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THE ROLE OF THE URBAN LAND DEVELOPMENT ORGANISATION IN MAINSTREAMING WATER SENSITIVE URBAN DESIGN

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Abstract

Practitioners are advocating change in the way urban water is managed in Australia. This change, described by the term water sensitive urban design (WSUD) involves integrating the management of the three urban water streams with the aim of conserving potable water use, minimising wastewater generation and managing the impact of stormwater on downstream waterways.

The transition to WSUD requires both social and technological change. Considerable effort has been made in developing elements (technology) that enable the objectives of WSUD to be met. These technologies include vegetated and non-vegetated detention and infiltration systems applicable at a range of scales (local to precinct to regional). However, despite advances in WSUD technology, a WSUD approach is yet to be mainstreamed in Australia. Experience to date has been ad-hoc and limited to scattered demonstration projects. Additionally, examples of WSUD have primarily focused on stormwater quality and quantity management and have ignored the potential to reuse stormwater and wastewater in reducing the demand for potable water.

It is widely accepted by practitioners that the lack of widespread adoption of WSUD is due to existing social and institutional arrangements around urban water management and land-use planning. One stakeholder that has been identified as critical through research by Brown and Farrelly (2007) into these institutional arrangements is the land developer. This research has shown that the commitment of the land development sector as a whole to WSUD is weak, with only a few examples of organisations adopting the new approach to urban water management.

To date there has been limited research focused on the land developer and WSUD. In such investigations, the land developer has either been studied as part of a multi-stakeholder analysis or through case study examples. While this research has been useful in confirming that WSUD implementation is still limited to demonstration projects, it is not specific enough to articulate the motivations in a land developer adopting WSUD. It is suspected that one reason for this lack of specificity is because previous research has not drawn on organisation literature.

This paper, after first justifying the need for research focused on the land developer and the adoption of WSUD, presents an analysis of the literature available on organisations. In particular, this paper identifies potential internal, external and technological drivers that could influence a land developer's decision to adopt WSUD. The paper then proposes a possible method of integrating these drivers with existing WSUD scholarship that can be used as a framework for future research on land developers and the adoption of WSUD.

1. Introduction

Practitioners are advocating change in urban water management. The traditional approach where the three urban water streams of potable water, stormwater and wastewater are managed in isolation is no longer considered acceptable. This siloed approach to urban water management has failed to properly protect the environment and has resulted in waterway degradation and unsustainable resource use (Vlachos & Braga 2001). Growing concerns over these impacts, coupled with population growth, aging infrastructure, equitable access to water and climate change have lead to practitioners advocating a new approach (Hlavinek *et al.* 2006, Marsalek *et al.* 2001). The new approach advocated by practitioners involves integrating management of the three urban water streams and aims to conserve potable water, minimise wastewater generation and manage the impact (in terms of quality and quantity) of urban stormwater on downstream waterways (Wong 2006). The features of the new approach are environmental and waterway protection, resilience to climate change and responsiveness to the local social, cultural and environmental context (Mitchell 2006, Newman 2001, Wong 2006).

Although there is common agreement in the literature for a shift to integrated urban water management, traditional management techniques still prevail (Gleick 2002) and widespread adoption of water sensitive urban design (WSUD) is yet to occur. Experience to date has been ad-hoc (Harding 2006) and limited to scattered demonstration projects (Mitchell 2006). In addition, examples of WSUD have primarily focused on stormwater quality and quantity management and have ignored the potential to reuse stormwater and wastewater in reducing the demand for potable water (Mitchell *et al.* 2007). Although the availability of water sensitive technology (as well as regulation) was originally considered a barrier (Lloyd 2001), the lack of widespread adoption of WSUD is now primarily attributed to social and institutional arrangements (Wong 2006).

Research on institutional and social impediments to the uptake of WSUD has identified the land developer as a critical stakeholder (Brown & Farrelly 2007). This research has shown the commitment of the land development sector as a whole to WSUD is weak with few examples of organisations adopting the new approach to urban water management.

Masters research is currently being conducted by the first author at Monash University to determine the role of the land developer in implementing WSUD. In particular, the research is aimed at understanding the factors influencing a land developer's decision to include WSUD as part of a new development. This paper summarises the literature review conducted for the research. It first justifies the need for research focused on the land developer and the adoption of WSUD. Second, it posits a conceptual framework for understanding the reasons why a land developer would adopt WSUD.

2. Water sensitive urban design and the land developer

Water sensitive urban design (WSUD) is one term used to describe the new integrated approach to urban water management being promoted by practitioners. WSUD reflects the belief that urban water management needs to shift to an adaptive and participatory management approach that considers all parts of the urban water cycle (natural, constructed, surface, sub-surface) and the interaction of urban water management practices with natural and anthropogenic systems (Mitchell 2006). However, unlike other terms used (such as integrated urban water management and total water cycle management), WSUD emphasises the integration of this new approach with the urban landscape (Wong & Brown 2009, Lloyd 2001) and for this reason has been the term chosen to describe integrated urban water management in this paper (and research).

Land developers and land development are responsible in part for preparing land for economic and population growth by building communities that service business activity, employment and housing (NCTR 2010). This not only builds communities but also has the potential to boost local and national economy through the generation of taxes (for example, business, land and property taxes) and land sales. In Australia, land developers will continue to have this role as population continues to grow. Between 2007 and 2008, Australia's population was growing at 1.9 percent (Commonwealth of Australia 2009) and is predicted to continue, reaching between 30.9 and 42.5 million by 2056 (ABS 2008).

Land development is inextricably linked to water (Hanak & Browne 2006). In creating communities, land development has an obligation to provide these communities with equitable access to water and other services. Land development reshapes the land for community purposes but also changes natural hydrology within and downstream of the development. Traditional urban water management and centralised infrastructure has also supported land development to spread away from natural water sources and waste treatment facilities into drier climates (Newman 2001).

Traditional approaches to land development and the effect of these approaches on natural resources are increasingly being described as inadequate. From a water perspective, Newton & Bai (2008) state that cities (existing and future) need to change to account for the wasteful consumption of water and the production of wastewater. Land development also needs to change to account for downstream effects such as erosion and water quality degradation (Fletcher *et al.* 2007).

Land development in its traditional form of providing potable water and managing waste streams is also being jeopardised by climate change and population growth. Centralised urban water services are struggling to meet current and future water needs. Hanak and Browne (2006) state that land development of the future will be forced to consider alternative water supplies and the integration of water harvesting and reticulation into the development to assure buyers that their investment is water proof.

A WSUD approach enables the land development organisation to water proof their investment, as well as manage the environmental degradation attributed to traditional urban water management practices. Standard WSUD practices in conserving potable water, managing stormwater and minimising wastewater production (Wong 2006) include:

1. Potable water conservation:	Demand management Rain/stormwater harvesting and reuse Aquifer storage and recovery Greywater/blackwater reuse
2. Stormwater management:	Rain/stormwater reuse Aquifer storage and recovery Peak flow reduction Stormwater quality improvement Preserving hydrologic characteristics Infiltration inflow reduction
3. Wastewater minimisation:	Demand management Greywater/blackwater reuse Infiltration inflow reduction

The adoption of WSUD principles requires a new approach to land development. Built and landscaping requirements need to be integrated with urban water management objectives (Mouritz *et al*. 2006). For example, onsite attenuation and treatment of storm flows requires space traditionally reserved for open space

(Hatt *et al.* 2006). Additionally, the urban water management features implemented must be sympathetic to the land use onsite and the pollutant loading typical of such a development. In summary, WSUD adoption within new land developments requires a greater understanding and response to the link between land use and water.

3. Current understanding of land developers and the adoption of water sensitive urban design

The current focus of literature on the adoption of water sensitive urban design is on institutional and social barriers. While acknowledging the technology necessary in realising a water sensitive approach to land development is available and has been implemented across Australia, the research indicates that WSUD is yet to become the mainstream approach to land development (Brown 2005). Examples of implementation are scattered and limited to demonstration projects (Mitchell 2006). The strategies employed focus mainly on stormwater quality and quantity management and ignore potential options to reuse stormwater or wastewater in minimising the demand on potable water sources (Mitchell *et al.* 2007). Institutional and social arrangements, not technology, are now considered the main barrier to widespread adoption of water sensitive urban design (Wong 2006).

The land developer can be a powerful ally in promoting change in urban water management and land development practices. Due to their importance in supporting population and economic growth, land developers are politically persuasive at all levels of government, being reputed as highly influential in dictating terms that suit them (Goodman & Coote 2007). An example of the power of land developers can be seen in metropolitan Melbourne where the urban growth boundary was extended to accommodate the development pursuits of a few larger development organisations (Buxton & Taylor 2009). Land developers are businesses in such that if change is to be advocated and lead by these organisations it must also be economically favourable.

Thus, what is the receptivity of the Australian land developer to water sensitive urban design? Why or why not have land developers adopted water sensitive urban design? The literature on land developers and the adoption of WSUD is scarce. The literature that is available focuses on the land developer as part of a broader stakeholder analysis (Brown & Farrelly 2007, Gardiner & Hardy 2006) or indirectly through the analysis of WSUD demonstration projects (Farrelly & Davis 2009, Mitchell 2006).

Brown and Farrelly (2007) identify the land developer as a key stakeholder in mainstreaming WSUD and that their commitment to WSUD (as perceived by the larger urban water sector) to be weak. Despite this finding, the urban water professionals surveyed stated that the land development sector's awareness of WSUD was improving, with some individual land development organisations committed to the new approach. However, what factors influenced these organisations to adopt WSUD was not investigated in the study.

Gardiner and Hardy (2005) explore individual motivation for the adoption of WSUD in the Australian development industry through a series of semi-structured interviews. Four exploratory questions were posed in the study, one of which, asked about the motivations for adopting WSUD, i.e. 'what are the motivations for and impediments to its implementation?' (Gardiner & Hardy 2005: 16). Through this questioning, the study identified broad motivations for WSUD adoption including proactive WSUD council policy and development within environmentally sensitive areas and the lack of traditional urban water management infrastructure. Given the potential significance of these motivations, it is clear that targeted research focussing on the reasons why these factors (and others) motivate land developers to adopt WSUD is needed. Such a targeted research project would help assess if all drivers identified by Gardiner and Hardy (2005) are necessary in motivating land developers to adopt WSUD.

Farrelly and Davis (2009) explored the adoption of WSUD through a case study analysis of WSUD demonstration projects in Perth, Melbourne and Brisbane. The case studies identified a range of drivers, mainly external, as influencing the projects. These drivers included environmental concerns (waterway degradation, water scarcity), market advantage, political endorsement (funding, policy initiatives and targets), and promotion of technology. Exploration of the internal and external drivers was not specific to the land development organisation. Hence, this multi-stakeholder approach makes it difficult to identify specific organisational drivers across the case studies and to determine possible inter-relationships between drivers internal and external to the organisation in adopting WSUD.

Mitchell (2006) conducted a review of 15 case studies of WSUD adoption scattered across Australia. The case studies were selected because of their application of integrated urban water management (IUWM) tools deemed critical by the author. These cases included large-scale sub-divisions or regional applications, and included a mix of greenfield and redevelopment sites. Land use for the case studies was predominately residential but also included commercial, residential, mixed use and open space. Although the primary aim of the study was to give a snap shot of progress in WSUD, some drivers were noted, including limited access to traditional urban water management services and financial reward. The degree of influence these drivers had on the WSUD projects assessed though is unclear from the study. For example, financial reward is noted by the author as being a finding after the demonstration projects were completed. Whether or not this incentive was understood and drove the land developer from the outset cannot be deduced from the study.

The above review demonstrates that there is a need for specifically targeted research into what drives a land developer to adopt WSUD. Without understanding what drives these organisations, intervention measures aimed at removing barriers (such as those identified by Farrelly & Davis 2009) are likely to be inadequate.

4. What drives organisations behaviour and change

The factors that influence organisational behaviour (and change) have been studied broadly through two fields of research; firstly within economic and administrative studies and later through corporate environmental sustainability. Studies within the fields of economics and administrative studies evolved over time and produced three strategies for analysing organisations and their behaviour. Traditionally, organisations were studied as simply a profit-maximising entity (Nelson & Winter 1982) and the focus of research was on improving organisational efficiency and performance (Thompson 2003). Therefore, in this research, organisations were considered closed systems, operating in isolation of other organisations and institutional forces. The factors studied as influencing behaviour were those that provide an organisation with certainty in goal achievement (Thompson 2003).

The next stage of research developed within the fields of economics and administrative studies recognised externalities as critical to the survival of organisations. The organisation in this approach was studied as an open system subject to uncertainty (Thompson 2003). While earlier studies ignored the influence of external factors on organisational behaviour, the open systems approach took the opposite stance of ignoring internal drivers in its search for causes of uncertainty.

More recently, economic and administrative studies of organisations have merged the ideas espoused by the "closed" and "open" system theorists. The effect is a strategy that enables the organisation to be conceived as an entity faced with uncertainty that looks to internal processes to provide stability. Thompson describes this new image of the organisation as a 'problem facing problem solving phenomenon' (Thompson 2003: 9).

Although the open and mixed strategy for studying an organisation recognises external drivers, these studies do not explicitly consider the natural environment as a source of uncertainty in organisational behaviour and a

driver for change. The environmental movement of the 1960's recognised and brought to the attention of society the value of the environment and the detrimental effects human activities were having on it (de Steiguer 1997, Viessman & Welty 1985). Organisations in particular were made accountable for their effect on the environment, which lead to new fields of research into sustainability and more specific to organisations, corporate sustainability.

Organisations and their behaviour, in particular regarding factors driving change, have also been addressed through innovation studies. An innovation is defined as something new as perceived by the adopting party and can be a technology and/or process (Edquist 1997). An organisation and its ability or inclination to adopt new technologies is an important subject of analysis for economic theorists (Dosi *et al*. 1998). These scholars are interested in innovation and organisations due to the effect innovation can have on market structures (and vice versa) and long term purchasing and operating trends of similar organisations. Innovation is also a key focus of transition studies and sustainability literature. Transition studies identify the organisation as a key actor in realising social change and technology adoption. However, these studies provide little detail on the dynamics that encourage the individual organisation to adopt new practices and technology and support the transition of interest. Doppelt (2003), for example, states that a major failing of sustainability literature is that it has played scant attention to the internal characters of an organisation in operationalising sustainability.

The above summary demonstrates that a considerable amount of scholarship exists broadly on organisations. It is the opinion of the author that this research has not been adequately consulted in the existing scholarship on land developers and the adoption of WSUD. The following sections provide a description of potential drivers that could influence and be further developed in the literature on WSUD.

4.1 Influential factors on organisational behaviour

The literature on organisational change from "open", "mixed" and sustainability perspectives clearly identifies multiple factors as being influential in the behaviour and dynamics of an organisation. These factors can loosely be divided into three groups; factors internal to the organisation, factors external to the organisation and factors related to technology. A summary of the potential factors influencing organisational behaviour and change identified through the literature review is given in Figure 1.

Figure 1: Potential factors affecting organisational behaviour and change

Internal factors affecting organisational behaviour and change

A key factor affecting organisational behaviour and change is the transaction cost – the cost incurred in making an economic exchange. Even if the cost of a good varies little across a sector, the costs associated in processing that good can vary substantially between organisations (Benham & Benham 2010). Thus, economists describe transaction costs as the foundation upon which organisations exist (North 1990). Factors affecting transaction costs are both internal and external to the organisation. Internal factors affecting transaction costs include knowledge and the transaction skills of the organisation (and the individuals within it) (North 1990, Benham & Benham 2010).

Knowledge is a key factor in enabling organisations to adopt new processes, technologies and / or behaviours (North 1990, Dunphy *et al*. 2007). To change, organisations need to be able to recognise new knowledge, assimilate the new knowledge into current practices and apply this knowledge to commercial situations (Cohen & Levinthal 1990).

The pursuit of knowledge and change has a cost and the organisation, in the pursuit of knowledge, must see the benefit of this cost (North 1990). The benefit of knowledge to the organisation can be a mix of many reasons, for example, profit, efficiency, reputation and competitiveness. In achieving a competitive advantage, Dunphy and others (2007) describe efficiency and the adoption of new technology as the historic drivers for change in organisational behaviour. The pursuit of knowledge can also be driven by compliance. Sustainability literature describes compliance as the most obvious internal driver for an organisation adopting technology that is compatible with environmental needs (Dunphy *et al*. 2007, Doppelt 2003).

The role of management in an organisation is to identify external knowledge, assess if the knowledge is favourable in terms of transaction costs, and if it is, incorporate the knowledge into the routines of the organisation (North 1990). Dunphy and others (2007) also state change in organisational practices to include environmental impacts and outcomes must be supported by management.

Leadership is not always synonymous with management when related to organisational behaviour and change. Obviously it is beneficial if management lead organisational change as it legitimises the process or technology being advocated. However, a "change agent" can be any individual in an organisation who has the personal or professional capacity to influence a limited area of organisational activity (Dunphy *et al.* 2007). In creating this change, change agents are critical in knowledge recognition and learning (Cohen & Levinthal, 1990) and the transfer and translation of this knowledge into terms that match their organisational structure and needs (Cottrill *et al*. 2003, Lennox & Ehrenfield 1997).

Organisational behaviour is shaped by its vision and culture. The vision is shaped by the core values and aims of an organisation and is critical in gaining commitment from the entire organisation (Dunphy *et al.* 2007). Doppelt (2003) states that without a vision of environmental responsibility employees can be lead to believe that compliance alone drives sustainable action. The vision can also reflect how the organisation wishes to be perceived by stakeholders (that is, its reputation) and hence the values of the organisation.

Thompson (2003) describes prestige as the cheapest form of power and a critical driver in organisational behaviour. If an organisation and its products are well regarded, it may more easily wield informal power in the community, attract personnel, and influence relevant legislation.

The structure of an organisation is a fundamental vehicle by which organisations achieve control of its environment. By delimiting responsibilities and control over resources, the organisation provides their employees with boundaries within which efficiency may be a reasonable expectation (Thompson 2003). Structure is also considered in sustainability literature as affecting organisational behaviour. However, in this literature an efficient (or bureaucratic) organisational structure is not necessarily considered beneficial. An efficient organisational structure is described as being rigid and inflexible and ineffective in supporting adoption of green technologies (Lutzenhiser 1994). Rather, a flexible corporate structure is encouraged in supporting change to long term corporate sustainability (Dunphy *et al.* 2007).

The size of the organisation also affects organisational behaviour and change. Small firms may seek products that attract a higher market value as their size prevents them from competing in a low cost market (Lutzenhiser 1994), while larger firms may innovate to improve performance (i.e. profitability). The ability of larger firms to innovate is also likely to be supported by a greater availability of resources (human, knowledge-based and economic) (Frambach & Schillewart 2002, Rogers 1995, Lutzenhiser 1994).

External factors affecting organisational behaviour and change

External factors affecting organisational behaviour are described by Thompson (2003) as being part of the task environment. The task environment of an organisation includes those parts of the environment (non-physical) that are relevant or potentially relevant to the organisation in setting goals.

Regulatory groups including government organisations (through public policy and regulation), unions (i.e. industry characteristics) and inter-organisational associations (i.e. network alliances) are one sector of the task environment explored by Thompson (2003). From a sustainability viewpoint, public policy plays a critical role in steering sector wide adoption of environmentally beneficial behaviour (Montalvo 2008, Dunphy *et al.* 2007),

while environmental regulation exerts pressure for practices to change (for example, through a cost for non-compliance) (Dunphy *et al.* 2007, Corral 2003).

The second part of the task environment referred to by Thompson (2003) is the availability of necessary resources. Hekkert and Negro (2009) state that the availability of resources such as markets, funding, research and development programs and skilled practitioners are essential in the adoption of new technology. Financial resources and market incentives help protect an organisation from economic risks, provide an incentive for more environmentally aware products, and together with human resources accommodate knowledge generation and learning in reducing firm uncertainty surrounding the new technology and practice (Montalvo 2008).

The character of the industry within which the organisation operates is another element of the task environment discussed by Thompson (2003). The industry dictates who an organisation's competitors are and what the basis for competition is. For example, some industries are stated as being more innovative than others, promoting innovation through competitiveness and the generation of new knowledge (either internally through research and development or through network alliances) (Lutzenhiser 1994, Gonzalez 2009).

The ability of organisations to identify and use new knowledge has been identified in this paper as a critical internal driver in shaping organisational behaviour. This knowledge can be generated from within and/or external to the organisation. Network alliances can play a key role in linking organisations to external knowledge and alternative perspectives on a common problem (Bouwen & Taillieu 2004, Doppelt 2003). Network alliances (or cooperatives) can also help reduce uncertainty posed by externalities (such as markets) (Thompson 2003).

The environment and the relationship between organisational behaviour and the environment is the core focus of corporate environmental sustainability literature. Organisational practices of the past are no longer considered appropriate and organisations are being encouraged to change to account for their effect on the environment (Dunphy *et al.* 2007, Doppelt 2003).

Society can also force organisations to change their behaviour and outputs. This is a theme common of the environmental movement and corporate sustainability. Consistent demands for more environmentally sensitive solutions from stakeholders and investors are considered helpful in exerting pressure on organisations to change (Montalvo 2008).

Technological factors affecting organisational behaviour and change

Technology is a key variable explored in economic and sustainability literature on organisational behaviour. From an economic viewpoint, Thompson (2003) considers technology as being central to organisational behaviour and North (1990) describes technology as one of the constraints upon which organisations may be designed. The adoption of green technology is a key focus of literature on organisational change towards sustainability.

Rogers (1995) describes the adoption of new technology as dependent on five factors: compatibility, complexity, observability, trialability and uncertainty of the new technology as perceived by the adopter.

Compatibility describes the ability of the new technology to meet the needs of the adopter or solve a problem that the incumbent technology is incapable of resolving (Panebianco & Pahl-Wostl 2006).

Implicit to a new technology is new knowledge, which is inherently complex. For adoption to occur, this new knowledge needs to be transferred and interpreted by the adopter. Geroski (2000) states that if knowledge transfer is difficult and costly knowledge accumulation by the adopter will be incomplete and inadequate in reducing the uncertainty inherent to new technologies.

Testing and learning by doing (observability and trialability) raises awareness of a new technology and demonstrates the feasibility of its application (Lovell 2007, Schot *et al.* 1994). The tests and observations also create new knowledge (Geroski 2000), which reduces complexity and improves certainty in the potential application of the new technology (Levitt 1980, as referenced in O'Toole 1986).

Uncertainty is intrinsic of new technology (Dosi 1982). Adopters who are risk takers will adopt early, while the risk adverse will gradually adopt as uncertainty declines (Geroski 2000).

In sum, the diversity of factors influencing the behaviour and potential for change in an organisation such as a land developer indicates a complicated latency associated with the adoption of innovative approaches such as WSUD. While the factors are critical to understanding the nature of the organisation, they are unproductive for applied research without structure or logic. The following section posits a method for integrating these factors within a framework of organisational receptivity toward WSUD that provides the necessary structure for practical research outcomes.

4.2 Conceptual models of organisational behaviour and adoption practices

Despite the breadth of research concerning organisational behaviour and change, Gonzalez (2009) states that there is still a need for an overall conceptual framework highlighting the interaction between critical drivers. Montalvo and Kemp (2008) support this claim, stating in a review article that existing conceptual models on the adoption of clean technology either focus too broadly at the sector level and ignore the particular needs of the organisation, or if focused on the organisation, neglect the influence of externalities.

In lieu of an adequate conceptual model, this paper (and research) proposes to test for the existence of all drivers identified in Figure 1 in respect to how they built organisational receptivity to WSUD. The receptivity framework was developed by Jeffery and Seaton (2003/2004) to evaluate policy instruments and to guide policy that considered the ability of the target audience to respond. The frameworks original context was water management, and has since been adopted by the National Urban Water Governance Program (NUWGP) to assess the commitment of urban water professionals within Perth, Melbourne and Brisbane to improving stormwater quality (Brown & Farrelly 2009).

The receptivity framework defines four inter-dependent components: awareness, association, acquisition and application. The components are described in terms of knowledge. That is, the receptivity of an organisation to change is contingent on the organisation being able to seek new knowledge (awareness), recognise the potential benefit of this new knowledge (association), acquire skills, processes and/or infrastructure to exploit new knowledge (acquisition), and be able to implement the knowledge to achieve the benefits originally identified (application) (Jeffery & Seaton 2003/2004). Attributes of all four components are necessary for innovation (i.e. WSUD), especially if it is to become routine. Technology and support services (for example, technical guidelines and knowledge sharing networks) are considered well developed for WSUD. However, a lack of awareness that a problem with the traditional mode of urban water management exists, ultimately limiting the application of WSUD technology and associated support services (Brown & Farrelly 2009).

The four components of the receptivity framework highlight the influence of both internal and external drivers in realising innovation. This is articulated in the work completed by the NUWGP. For example, the definition

given for awareness emphasises the role of the individual (or organisation) in identifying with the problem, while application is described as hinging on external drivers such as policy mechanisms and market drivers in providing an enabling environment (Brown & Farrelly 2009).

Importantly, the receptivity framework defines these drivers from the perspective of the recipient as opposed to the outsider or the enforcer. The framework is considered useful in this research as it guides government intervention that is focused on improving the ability or capacity of land development organisations in adopting WSUD.

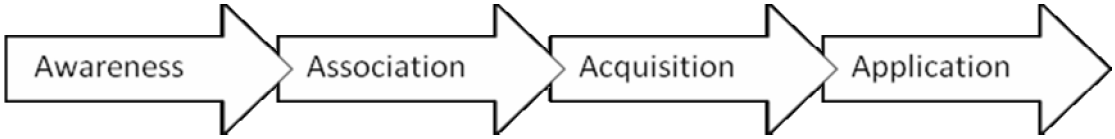

Figure 2: The receptivity model (Jeffrey & Seaton 2003/2004)

5. Conclusion

This paper has highlighted a lack of academic research on the motivations of the private land developer in adopting water sensitive urban design. Such research is necessary to fully understand the institutional changes required to foster a shift from traditional urban water management practices to the more integrated approach encouraged through the term water sensitive urban design.

The literature review presented in this paper identifies multiple factors that could potentially influence an organisation like a private land developer in adopting water sensitive urban design. Masters research currently being conducted at Monash University aims to test for the existence of the organisational drivers identified in Figure 1 in the decision of land developers who have included water sensitive urban design in developments within metropolitan Melbourne. It is proposed that the presence of these drivers will be related to the receptivity framework developed by Jeffery and Seaton (2003/2004) because of its background in guiding urban water policy that is targeted at the needs of the implementer.

This research on the motivations of the private land developer in adopting water sensitive urban design (in particular through the lens of the receptivity framework) will be useful to policymakers in developing regulative and policy instruments that better reflect the operating approach of the land development industry. With such instruments in place, the uptake of water sensitive urban design is likely to improve and become more widespread.

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