, and resources, especially visionary leaders in the case of Asian cities (Nas [2]).

The concept of cultural borrowing in urban planning and design will be explained further using transit-oriented development (TOD) and “smart cities” as a specific area of policy and “smart cities” practice. The paper focuses primarily on Japan as an example of a cultural borrower and a cultural exporter of ideas on high-density urban development in precincts around railway stations. The influences that will be explored in the paper include: the antecedents of policy and guidelines for TOD planning; the role of consultants; and the influence of powerful political leaders as change agents.

The structure of the paper is as follows. Section 2 explains the meaning of cultural borrowings illustrated with the history of urban planning and transport in Japan since the time of the modernisation of Japan (Meiji era onwards). In section 3, planning and assessment frameworks for transit oriented development (TOD) are explained with an example from Sydney, Australia, as an example of good practice formulated within the country that could be exported, and from selected Japanese cities where impressive developments at railway stations could be appropriate models for other countries. Fieldwork and interviews in Japan, and professional practice in Australia by the authors, has led to the formulation of five elements in the master planning of TOD/smart cities (accessibility, amenity, access, affordability and ancestry) together with their associated planning objectives and (site-specific) issues to resolve through intervention by the public and private sectors. A generic planning and evaluation process is also proposed in Section 3 that has been derived from the TOD/smart city investigations and professional practice undertaken by the authors. Finally, the conclusions summarise the key messages for wider applicability of the research findings and suggest areas of future research.

2. Cultural Borrowings

The advance of human civilisation has been always dependent on cultural borrowings and will continue to do so. This has clearly been the case with the international circulation of planning ideas and policies during the 20th Century directed towards liveable cities and better communities. The defining characteristic of the cultural borrowing in the 21st Century is the ease and speed of access to information in the electronic age through the power of computer search engines. In the past, libraries were the depositories of key books, journals and documents and university planning courses provided the gateway and a guide to what was important. Today, researchers can exploit search engines by typing in key words such as “transit oriented developments”, or can gain ideas by accessing social media. Although “knowledge is power” this exponential explosion in information is of little value to the key stakeholders – “the

directors of urban development” - without synthesis and interpretation. To tap effectively into this public domain information urban governments must be advised by professionally competent planning departments, and their consultants. If they rely on consultancy services then issues of intellectual property and proprietary computer software will arise as a constraint to the amount of independent advice offered.

In the case of urban land-use and transport planning, it was US companies that originally developed the methodology, exporting it to other countries, including Australia [3] and Japan [4]. Assisted by university postgraduate courses and professional development courses, Australian expertise in this field grew through the 1970s and 1980s and there was a rise in the number of domestic consultants in this field. In the global economy of today international consulting companies dominate the work, buying out these local companies and pulling in expertise and resources from anywhere when responding to requests for proposals.

Japan is an interesting case in point with regard to cultural borrowings because from the Meiji Restoration onwards she is both as an importer and exporter of the cultural borrowings, driven by edicts of the Emperor or from the national Government, or by the market power and lobbying of Japanese developers. In restoring Imperial rule to Japan and the opening up of the country to outside trade and influences the new Government took the initiative to restructure Edo (Tokyo) from a castle town into a modern capital city. This “modernisation” of Tokyo was in conformance with a “Western image” as the prime objective (Funo [5] p.246): it was the start of overseas cultural borrowing that included the reform of the Japanese legal system and city planning. The Ginza Brick Quarters Project (1872 – 77), promoted by the Minister of Finance, Shigenobu Okuma, was symbolic of this modernisation launched to refashion the entire Ginza district (formerly the silver trade quarters) with a European flavour in red brick buildings. The English architects – the Waters Brothers - were invited to prepare plans for the area, where, after a decade, 2855 buildings had been completed in a Georgian-style with streetscape of maples, willows and gaslights. Western architects and urban planners promoted modern city planning, importing Baron G. E. Haussmann’s grand projects of Paris, the Nazi national land planning during the second world war, the Greater London Plan after the Second World War and the German B (Bebau-ungs – Plan of the early 1980s).

However, over the years, despite the substantial efforts to promote a multi-nucleus urban pattern, Tokyo continued to preserve its strong centralised structure, but rather at a macro scale. Nevertheless, looking at a micro scale within the central area, there have emerged a number of urban spots near by the rail stations that can be quantified as transit oriented development (TOD) settlements (Shinjuku, Harajuku, Ikebukuro). Urban re-generation plans have also been applied for non-core city development and one good example is the re-development of Roppongi, where a multi-use, 54-floor tower has been constructed near subway rail stations. Recently, TOD has been promoted by JICA in presentations to the Indonesian Government on the planning and implementation of the Jakarta metro (Black, Parikesit, et al. [6]). In fact, a case could be made that the Japanese have perfected TOD over several decades as their domestic response to urbanisation problems of rapid post-war growth (1960 – 1980) and density. Western researchers have only recently arrived to discover that in Japanese cities there are rich cultural borrows (see, for example, Murakami and Cervero [7] and Nuworsoo and Deakin [8]).

3. Transit Oriented Development (TOD)

3.1 Cultural Borrowings – the USA and Japan

Transit-oriented development (TOD) is a concept where a rail, bus, or ferry public transport can anchor a more environmentally- and socially-responsible urban form and help achieve more sustainable outcomes that are common goals of many governments’ urban policies. The name itself is a give away to its American origin. TOD may be viewed as a reinvention, rather than something new. It is almost in reaction to the problems created by Fordism that the New Urbanists/ TOD advocates in the USA figured out that they needed to go back to an older form of street-car suburbs [9]. Asian variations of TOD are a function of density and land shortage on a scale that has yet to apply to Australia or the USA, rather than being driven by the concept of sustainability, as we know it. Urban sustainability policy in Japan is couched in terms of the “compact city” (Kachi, Kato, et al. [10]). In the USA, the need for urban renewal leads to the developments being driven by local interests rather than being imposed by the state.

In the USA, transit oriented development “is viewed by many as a promising tool for curbing sprawl and the automobile dependence it spawns” (Cervero, Murphy, et al. [11] p.3), and hence has particular relevance to the integrated development of public transport and land use in Australian cities. It has been promulgated in the United States of America by leading architects and planners with support from the development industry and picked up by Australian consultants as part of the “new urbanism” (which in itself is an American term). TOD has become part of Australian urban planning practice (see, for example, its application to the proposed, but now cancelled, Northwest Sydney metro by SCOTTCARVER [12]). In the mid-2000s, a major research and development study was undertaken for the NSW Government Roads and Traffic Authority (now NSW Roads and Maritime Services) with particular emphasis for land-use developments along busways (transit lanes) in outer suburban Sydney (Blakely and Black [13]). Part of the work program involved study tours organised by the research team for government and private sector participants to US cities to document TOD case studies, and site visits by researchers to analyse TOD developments in Japan. The authors have updated case study examples of TOD in Japan more recently to form the design principles in Section 3.3 below.

There are numerous examples in Japan where the private sector has initiated and successfully initiated a coordinated approach to land use development and public transport. The case study of Tama Garden City development represents one of the most successful examples. In the post-war era Tokyo had a designated green belt to control metropolitan sprawl, as was common in the planning of many great cities of the world. With the demise of the Tokyo green belt a private railway company, Tokyu Corporation, developed from 1973 a new town housing some 500 000 people. The outline characteristics of Den'en Toshi Development Project (Kawasaki Prefecture) that form a coherent case of “cultural borrowing” from the rest of the world are:

- One enterprise developed both land and railway
- Complete internalisation of external economy of the Railway Development
- Well-planned land-use and land readjustment
- Infrastructure development and acquisition of land for the railway and public use
- Extension of the railway in accordance with settlements
- Stable revenue from fares
- Shopping complex of the same enterprise
- Agglomeration effects by economies of scale and scope
- Well-coordinated feeder service to the station
- High level of accessibility to public transport.

One of the most successful policies associated with the post-war reconstruction of Japanese cities is the land-readjustment program that has been promoted in many Asian cities by Japanese consultants (Archer [14]). The mechanism of the Land Re-adjustment Program and Local Government Planning has proved to be a highly successful policy for the redevelopment of station precincts. It has allowed existing landowners to share in some of the profits that arise from re-zoning to higher densities, for developers to consolidate lots to allow imaginative higher density buildings to be erected and to return land for public purposes around railway station pedestrian access points.

3.2 Strategic Planning and Assessment

A research project initiated by the University of Sydney Planning Research Centre supported by the University of New Orleans for the New South Wales Government produced an original strategic planning and assessment process that could form a blue-print for cultural borrowing. In any government-led planning and assessment process (see Blakely and Black [13]) an institutional analysis must be undertaken of institutional performance. This includes: institutional support; environmental performance; economic performance; and quality of the built environment and accessibility of the users to all modes of transport. Table 1 lists the type of generic questions to ask and the specific measures to collect when undertaking this strategic planning study.

Table 1. Strategic planning and assessment process for TOD with indicators and measures

Institutional Support	
INDICATORS	MEASURES
Institutional readiness	Is the TOD government recognised?
	Is the precinct zoned for TOD supportive land uses by the local government?
	Is there a specific TOD precinct plan?
	Is there an implementation body?
	Are there public subsidies?
	Is there active public-private partnership to encourage TOD?
Environmental Performance	
INDICATORS	MEASURES
Air quality and pollution	Estimate emission based on VKT
Energy usage (people)	Estimate car fuel consumption based on VKT
Noise	Average and peak noise levels at building facades
Economic Performance	
INDICATORS	MEASURES
Range of business	Number of reecotail, commercial and industrial businesses (possibly on GIS data base)
	Suitability of retail for local residents (Index of Retail Variation)
Business success	Rate/Number of vacant buildings/units (retail, commercial, industrial)
	Number of jobs in the area (by, categories, FT/PT)
	Number of people in home-based employment
Range of housing	Number of residential units (Houses/flats/apartments)
	Number of rental versus owner-occupied residences
	Number of affordable housing units (to be defined). Range of 1,2 & 3 + bedroom(s)
Solid financial base	Property value (over time)
	Percentage of income spent on housing and transport
	Rates collected by local government (\$)
Quality of the Built Environment and Accessibility	
INDICATORS	MEASURES
Vibrancy	Resident population (density)
	Pedestrian counts
	Area/number of vacant land parcels
Attractiveness	Subjective measure of façade quality
	Subjective measure of streetscape quality (includes pedestrian amenity)
	Number of heritage buildings preserved
	Public art
Safety and perception	Quality of lighting
	Security at railway station
	Facilities (incl. retail) at railway station
	Crime Prevention Through Environmental Design (CPTED)
	Building Frontage – SAFE assessment (measure to be determined)
Mixture of uses	Number of mixed use buildings
	Housing/population density
Spaces dedicated to	Plazas, parks and open spaces

pedestrians	Area/number of auto-oriented land uses
	Area/number of pedestrian-oriented land uses
	Bicycle parking spaces
	Bicycle traffic volume
	Presence of Principle Shared Paths (PSP) and on-street bicycle lanes
	Number of traffic calming
	Auto traffic speed and volume
	Number of traffic calming
	Auto traffic speed and volume
	Number of parking spaces (surface, on-street, and parking structures)
Accessibility by transport mode	Number of opportunities within specified travel time by competing modes and accessibility patterns provide by the access modes

3.3 TOD Design Principles – Cultural Borrowing from Japan

In terms of urban design the authors conducted an international search for best practice. After appraising TOD developments and associated design principles in Australia, European and US, the authors concluded that urban form and density at Japanese railway stations would provide the best analogue for more general application. Therefore, site visits were arranged to selected “TOD” examples in Japan in the cities of Aomori, Kawasaki, Kyoto, Nagoya, Osaka, Sendai, Shizuoka, Tokyo and Yokohama and a qualitative survey administered to those key people involved in such developments, or on the compact city, as often called by the Japanese. Based on field notes and photographic evidence the master-plan design principles that are described below were derived from the authors’ extensive professional experience in this field. Previous research by Obermaier and Black [15] had established that cities along the Tohoku shinkansen had grown at a faster rate in terms of population and employment than cities of comparable size far away from high-speed rail investment. Notwithstanding the fundamental principle from cultural borrowings - that of local adaptation to the site specific requirements in any urban setting – one of the key successes of TOD in Japan is the asymmetrical feature that underpins design in Japanese historical and contemporary culture: urban form one side of the railway station is characterised as informal in street patterns and land-use activities such as small restaurants and bars; and on the other as formal with modern office blocks and department stores (often fully integrated into the station layout).

Having undertaken a strategic planning and assessment of an existing or potential node suitable for transit oriented development (Section 3.2) the next step is to produce a master plan for implementation by governments and developers. Based on our practical experience, and more specifically based on observations in the neighbourhoods surrounding railway stations in Japan, five key elements have been identified to produce high-quality design outcomes that can be adapted and applied in any cultural setting (Table 2). It must be noted that the examples of the objectives and issues are specific to a case study in metropolitan Sydney.

Table 2. Five elements of a smart city (transit oriented design) with objectives and issues [17]

Elements	Objectives	Issues
Accessibility	To improve walking and cycle access to the T-way and in centres	Restricted access to bus stops through current subdivision pattern
	To promote the use of the T-way and other bus services	Bus stops are visually inaccessible from the main street.
	To maximise pedestrian and vehicular cross-flows along the T-way.	Barrier effect caused by fences and the T-way having limited cross-over Safety factor with deserted areas forming access ways
Amenity	To improve the quality of the public domain in centres and neighbourhoods	Quality of public realm Quality of built environment
	To enhance and vitalise town centres and the T-way	Lack of variety
	To incorporate a mix of well integrated services in town	

Elements	Objectives	Issues
	centres	Lack of shade and shelter
	To develop public areas that accommodate for environmental conditions	
Axis	To improve connections between the T-way and local bus services	Poor connection between the T-way and other bus services No major connection of community with cultural facilities
	To strengthen the relationship between cultural precincts, open space and centres	No relationship between amenities and civic space
	To provide parking opportunities for T-way bus stops in activity centres	No provision for car parking at major T-way bus stops
Affordability	To increase mix housing types and housing affordability to devise sharing water and energy between buildings and innovation ideas e.g. prefabricated building systems, innovative unit design solutions, and shared living environments (intelligent building design)	A smart city centre ensures that there is a wide range of dwelling types and sizes within its precinct. Discourages the exclusion of families, people on lower incomes, and people who might otherwise be marginalised The consequences of diminished affordability are loss of social and cultural diversity.
	To encourage hared bicycle and car facilities to encourage developers to incorporate principles of a smart city and green infrastructure in new developments	
Ancestry	To encourage increased activity in centres	Lack of opportunities for informal social cohesion
	To promote an outdoor experience in town centres	Shopping malls can restrict outdoor activity
	To respond to the cultural character of communities	Multi-cultural composition of locality not reflected in design of centres
	To improve the safety and security of the public domain	No strong relationship between land uses Need for improved safety and surveillance

These elements that must be adapted to the local situation are: accessibility; amenity; axis; affordability; and ancestry. Table 2 lists the objectives and associated issues for each of the five elements as a guide to what needs to be considered in any local application of these elements. It should be noted that the details in Table 2 are drawn and adapted from a specific study of TOD on a suburban road-based “transit-way” (T-way) – or a bus rapid transit route - in metropolitan Sydney in an action-oriented research design for the State of New South Wales Roads and Traffic Authority [13] and are provided as illustrative examples only. As emphasised above, adaptability of the specific objectives and issues in the local situation is paramount to achieving successful outcomes for a “smarter city”.

4. Conclusions

“Cultural borrowing” is the international circulation of ideas or knowledge that are not protected as intellectual property or patents and are in the “public domain”. These ideas are borrowed from somewhere, massaged and adapted and deployed in some other cultural setting. Some of these planning ideas become conventional wisdom, gaining a local foothold, being translated into local legislation with indigenous adaptations, and becoming statutory documents that help guide urban development. Although transit oriented development arose as a concept in the US as part of the new urbanism movement a case can be made, as articulated in this paper, that the Japanese have long realised the business advantages of intense land-use developments above and adjacent to railway stations.

Fieldwork in Japanese cities and interviews with practitioners has led us to work from first principles and propose a planning and assessment framework for transit oriented developments/smart cities and to further identify five key elements for successful public spaces. These are accessibility, amenity, axis, affordability and ancestry all tempered by adaptability to the local situation. Each element will have local objectives and local issues that were illustrated with a specific example based on a research study for the New South Wales Government on transit oriented development in a low-density suburban environment of metropolitan Sydney, Australia. These proposed five elements that are demonstrated in Table 2 can be used for proposing new sustainable, and smarter, urban development plans and for

improving the decision-making process to achieve better outcomes in the built environment. However, future studies and further investigation need to be done to review the adaptability and applicability of each of these elements in various case studies and examine how to achieve more sustainable outcomes by considering each or all elements that are common goals of many governments' urban policies. We have embarked on a research study that applies the five elements to a city devastated by the earthquake and tsunami in Japan in March 2011.

Further research is also underway on a related topic of "cultural borrowing" – that of "green" infrastructure. Although the term often refers to "green" buildings in terms of energy-efficient designs and vegetation of roves or facades it has applications in the public realm, especially storm-water management and landscaping along transport right-of-ways. Green infrastructure guidelines in the USA, UK, Singapore and Australia have been reviewed, and a case study of a "green" solution to a road-widening project in Sydney is under preparation. Additional research is now formulating performance indicators for green infrastructure for professionals working in this field.

Acknowledgements

The research results are the result of collaborative efforts with colleagues over many years: Professor John Black led the Planning Research Centre at Sydney University team (Professor Ed Blakely, Professor John Renne, Dr Santos Bista) in association with Jackson Teece Architects (Mr David Chesterman, Mr Carlos Frias and Ms Nadira Yapa) that undertook the TOD study for the New South Wales Roads and Traffic Authority. In Japan, the following people assisted with data: Dr Masafumi Ota, Manager, Project Coordinating Secretariat, Planning and Administration Division, Railway Headquarters, Tokyu Corporation, Tokyo; Mr Dongkun Oh, Assistant Manager, Residential Realty Division, Residential (Development) Headquarters, Tokyu Corporation, Tokyo; Professor Kazuaki Miyamoto, Tokyo City University; and Professor Yoshitsugu Hayashi, former Dean, Graduate School of Environmental Studies, Nagoya University.

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