

A Case Study Analysis of the Critical Factors Influencing a Private Land Developer Adopting Water Sensitive Urban Design

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ABSTRACT

This paper explores the factors stimulating a private land developer to adopt water sensitive urban design (WSUD) in an urban land development project. Two divergent examples of the adoption of WSUD in land development projects are presented, a greenfield industrial and an infill commercial development, both located in metropolitan Melbourne, Australia. Case data was sought from semi-structured interviews with personnel involved in the urban land development project as well as supporting documentation. The interview questions focused on the implementation process and were guided by factors identified from literature in corporate sustainability, and administrative and economic studies as potentially influencing organisational behaviour and change. The research reveals the importance of economic factors at a contextual, organisational and individual level in stimulating adoption. In the case of the infill development, the economic factors were supported by a strong community expectation for sustainability in commercial developments. In the greenfield case study, the community did not factor in the case of adoption. Rather, regulatory incentives and leadership from stakeholders reduced the risk associated with adopting the WSUD technologies proposed. These insights demonstrate that policy aimed at supporting widespread adoption of WSUD by the private land developer will vary with land development types.

KEYWORDS

Water sensitive urban design, land developer, adoption

INTRODUCTION

Water sensitive urban design (WSUD) is a new approach to urban water management that is yet to become mainstream practice in urban land development practice. The principle reasons reported for this implementation failure are the lack of conducive, institutional and social conditions to support such a transition (Wong & Brown, 2011). The approach stems from the recognition that urban land-use practices are linked to ecological processes and that traditional approaches to urban water management as well as land use planning have been ignorant of this relationship. The ‘big-pipes’ of centralised urban water management systems have fostered a sprawling urban environment, which have simultaneously changed the natural hydrology of the land. As a consequence, these traditional approaches have facilitated waterway degradation and an increase in the probability of flooding and drought conditions in the urban environment (Rogers & McFee, 2005). WSUD counters this affect by espousing

integrated management of the three urban streams (potable water, stormwater and wastewater) within the built environment with the aim of minimising potable water demand through conservation and fit-for-purpose applications and reducing the impact of run-off and waste streams on downstream aquatic ecosystems (Wong & Brown, 2011). In terms of technology, it represents a change from centralised ‘big pipe’ solutions where management is offsite and isolated from the urban environment to a hybrid of these centralised systems with small-scale visible systems that require land within the urban footprint (Newman, 2001). Ultimately, the technology required in a WSUD approach is diverse and flexible to ensure the vulnerability and impact of urban water management practices is minimised (Wong & Brown, 2011).

Multiple stakeholders are involved in the uptake of WSUD of which the private land developer is one. The land developer prepares land for economic and population growth to build communities that service business activity, employment and housing. In creating these communities, the land developer is also obligated to provide equitable access to services such as water, flood protection and wastewater management (Hanak & Browne, 2006). But why would a land developer choose WSUD over ‘big pipes’ in providing these services? And what are the incentives? Despite the critical role of the land developer in advancing a WSUD approach, limited empirical research targeted at this stakeholder exists. Rather the private land developer has often been buried in broader region-wide stakeholder studies (Brown & Farrelly, 2007; Gardiner & Hardy, 2006) or indirectly through the analysis of demonstration projects (Farrelly & Davis, 2009; Mitchell, 2006). While these studies provide generous insights into the factors facilitating and limiting adoption of WSUD broadly, they do not help us understand why and what factors would stimulate a private land developer to adopt a new approach to urban water management that is not the norm. In the absence of such knowledge and insight, policy and regulatory interventions to efficiently and effectively stimulate such change are likely to be inadequate.

This paper presents two divergent case studies of a private land developer adopting a WSUD approach in metropolitan Melbourne, Australia. The case studies focus on the factors affecting the decision of the private land developer to adopt WSUD. The next section describes the analytical framework developed to analyse the potential factors affecting an organisation’s decision to adopt new technologies and approaches.

RESEARCH APPROACH

Analytical framework

The adoption and diffusion of innovative environmentally-cleaner technologies is influenced by a myriad of factors (Montalvo, 2008). Yet despite the growing scholarly interest in the drivers and barriers influencing adoption, limited research has focused on linking these factors to the organisation and its dynamics in relation to change. In lieu of such literature, this research has drawn upon economic and administrative studies, as well as recent scholarship in corporate and environmental sustainability to conceptualise a framework for understanding the factors influencing a private land developer implementing WSUD at the project scale. This framework is presented as a ‘wheel of organisational behaviour’ in Figure 1. It includes three nested levels – the context, the organisation and the individual level – that are dissected into four areas – political, economic, social and technological. These four sections have been chosen based on the acronym PEST, which is a diagnostic tool used by consultants and researchers to understand the effect of the macro-environment on firm behavior. The

categories also match those delineated by Freeman (1984) as the type of affects stakeholders have on an organisation or vice versa. Details regarding each section of the conceptual framework are given in Table 1, and will be used to describe the implementation process of each case study.

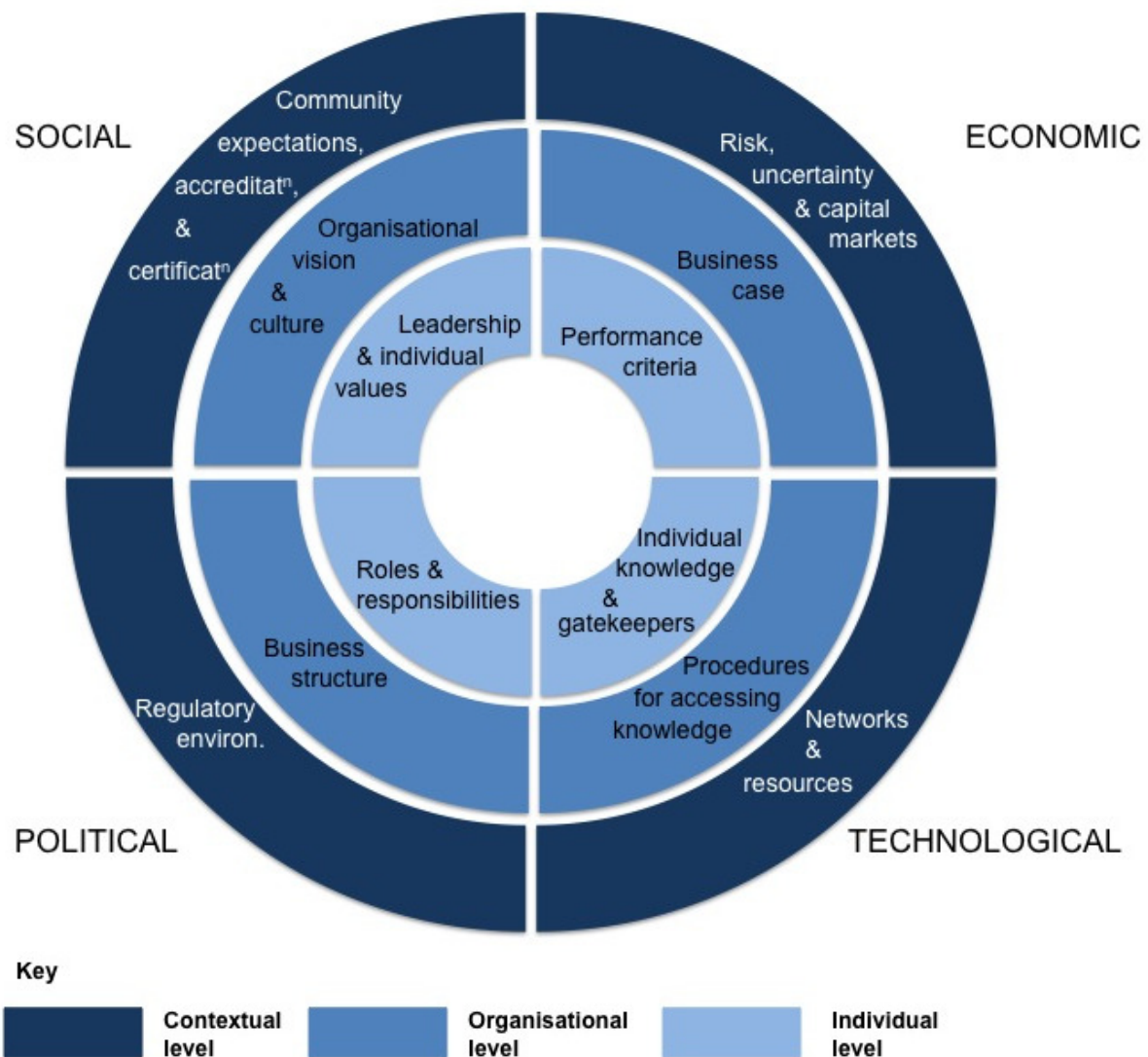


Figure 1. The ‘wheel of organisational behaviour’ – the framework used in the case study analysis to understand the potential factors influencing the adoption of WSUD by the private land developer.

Methods

A case study approach was used to explore the factors influencing the adoption of WSUD by private land developers. Yin (2003) states a case study approach as being appropriate if firstly the boundary between the phenomenon and the context is unclear; secondly, the number of variables exceeds the number of data points; and thirdly, multiple sources of data will be required in understanding the reasons. The adoption of WSUD is inextricably linked to external factors (otherwise institutional factors would not be a barrier to adoption) and the analytical framework and assessment tool reflects the complexity of these factors.

Table 1. The definitions of the factors included in the ‘wheel of organisational behaviour’ as potentially influencing adoption of WSUD by land developers.

	Contextual	Organisational	Individual
Political	Regulatory environment controls (or mandates) public behaviour through rule-setting, monitoring & sanctioning activities. It broadly takes one of four forms: mandated policies and procedures, standards for performance & outcomes, reporting and information disclosure requirements, & incentives & disincentives (e.g. subsidies)	Business structure provides a framework for organising and coordinating business activities. It defines the roles & responsibilities of individuals and business units as well as the procedures (or rules) through which these roles & responsibilities can be achieved.	Roles and responsibilities permitted through the organisational structure define the rules governing individual behavior.
Economic	Risk, uncertainty and capital markets relate to the likelihood of appropriating benefits, the realisation of these benefits relative to business cycles, the age of traditional infrastructure and access to capital markets to ensure economic benefits.	Business case is a commercial assessment of a project, policy or program that requires an organisational commitment of human and financial resources. Many reasons can influence the business case for organisational change, including profit, efficiency, reputation, value and competitiveness.	Performance criteria gauge the behaviour and effectiveness of an employee or project. They are generally linked to the business case of the organisation and help ensure successful implementation.
Social	Community expectations, accreditation & certification represent society’s expectations of organisational behaviour and have the effect of honouring or shaming their actions.	Organisational vision and culture articulates the goal and rationale behind a change initiative and is important in guiding cultural change in the organisation.	Leadership and individual values from management and employees is required in implementing the vision and culture espoused by the organisation.
Technological	Networks & resources facilitate the exchange of information, experiences and motivations between similar and associated organisations. Networks can help reduce uncertainty posed by externalities (such as markets) and provide confidence in new practices and technologies by linking organisations to examples and experiences of adoption that can answer questions of compatibility, certainty and complexity.	Procedures for accessing knowledge facilitate an organisation in recognising new external knowledge, assimilating it and applying it to commercial ends. The structure of the organisation is one method through which knowledge transfer is supported. Experience through implementation also provides background necessary to affirm the value of a technology /process and change organisational practices to support ongoing adoption.	Individual knowledge and gatekeepers are where knowledge is held an organisation. A ‘gatekeeper’ is a particular individual that links the organisation to external pools of knowledge and translates the knowledge into a form that can be adopted. The success of this translation is subject to the existing knowledge base of the other employees. This knowledge base is influenced by experience within the organisation, prior work experience, vocational training and network associations.

References: Montalvo (2008); Dunphy *et al.* (2007); Doppelt (2007); North (1990);

The two case studies presented in this paper are located within metropolitan Melbourne, Australia. The city was chosen for two reasons. First, it has been identified as making ‘great advances in engaging a range of organisations and the community in the pursuit of WSUD’ (Roy *et al.*, 2008, p. 350). Second, it faces many of the challenges typical of large international cities in transitioning to an integrated approach to urban water management.

The two cases - a greenfield industrial development and an infill commercial development - were selected from the results of a tailored online survey distributed to professionals in the urban water and land development industry. Five case studies were identified from the survey, but due to space constraints, only two of the most divergent types are presented.

Case data was sought from semi-structured interviews with personnel involved in each urban land development project. These individuals included the project manager and director from the land development organisation as well as representatives from the stakeholder groups involved in the decision process. The interviews focused on the implementation process with questions designed to elicit whether the factors identified from the literature were present and if so, how important they were to the organisation adopting WSUD. The interviews were recorded and transcribed, and were between 30 and 45 minutes. Supporting documentation, including government documents, approval documents regarding the WSUD strategy and marketing material, was also collected and analysed to validate the findings of the interviews.

The transcripts and supporting documentation regarding each case study was stored using the qualitative computer analysis software NVivo. The data was coded using the NVivo software. Memos were also kept within the case file to record thoughts on the data and the codes, hence, providing a chain of evidence to support the ultimate case findings. The case study reports were sent to interview participants for feedback as part of the validation process.

ADOPTION OF WSUD IN THE GREENFIELD INDUSTRIAL CASE STUDY

The greenfield industrial development is located in one of the designated growth areas of metropolitan Melbourne that is currently used for agriculture. A stormwater harvesting and reuse scheme for direct potable water injection has been proposed for the site. The WSUD elements included in the scheme are constructed wetlands and waterbodies and an onsite chemical treatment facility. Construction of the scheme is scheduled to commence in 2011.

At a contextual level, policy requirements sparked the project team to consider WSUD. The land required rezoning for industrial use and, in so doing, had to demonstrate adequate flood protection. Onsite stormwater retention was identified as the only means of meeting the regulatory requirements for flood protection. Financially, this decision was mediated by the contribution required by the local drainage authority for offsite stormwater management being wavered. The harvesting scheme did not include reuse for potable water injection until a stakeholder was willing to take long-term ownership and management of the asset. The local water retailer agreed to this role once the scheme became cost-competitive with the traditional ‘big-pipe’ approach. This was made possible with the receipt of competitive federal funding. The time required to access this funding and integrate the reuse strategy with the case study development was supported by a lack of pressure from the land developer to develop the land.

The adoption of WSUD in the case was supported by the organisation's desire to lead the industrial land development industry. It did not have a culture or vision for sustainability. However, WSUD had been successfully adopted in previous urban land development projects by the organisation. This prior success helped establish trust and confidence within the organisation of the leadership qualities of the approach.

The organisation's management endorsed the WSUD features proposed for the case study and were described by interviewees as passionate for a successful implementation. 'The water story' (as termed by management) became a metric of success for the project, particularly because of the 'sense of place' the elements brought to the development. This sense of place was an important part of the vision for the project in heralding a premier, leading development amidst a predominately rural landscape. Leadership was also important from the project team in initially identifying the potential of WSUD to meet flood requirements and harvested stormwater as a potential supplementary potable water supply for the site.

ADOPTION OF WSUD IN THE INFILL COMMERCIAL BUILDING CASE STUDY

The infill development is a four-storey commercial building located in the central business district of Melbourne. The building is part of a larger project to redevelop a disused brewery site for commercial use. The WSUD features adopted in the building included vacuum toilets, rainwater harvesting, an anaerobic digester and reed beds.

At a contextual level, the adoption of WSUD in the development was sparked by a growing market in sustainable commercial buildings as described by the Green Building Council of Australia's (GBCA's) voluntary accreditation scheme, the green star rating tool. Since its inception in 2002, the number of commercial buildings seeking accreditation using the rating tool has increased by 11 percent establishing a strong community drive for sustainable commercial buildings (GBCA, 2011). The industry was reported in the interviews as having a long way to go, thus providing a market for land developers to demonstrate innovation and leadership in sustainability.

In recognition of this growing market for sustainable commercial buildings, the private land developer has built a business case for sustainability. The chief executive officer (CEO) has made a commitment that all future projects will be a minimum five star (out of six), which signifies 'Australian Excellence in environmentally sustainable design and/or construction' (GBCA, 2011). This commitment is supported by an organisational culture to seek sustainability and innovation in all of its projects and the connection between the organisation's CEO to the board of the GBCA. This connection provided an informal mandate for the organisation to act and lead according to ideals of the GBCA through the case study.

At an individual level, the case study provided an opportunity for the private land developer to demonstrate its capacity to lead the industry in delivering sustainable commercial buildings. The building was set a performance criterion of a perfect green star rating, which had not been achieved by the sustainable commercial building sector. A WSUD approach was critical in achieving this criterion, as water is one of six criteria addressed in the rating tool. The adoption of novel WSUD technologies was also supported by the organisation's desire to use the case study project as a demonstration project, from which lessons could be adapted to larger scale developments more typical of the private land developer's portfolio.

DISCUSSION

The factors influencing adoption of WSUD in the two case studies are presented in Figure 2, which need to be read in reference to the factors highlighted in Figure 1 and the descriptions given in Table 1. What is evident from the research findings is the importance of the economic theme at a contextual, organisational and individual level in the adoption of WSUD in an urban land development project. In the infill case study, the economic incentive for adoption is a consequence of a strong community expectation (evidenced by the strength of the social theme in the wheel presented in Figure 2) for sustainable commercial buildings, to which the organisation responded by establishing a business case and culture to pursue sustainability. The case study project was a direct outcome of this business case and culture and enabled the organisation to demonstrate leadership in sustainability. In the greenfield industrial case study, the community is not a factor in the adoption of WSUD (evidenced by not being highlighted in the wheel presented in Figure 2). Rather, the economic risks associated with adopting a new approach is mediated due to the compatibility of WSUD with regulatory standards and financial incentives, and the leadership and knowledge of stakeholders. However, these factors are influential only if the organisation is able to access external knowledge and identify benefits in this knowledge to the project and the organisation. In the case of the greenfield development, this benefit was to lead.

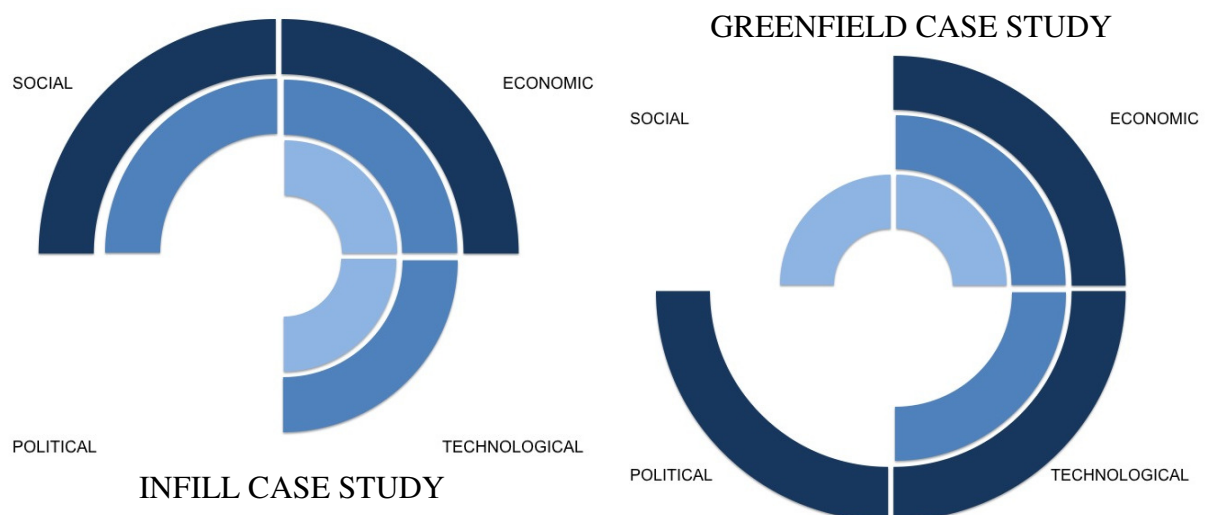


Figure 2. The factors identified as influencing adoption of WSUD in the infill commercial (left) and greenfield industrial (right) case study.

CONCLUSION

The adoption of WSUD by the private land developer in the case studies presented have been analysed with respect to the diagnostic tool, PEST. The results demonstrate the overarching need for economic incentives (i.e., the 'E' of the PEST tool) at the context, organisation and individual project level in the adoption of WSUD. These economic incentives are dependent on other non-economic factors at the context level and vary across development location. In infill commercial developments, the business case for adoption is facilitated by a strong community expectation (i.e. the social theme of the PEST tool) for sustainable design that includes aspects related to water. In greenfield industrial developments, where the community drive is absent, the business case is influenced by political will and the support of

stakeholders in respect to leadership and knowledge (i.e. the political and technological theme of the PEST tool). Thus, this research indicates that policy aimed at supporting mainstream adoption of WSUD by the private land developer is unlikely to be standard across development types. Second, it demonstrates how policy interventions can be more effectively targeted by assessing the PEST factors in a private land developer adopting WSUD, and matching contextual and organisational drivers with policy levers.

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