Station area developments in Tokyo and what the Randstad can learn from it

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This chapter discusses the theories and methodologies that are used to help answer the main research question of this thesis, i.e. “What are the driving forces behind the development of station areas in Tokyo, and to what extent can similar forces be activated in the Randstad?” The theoretical framework underlying this research consists of three pillars. The first pillar is about the integration between transport and land use developments and is explored using the node-place model. This model is used to identify the factors responsible for structuring station area developments in Tokyo. The second pillar deals with other government-private sector relationships in planning. These relationships are explored using the concept of market-conscious planning to find ways in which local governments can improve the way that markets function, in this case land use and real estate markets. The planning of station area development projects in Tokyo is analyzed to gain an understanding of how to improve the development of station areas in the Randstad. The core of this analysis focuses on illustrating the way that incentive systems work, i.e. the instruments that are used to trigger private developers to invest in public facilities. These systems play a pivotal role in the development of station areas in Tokyo and illustrate the way that planning is carried out in Japan. The third and last pillar is concerned with the transfer of institutional features and is addressed using the concept of ‘institutional transplantation.’ This concept is used to explore how the lessons drawn from station area developments in Tokyo could be applied to station area development projects in the Randstad. Ideas from one country cannot simply be replicated in another, as both the Netherlands and Japan differ significantly from each other. These differences need to be taken into account when adopting development practices from Tokyo to the Randstad.
This chapter further elaborates upon the methodologies used for describing and analysing station area developments in Tokyo (explanatory science), and those used to explore how station area development practices in the Randstad can learn from Tokyo (design science). The method of ‘experiential learning’ has provided a useful framework for structuring this research. It is used to structure both the explanatory science part and the design science part of this research. Regarding the former it is used to identify through first hand observation, interviews with key actors and literature study, the driving forces behind station area developments in Tokyo. As for the latter, it is used to assess, with the help of practitioners involved in station area development projects, the (im) possibility of applying the Tokyo approach to the Randstad. This is done in two steps. First focus groups and focused-group interviews were organized. Subsequently, individual interviews were held to fur

The first three paragraphs elaborate upon the theories behind this research and the processes that lead to their development. The fourth paragraph presents the analytical scheme underlying this theoretical framework. The fifth and final paragraph describes the methodological framework behind this research.

2.1 Transport and land use interaction

It is common wisdom among planners that land use and transportation patterns are closely related to each other. However, despite the wide consensus on the interrelationship between transport and land use systems and some examples of good practice, land use planning is often uncoordinated, if not contradictory to transport related choices (Cascetta & Pagliara, 2008; Filion & McSpurren, 2007; Haywood, 2005). For example, it is still quite common that railway infrastructure is completed before the urban development around stations starts or worse, urban developments are completed before the railway infrastructure has started. In both cases this hinders an efficient exploitation of the public transport infrastructure. Uncoordinated developments still occur, because transport and land use planning have tended to be separate operations in practice (Papa et al., 2007). Transport planners tend to base their decisions on standard future land use patterns derived from market projections, rather than on a land use plan. Due to this they are unable to respond well to urban planning directions. Land use planners, on the other hand, tend to make land use decisions (e.g. assigning densities, and the location of activities) on an urban plan without taking into account its future consequences on the transport system. Therefore institutional integration coupled with a more coordinated and cooperative planning process is needed to ensure the successful implementation of transport land use policies (Cervero, 1998; Curtis & James, 2004; Hull, 2005).
The ‘land use transport feedback cycle’ is often used to illustrate the complex relationship between land use and transport (Giuliano, 2004; Meyer & Miller; 2001; Wegener & Fürst, 1999). According to this cycle, land use and transport patterns influence each other. Land use patterns partly determine the location of human activities such as living, working, shopping, education and leisure. The distribution of human activities requires trips in the transport system to overcome the distance between the locations of the activities. These trips create a new travel demand and, consequently, a need for transportation services, whether in the form of new infrastructure or a more efficient operation of existing facilities. The increase in accessibility resulting from these transport improvements co-determines the location decisions of landlords, investors, households and firms. This results in changes of the land use thereby starting the cycle again.

The relationship between transport and land use patterns is not mutually exclusive as external factors also influence their development. Land use developments are not only influenced by accessibility conditions, but also by the availability of developable land, local land use policies (e.g. zoning and land use plans), the regional demand for new development, the attractiveness of the location, and the appropriateness of adjacent land uses (Bertolini, 2009; Meyer and Miller, 2001; Papa et al., 2007). Likewise activity patterns are not only determined by land use characteristics. Attitudinal, lifestyle and socio-economic characteristics tend to have a much stronger influence on travel behavior than land use patterns do (Dieleman et al., 2002; Filion et al., 2006; Kitamura et al., 1997; van Wee & Dijst, 2002). And the development of transport systems and their respective networks are not only determined by travel demand, but also by developments that influence the supply side such as infrastructure investments, technological innovations or transport policies.

Considerable complexities also occur within the ‘transport land use feedback cycle’ due to large differences in development dynamics. Activity patterns can adapt relatively fast, while it takes much longer for a transport and land use system to change. For example, improved accessibility conditions can result in different activity patterns without the land use changing first. In addition, land use changes can occur decades after or well before the development of a transport system. Moreover, changes in a transport system are just one of many changes occurring at the same time. This makes it very difficult, if not impossible, to single out the impacts of transportation on land use and vice versa (Giuliano, 2004). In other words, transport and land use patterns do not always follow the cyclical path as is suggested by the transport land use feedback cycle. These complex interactions are represented in figure 2-1 (Bertolini, 2009; Wegener & Fürst, 1999).
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Figure 2-1  Transport land use feedback cycle

The perhaps most significant land use impact of a transport system is its impact on property values. Generally, properties near a railway station have higher property values compared to similar properties located further away from railway stations. For example, in the Netherlands commercial properties within ¼ mile of a railway station have a 16 % higher property value compared to commercial properties beyond this distance. For residential property this is about 4% more (Debrezion, 2006; De Graaf et al., 2007). The exact impact that railway stations have on property values depends on several factors such as the level of service provided (e.g. local versus rapid train services), the type of property, and demographic factors such as income and racial division.

However, investments in transport systems not only have an impact on land use, as is suggested by the transport feedback cycle, but also on regional economies and neighbourhoods. Furthermore, these can be contradictory. For example, transportation investments can result in an increase in jobs, annual sales or overall economic growth;
while at the same time the construction of a railway line can have negative effects on a neighbourhood (such as disrupting social patterns due to the displacement of people). Transportation investments do not always generate population and employment growth. In Japan, for example, the *shinkansen* the Japanese high speed railway, did not cause growth, but simply attracted it from elsewhere. The regions served by the shinkansen were already growing and the shinkansen diverted this growth to its stations (Sands, 1993). Meyer & Miller (2001) refer to this as the redistributive impact of a transportation investment. In addition, it is argued that transportation investments only enhance growth in areas that are already growing prior to the investment (Giuliano, 2004; Wegener & Fürst, 1999).

At the same time, land use can have transportation impacts. Several studies have shown that neighbourhoods characterized by a high density, a mix of land uses and a pedestrian-friendly design have a positive effect on public transport usage (e.g. Cervero, 1996; Cervero & Kockelman, 1997; Kitamura et al., 1997). Neighbourhoods that are developed along the three principal dimensions of the built environment, that is high density, rich diversity and pedestrian-oriented design, are thought to lower the use of the car and encourage people to walk, cycle or use public transport. However, as the right part of the transport land use feedback cycle illustrates in figure 2-1, land use characteristics are not the only factors that influence travel behaviour, and thus the performance of the transport system. As was mentioned before, socio-economic, lifestyle and attitudinal variables play a far greater role in this. Household income and household size play an important role in influencing travel behaviour. People with higher incomes are more likely to own and use a car compared to people with lower-incomes and elderly people. Therefore, the latter groups tend to rely more heavily on public transport. In addition, families with children use cars more often than households without children. This is because it is considered more convenient for families with children to travel by car than use public transport or cycle (Dieleman et al., 2002). However, the true determinants of travel are the prevailing attitudes towards urban transportation. Attitudes are more strongly, and perhaps more directly, associated with travel than land use characteristics. This suggests that changing land use characteristics through land use policies may not alter travel behaviour unless these policies or their outcomes are able change public attitudes (Kitamura et al., 1997).

Despite the limitations mentioned above, the ‘transport land use feedback cycle’ is considered a useful tool as it is provides a better understanding of the underlying relationships between transport and land use. This research follows the reasoning of the transport land use feedback cycle and uses the node-place model of Bertolini (1999), and the theoretical notion behind it, to further explore these relationships with a particular focus on station areas. The basic idea of this node-place model is that improving the transport provision (or the node value) of a location will, because of improved accessibility, create conditions favourable to its further development. In turn, the development of a station area (or an increase in the place value) will, because of a growing demand for transport, create conditions favourable to the further development of the transport system. The emphasis on ‘conditions’ is important as it
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refers to a development potential which in reality may or may not be realized depending on factors that go beyond land use transport interaction (see figure 2-1). Various types of the node-place model have been applied during the last ten years in the Netherlands (Peek et al., 2006). The first types were mainly descriptive and were aimed at identifying ways to improve the coordination of transport networks and spatial development in the Randstad. Next, the node-place model was used to categorize station areas. This gave policy makers a tool for determining priorities in policy and investments. Other types were used to gain insight into future situations of regional networks of station areas. Finally, some types focused on facilitating actual developments of one single location taking into account the perspective of all the actors involved. During the last decade the orientation of the node-place model has shifted from a coherent policy for whole networks of nodes to the actual (re)development of certain locations (Peek et al., 2006). The node-place model has also been applied to other countries such as Italy (Papa et al., 2007) and Switzerland (Reusser et al., 2008). In Italy the node-place model served as a tool to discuss the potential need and possible scope for policy intervention. In Switzerland the node-place model was used nationwide to evaluate railway stations with respect to sustainability and spatial patterns.

In this research the node-place model is used to gain insight into the development dynamics of station areas in Tokyo. More specifically, it is used as an explorative tool to find out which transport and land use factors are responsible for structuring station area developments, and to what extent. The expectations of the model are compared to the actual investments taking place in and around station areas to find out if stations develop as assumed by the model. The matches and mismatches identified should give an idea of the mechanisms (driving forces) behind the development of station areas in Tokyo. The findings from this can be used to help cities that are seeking for ways to promote the integration of public transport and urban development or ‘transit-oriented development’ (Calthorpe, 1993; Cervero, 2004; Dittmar & Ohland, 2004).

Several studies have shown that a successful integration of public transport and urban development requires plans that cover entire metropolitan regions and that are consistent over a long period of time (Bertolini, 2007; Cervero, 1998; Curtis et al., 2009; Dittmar & Ohland, 2004; Fillion & McSpurren, 2007). The importance of the region is underlined by the fact that, at least in the Netherlands, mobility and activity patterns take place on a regional scale (Ruimtelijk Planbureau, 2006). For example, in the metropolitan region of Amsterdam most people work, shop and enjoy leisure activities within their own metropolitan region (Bureau Onderzoek en Statistiek, 2008; 2010). In other words, the daily urban system occurs predominantly at a regional level. Therefore, it is assumed that a regional approach, which focuses on railway corridors, is needed for a successful coordination of transport and land use changes. Why focus on railway corridors? There are various reasons for this (Bertolini & Rietveld, 2008). First, within a railway corridor origin (residential areas) and destination (working and leisure areas) locations can be developed in a coherent way. This allows a developer to design an integral strategy for the whole area aimed at specific target groups. Second,
focusing on the railway corridor allows plans between different station areas to be coordinated. In this way destructive competition between station areas can be avoided and instead synergies between them can be promoted. Similarly, a focus on the railway corridor can stimulate a better transfer between different modes of transport. Third, focusing on the railway corridor makes it possible to utilize public transport in a more efficient way, such as initiating developments that generate off-peak travel or bi-directional traffic flows.

In this research a railway corridor is defined as a railway line operating at a regional level and the land surrounding the stations of that line. It is realized that railway corridors are not necessarily limited to a regional level, as at a local level (e.g. a subway line or tram line) and at an (inter)national level (e.g. an intercity line or high-speed railway line) railway corridors may also exist. However, as such corridors are not concerned with daily activity and mobility patterns they are left out of this thesis.

In addition to exploring the development dynamics of individual station areas, the node-place model is used here to further explore these dynamics within a railway corridor. The focus on a railway corridor is closely related to the (design) principles of transit-oriented development (TOD). Just like TOD the development of a railway corridor should focus on: organizing growth at a regional level, associating density (i.e. residential and job density) with a mix of land uses, a pedestrian-friendly design, and proximity to quality public transit services (Calthorpe, 1993; Cervero and Kockelman, 1997; Cervero, 2004; Dittmar & Ohland, 2004). It is believed that such practices maximize the return on transport investments, increase the use of public transport and control urban sprawl (Papa et al., 2007).
2.2 Market-conscious planning

Today governments, whether they are local, regional or national, frequently face budget constraints. The financial crisis that hit the world in the summer of 2007 exacerbated this problem as particular national governments bailed out several financial institutions by providing them massive loans. Consequently, many countries are being forced to cut expenses. The worsened financial situation is forcing governments to re-evaluate their relationship with the private sector. Governments are increasingly reliant on the private sector and their willingness to invest in government plans. However, this is not a new phenomenon. Since the early 1980s national governments in Europe have experienced, albeit at different levels and speeds, a transformation of the welfare state. Consequently, this has reduced the proactive role that governments used to play in the economy and society (Salet et al., 2003). Due to processes such as globalization and the liberalization of economic markets, the private and voluntary sector have become increasingly involved in the delivery of public services (e.g. water, energy and public transport) and public decision-making. In other words, responsibilities that were previously the near exclusive responsibility of government are now being shared (Stoker, 1998). However, national governments in Europe have not only relinquished responsibilities to the private sector, but also to other levels of government: in particular the European Union, regions and cities. This has made intergovernmental relationships more complex, leading to a multilevel pattern of governmental competencies (Salet et al., 2003).

The role of government has also changed on a local level. Local authorities have received greater autonomy, but at the same time have been witnessing reduced grants from the national government. This has urged municipalities to look for alternative strategies to increase their local income, and consequently has intensified competition between them. However, at the same time many municipalities are seeking for cooperation on a metropolitan and regional level. The private sector may benefit from this tension by playing municipalities against each other in finding the most attractive development sites within a region. The relevance of the regional context and the interrelatedness and competition between municipalities at this level seems to make local governments at least partly dependent on the private sector and semi-private sector for reaching their goals (Hoetjes, 2010).

Therefore, traditional government-oriented planning or even government-based planning is no longer a satisfactory approach. A different approach to planning is needed that is more capable of managing the complexities and pluralities characteristic of today’s society. In order to identify such an approach first the effectiveness of government intervention compared to market solutions is discussed. When one looks to the relevant academic literature it appears that the effectiveness of government intervention compared to market solutions has been the subject of much debate in economics. Basically, three mainstream economic approaches can be distinguished each having their own interpretation of this. They are neo-classical economics, welfare economics, and new institutional economics. The neo-classical approach considers the
market as a self-adjusting system in which supply and demand is corrected through the price mechanism until equilibrium is reached. It is assumed that such equilibrium can only be reached in a perfectly competing market characterized by rationally acting individuals and firms. However, in practice this is rarely the case. Markets are hardly fully competitive illustrated by the several monopolies and oligopolies that exist. Also, the assumption that market actors only behave rationally can be contested. Therefore, equilibrium often cannot be reached resulting in a suboptimal allocation of resources. Welfare economists consider these situations as market failures and such failures, it is argued, justify government intervention.

According to Wolf (1988) four types of market failures can be distinguished. They are externalities and public goods, increasing returns, market imperfections, and distributional inequity (income and wealth). In each case inefficient market outcomes (insufficient or excessive outputs) are produced. This, in the view of the welfare economists, requires government intervention to remedy or at least alleviate these shortcomings. For instance, pollution is a negative externality of which the associated costs in a self-regulating market system are not appropriable by or collectible from the producers. Consequently, more tends to be produced than in terms of costs and benefits to society is considered necessary. This provides, in the view of the welfare economists, the rationale for government intervention through taxing or direct regulation to correct these shortcomings. Welfare economists assume that governments are capable of doing this perfectly without incurring any costs and only acting on behalf of public interest (Buitelaar, 2003, p.317).

However, this is being challenged by new institutional economists who argue that there are not only market failures, but also non-market or public failures (Webster, 1998; Wolf, 1988). Government intervention may result in redundant and rising costs, unanticipated side effects (derived externalities), distributional inequity (power and privilege), and may have ‘private’ internal goals that do not always serve the public. In other words, an imperfect market allocation is not always accompanied by a perfect administrative process of allocation. For instance, the market-correcting policies of the government (e.g. taxation, regulation or subsidization) incur transaction costs (see Buitelaar, 2007). These are costs associated with the creation and usage of institutions (e.g. a tax law), and acquiring information that is needed to formulate policies. Welfare economists tend to ignore such costs, as they assume zero transaction costs, and as a result additional inefficiencies may occur. However, this does not mean that new institutional economists are against government intervention. Rather they argue that government intervention is not the only way of regulating markets. Whether government intervention is appropriate should be determined on the basis of its transaction costs compared to other alternatives.

When other institutional arrangements are more efficient than government regulation, i.e. achieving the same result at less cost, government regulation should be curtailed
(Coase, 1960). Accordingly, new-institutional economists see government intervention as functional as long as it improves the outcomes that would have otherwise been produced by markets or firms.

The three economic approaches outlined above can also be referred to when interpreting relations between planning policy and property markets. Each approach presents planners with a fundamentally different question (Adams & Tiesdell, 2010). The neo-classical approach addresses the question of how far planning policy directly affects the overall quantity of market supply and demand. The welfare approach concentrates on the extent to which planning policy is able to overcome market failure. New institutional economics focuses on the question of to what extent planning policy reduces (or indeed increases) market transaction costs.

These three approaches all view the market as dichotomous to government and planning (Adams & Tiesdell, 2010). However, this is a misleading distinction (Lai, 1994) and according to Alexander (2001) it is based on a widely held association between planning and ‘public’ as opposed to the private enterprise in the supposedly unplanned market. However, planning is not a strict government activity; nor do markets exclude planning. Also private firms are engaged in planning. For example, private railway operators in Japan each make their own business plans in which they outline their course for the coming years (see chapters 4 and 6). Therefore, it is better to make a distinction between ‘private planning’ of individuals and firms in the market and ‘public planning’ by planners in the government (Lai, 1994, p.91). In addition, it would be a misconception to think that markets can function separately from the state. A market can only function properly with rules and these rules generally need to be created and enforced by the government (Needham 2005; 2006). The choice between government and markets is thus not a dichotomous one (Buitelaar, 2003; Needham, 2006; Webster & Lai, 2003). Consequently, it is rather unfruitful to treat government on the one hand and markets on the other as each other’s counterparts. Instead, it is necessary to consider the way in which they interrelate and function together:

‘Our position in this respect is that state and markets co-evolve, complementing each other and, by trial and error, discovering better ways of distributing responsibilities between private and public sector and between private and collective action’ (Webster and Lai, 2003, p.2).

And more specifically applied to land use Needham (2006) argues:

‘The choice is rather how should a desire of the public, expressed through a state agency to influence land use decisions in particular way, be realized, with what combination of private law rules and what kind of public law rules?’ (Needham, 2006, p.27)

Therefore, one can argue that the relationship between the government and the market is symbiotic.
Politicians and public administrators are intricately involved in framing and reframing the market as they have the means to stimulate, regulate and shape market activities. Consequently, the public sector has the potential to re-make rather than merely accept market conditions. This implies that the public sector can use the market for its own sake. Therefore, the challenge is for the public sector not to become market actors, but rather to realize that they are already market actors, conscious of the market, and operate accordingly (Adams & Tiesdell, 2010).

Planners in the public sector that need to think and operate as market actors can no longer rely on an imposed and centralized coordination of both society and economy. Much of the planned order attempted in cities (e.g. city planning) and systems of cities (e.g. regional planning) has faltered, failed or been revised by the market. This is, as Webster and Lai (2003, p.21) argue, because government planners tend to ignore the strength of spontaneous re-ordering on the one hand and the interaction between planned and spontaneous order on the other hand. Failure occurs because, compared to the spontaneous ordering power of the market, a planned order by the public sector has an information disadvantage due to its dependence on centralized information. This information is more limited and in some cases simply defective and misleading (Webster & Lai, 2003). ‘Spontaneous’ refers to the ability of economic and political markets to adapt to changes in demand and supply without central planning. For example, markets have the ability to reassign property rights in response to changes in resource value (e.g. when land is subdivided). Political markets have the ability to adapt to changes in demand for collective action (e.g. a policy following voter interest). A government planner needs to be aware of this and of the exchange that is constantly taking place between this spontaneous order and the planned order. Imposed and centralized coordination (planned order) and spontaneous and decentralized coordination (spontaneous order) can compete (e.g. a government law constraining market activity or markets ignoring government plans) and complement (e.g. planning instruments stimulating market activity, or markets adopting government plans) each other. When government planners realize this, it will help them in finding better ways to distribute responsibilities between the private and public sector and private and public action. Planning by the public sector that recognizes the role markets play in coordinating land use changes and limits itself to establishing the rules of the game for market behaviour, offers both greater flexibility and predictability in meeting the needs of society. This is what Staley & Scarlett (1997) refer to as market-oriented planning. I prefer to call it market-conscious planning as introduced in Hoetjes et al., (2006).

In traditional government-oriented planning, regulations play a crucial role in coordinating land use changes. However, in many cases government regulations seem to impede rather than stimulate such changes, resulting in inflated transaction costs as well as more rigid and less efficient markets. A market-conscious approach to planning, I argue, seeks to find ways in which the government can help improve the functioning of markets. A possible way of doing this is by giving initiatives and freedom to the private sector, while at the same time presenting them with strict
requirements regarding the usage of land. For instance, in the case of planning, incentives allow the private developer a considerable amount of freedom in the planning and development of a location. However, the government is still able to influence this development; as a private developer who wants to apply for an incentive system needs to meet certain conditions pre-established by the government. Such an approach means that governments do not necessarily have to produce public services themselves. This could also be left to the private sector, whereby the government’s role is limited to establishing the requirements that the public services should meet (Salet et al., 2003). This example clearly shows that private sector investments can be used for achieving public goals and that public planning tools (e.g. incentives) can be used for achieving private goals. However, the extent to which this can take place depends on the negotiating powers of both the public and private sector.

The lack of market awareness by public sector planners is a central point in this thesis. This thesis builds on the argument put forward by Adams & Tiesdell (2010) by hypothesizing that government planners who behave as market actors are more effective in influencing developments, than government planners who neglect or deny the market as a mechanism for influencing developments. The aim of this research is to find out to what extent this is true by analysing the development process of station areas in Tokyo.

There are four arenas within which government planners should enhance their understanding of the market in order to increase the effectiveness of their policies (Adams et al., 2005, p.241-244):

1. Government actors need to realize that there is no such thing as a single market. Therefore policies need to reflect the particular characteristics of the submarket which they intended to influence.
2. Government actors need to acknowledge the importance of market dynamism. Property, land and transport markets are not static. Therefore policies should focus on facilitating the process of change.
3. Government actors should recognize the desire among the private sector for greater political stability and predictability, although this may seem rather ironic in the context of market dynamism.
4. Government actors need to be aware of the side-effects of planning and associated public policies, as these side-effects do not impact uniformly through the market.

The above indicates that government planners need to develop a better understanding of the market. However, it also necessary for market actors to enhance their understanding of the government, in regards to transport and land use planning. Market-conscious planning requires, as was mentioned before, an understanding of the interrelationships between government and market. Therefore, it may also be necessary for market actors to enhance their knowledge about public planning and implementation processes. There are three arenas within which market actors could learn about the government (Adams et al., 2005, p.246-247):
1. Market actors need to realize that government actions are structured by political and institutional realities. This tends to be ignored. For example, it is not realistic to abolish green belts - whether a developer likes it or not.

2. Market actors need to realize that the purpose of government actions is to change market outcomes, rather than to merely confirm market directions.

3. Market actors may need to broaden their understanding of the instruments available to the government which can be used to change market outcomes. Planning involves more than development control and general land use regulation.

From the above one can conclude that a market-conscious approach to planning has consequences for both the role of the government and the private sector in planning. However, it seems fair to say that the role of the government in planning will be most affected. In market-conscious planning, planning is no longer the exclusive territory of the government. As a result, a strictly governmental view on planning, or as Boelens (2010) likes to call it 'a planning from the inside-out', is no longer considered sufficient. This automatically raises the question of to what degree the government should remain involved in planning. The views on this differ considerably among scholars. Some (e.g. Klosterman, 1985; Sorensen & Day, 1981; Staley & Scarlett, 1997) argue that matters should be resolved with as minimal government interference as possible. In their view government regulation and planning should be minimized as it hinders entrepreneurship, impedes innovation, and imposes unnecessary financial and administrative burdens on the economy. Government intervention is justified in the case of market failures involving public goods, externalities, prisoners’ dilemma conditions (pursuit of individual gain leading to external effects), and distributional issues (Klosterman, 1985). Others go a step further by questioning whether the government should be involved in land use planning at all (Boelens et al., 2006; Boelens, 2010; Buunk, 2006; Pennington, 2002).

A crucial and distinguishing feature of a market-conscious approach to planning is that it is aware of the actual development opportunities determined largely by market forces, and it uses this knowledge to make the achievement of public goals substantially more feasible (Hoetjes et al., 2006). Taking into account market dynamics, means that public sector planners are better capable of deciding where and how to influence developments and helps them to explore possible synergies with public goals (Hoetjes, 2010). This is different from market-led planning, which is more heavily focused on attracting (foreign) capital investments and less focused on whether these investments have certain public merits. These aspects to planning are addressed in a more balanced way by the market-conscious approach.

This thesis will explore further how governments can improve the functioning of markets by focusing in particular on the planning tools that can be used to influence the decisions of land and property market actors. It is, however, realized that land and property actors can also influence the creation of new instruments (e.g. in Tokyo it is quite common that private developers lobby for new planning instruments).
There are four basic types of planning tools a government can use to achieve a desired land use (Adams et al., 2005; Needham, 2005):

1. **Market shaping tools**: instruments that shape the decisions of market actors. Examples are development plans, regulatory plans and indicative plans.
2. **Market regulating tools**: instruments that define the parameters for market actors’ decisions. Examples are zoning ordinances and restrictive covenants attached to land transfers.
3. **Market stimulation tools**: instruments that restructure the contours of the decision environment of market actors. Examples are indirect/fiscal measures such as subsidies and tax breaks and direct government action such as compulsory acquisition, provision of public infrastructure, and joint ventures.
4. **Capacity building**: instruments for developing actors’ capability to identify and/or develop more effective/desirable strategies. Examples are arenas for interaction/networking, and partnerships/partnering arrangements.

This thesis will focus on market regulating and market stimulating tools. In practice both tools often go hand in hand. For example, using regulations to direct developments away from a certain location is often accompanied by stimulating developments elsewhere through incentives. Both types of planning tools are assumed to have the greatest influence on the decision making behaviour of market actors. They are therefore considered to be the most effective tools for achieving the goals of both the public and the private sector. This is illustrated by describing the planning process of station area developments in Tokyo. The core features of the Japanese planning system are its flexible zoning system (a market regulation tool) and the several incentive systems (market stimulating tools) that are being used to stimulate a more efficient and safe land use in Tokyo (see Chorus, 2002; 2006). The workings of some of these instruments are described with the purpose of showing how non-financial compensation instruments (see Janssen-Jansen et al., 2008) are used to trigger private developers in Tokyo, as well as in other cities in Japan, to invest in public facilities such as parks, plazas, sidewalks, cultural facilities, and in some cases even residences. The guiding role of the government in such a system is not weaker than in a more permissive system, rather it is stronger. This is because the government is still capable of influencing, through certain pre-established conditions, a desirable development outcome, which in the case of Tokyo is a more efficient and safe land use. In turn the private sector gains a more prominent position in planning, provided that it conforms to the pre-established conditions set by the government (Janssen-Jansen et al., 2008). This approach to planning is considered one of the main driving forces behind the development of station areas in Tokyo. As result it may provide useful insights for station area development projects in the Randstad.
2.3 Institutional transplantation and learning

Good station area development practices in Japan cannot simply be copied in the Netherlands. As we have seen in chapter 3, Japan and the Netherlands differ significantly when comparing their geographical, socio-economical and political context. Underlying these differences is the social model, i.e. the collection of social and common values (Nadin & Stead, 2008). Contextual differences must be taken into account when transferring ideas from one country to another. If this is not done then ideas might not turn out as expected or worse, they might be rejected. Institutional transplantation (de Jong, 1999), or the borrowing of institutional features from one country to another, is one of the concepts used in policy borrowing, and provides a method for adopting good decision-making ideas from one country to another. It is used in this research to explore how instruments, policies, procedures and roles of actors featured in station area development processes in Tokyo could be applied to station area developments in the Netherlands, particularly the Randstad.

Before explaining why institutional transplantation is used and how it works, the term ‘institution’ deserves some further explanation. Institutions can be defined as systems of embedded and established social rules that structure social interactions (Hodgson, 2006, p.2). Language, money, table manners, system of weights and firms (or other organizations) are all examples of institutions. Such rules structure social interactions as they enable, constrain and also change behaviour. Organizations are, according to Hodgson (2006), a special type of institution because they have their own internal structures or networks which cannot function without rules of communication, membership, or sovereignty. For example, in a private railway company there are only a few people who have the authority to decide over investment decisions. They make these decisions based on certain rules that apply within the company (e.g. a certain return on equity) and give others within the company the responsibility to carry them out. Institutions can either be formal or informal. However, this distinction, as is argued by Hodgson (2006), is defined in different and confusing ways by various authors. Some identify ‘formal’ with legal and ‘informal’ with non-legal. Another regards the formal/informal distinction with explicit versus tacit rules. While yet another regards formal with designed and informal with spontaneous institutions. Therefore Hodgson (2006) suggests that it might be wise to use more precise terms such as legal, non-legal, and explicit versus tacit. To avoid this confusion and to be more precise in this research the term ‘legal’ and ‘non-legal’ will be used. Legal institutions refer to the legal and administrative rules of a country. They are the rules of the game telling people what to do or what not to do and under which conditions. Non-legal institutions are the cultural values and norms underlying social practices and rituals. They are helpful in understanding the impact that certain rules have on the behaviour of people. An insight into both the legal and non-legal institutions of the original and host country is needed to find out whether a specific institution is transferable or not. It is more difficult to transplant non-legal institutions than legal institutions as cultural values are more elusive and harder to disentangle. Besides, making a distinction into legal
and non-legal institutions, it is needed to make a distinction between the three levels of action within an institution. They are the constitutional level, the level of policy area, and the operational level. An insight into these levels of action is helpful in understanding the different domains in which transplantation processes occur (de Jong et al., 2002). Six domains can be distinguished (see Table 2-1).

Table 2-1  Different domains of institutional transplantation

<table>
<thead>
<tr>
<th>Level of action</th>
<th>Legal institutions</th>
<th>Non-legal institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constitutional level (ground rules)</td>
<td>Legal systems</td>
<td>Value orientations</td>
</tr>
<tr>
<td>Level of policy area (relations between governmental bodies)</td>
<td>Formal regulations</td>
<td>Informal codes</td>
</tr>
<tr>
<td>Operational level (daily activities)</td>
<td>Procedures,</td>
<td>Roles, techniques</td>
</tr>
<tr>
<td></td>
<td>administrative forms</td>
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Institutional transplantation is not a new phenomenon. Japan was in fact one of the first countries to borrow institutional features from other countries. During the Meiji-period (1868-1912) Japan borrowed institutional features from other countries in a desperate attempt to turn the country into a modern state (de Jong et al., 2002). At present institutional transplantation is a global phenomenon which, due to processes such as globalization, Europeanization and improved infrastructure facilities, is applied on a worldwide scale.

Why institutional transplantation is considered useful? The main idea behind borrowing institutions from one country and implementing them in another is that it should lead to improvements in the host country. It is regarded as a means to speed up development and to reduce the cost of development, as it is cheaper to adopt existing institutions than to develop completely new ones. How does institutional transplantation work? Institutional transplantation processes are considered to be more demanding for higher levels of actions and more difficult to implement for informal practices. In other words, the easiest procedures to transplant are those at the operational level, while value orientations at the constitutional level are the most difficult to transplant (de Jong et al., 2002). This thesis focuses on institutional transplantation processes at the operational level as it aims to transplant instruments, policies, processes, and roles regarding station area developments in Tokyo to station area developments in the Randstad. However, this does not mean that the other levels
of action will be ignored. The three levels of action are closely related to each other. For example, a change in procedures may require an adjustment of particular instruments, which in turn may require a revision of the law. However, for analytical purposes this thesis focuses on the operational level.

How institutional transplantation works and what is crucial to its success can be illustrated by two perspectives (de Jong et al., 2002). The first perspective, the ‘actor pulling in’ argument, considers institutions as essentially man-made and that they can be framed and reframed by policy actors following their own preferences. Transplants are ‘pulled in’ by actors supportive of their ideas and ideologies. However, actors will never be able to entirely frame institutions by themselves as others have a say in this as well. Therefore, prior to adapting or adopting ideas to one’s country some form of agreement needs to be made.

The second perspective, ‘the goodness of fit’ argument, considers the legal, cultural and political affinities and similarities between the host and donor countries. A transplant should fit into its new environment. Therefore, one should be aware of the (in) compatibilities between countries as this is considered vital in understanding the extent to which transplantation is possible. A way to assess the ‘goodness of fit’ of a transplant is by the concept of families of nations, which refers to a group of countries sharing similar legal, political and cultural characteristics. It is assumed that transplants between members of the same family are easier than transplant between members of different families. Two types of families can be distinguished at the constitutional level. They are the legal families and the cultural families. Legal families are based upon certain legal styles; these are the distinctive elements which give a legal system its particular form. Factors which contribute to the formation of a specific style include its historical development, its legal mode of thought, its legal sources and its ideology (Newman & Thornley, 1996). In Europe four different legal styles or families can be distinguished. They are the British, Napoleonic, Germanic and Scandinavian family. These legal families differ from each other in terms of constitution, state-society relations, political organization, policy style, form of decentralization and approach to public administration.

Cultural families can be distinguished according to their differences in value orientations. Hofstede, a Dutch social scientist, uses five dimensions to assess these differences (Hofstede & Soeters, 2000, p.3-8):

1. **Power distance**: the degree of inequality among people which is perceived normal by the population of a country. This ranges from fairly equal (small power distance) to extremely unequal (large power distance).
2. **Uncertainty avoidance**: the degree to which people in a country prefer structured over unstructured situations. ‘Structured’ means there are clear rules to how one should behave. A country with strong uncertainty avoidance is considered rigid. One with weak uncertainty avoidance is considered flexible.
3. **Individualism-collectivism**: the degree to which people in a country prefer to act as individuals rather than as members of a group.
4. **Masculinity-Femininity**: the degree to which values such as assertiveness, performance and success (masculine values) prevail over values such as quality of life, maintaining warm personal relationships, service, care for the weak, and solidarity (feminine values). When masculine values dominate one can speak of a performance society. When feminine values prevail one can speak of a welfare society.

5. **Long-term orientation versus short-term orientation**: the degree to which values are oriented towards the future like thrift and perseverance as opposed to values oriented towards the past and present such as respect for tradition and fulfilling social obligations. A society that adheres to future values more than past values is considered long-term oriented. When the reverse is the case a society is considered short-term oriented.

Countries may not only have different legal and cultural styles, but they may also differ in political style. This too is considered vital in understanding the extent to which a transplantation is possible and should therefore also be taken into account when assessing ‘the goodness of fit’ of a transplant. According to van Waarden (1999) certain national regulating styles can be distinguished based upon the political, legal and bureaucratic institutions present in a country. These styles can be characterized by comparing countries along three principal dimensions:

1. **Degree of intervention by the state**: to what extent, if at all, does the government intervene in society? This dimension is subdivided into three sub-dimensions: dominant source of intervention (government, market or societal organization), style of regulation (active or passive), and style of policy planning (fragmented or integrated).

2. **Relation between government and societal organizations**: how does the government deal with societal organizations during the phase of policy preparation or regulation? This dimension is subdivided into two sub-dimensions: kind of relationship (conflict-oriented, consensus-oriented or paternalistic) and character of the relationship (formal or informal).

3. **Policy implementation and conservation**: what approach is followed regarding the processes of implementation, conservation and sanctioning? This approach can either be strict (legalistic) or flexible (pragmatic).

It is important to be aware of the national regulating style of a country as it may help to explain the way people behave in a country. More specifically, in this research it helps provide an insight into the behaviour of the actors involved in the development process of station areas.

The two perspectives, the ‘actors pulling in’ and the ‘goodness of fit’ argument, complement each other as both perspectives highlight different aspects of the transplantation process. The ‘actors pulling in’ perspective stresses the need not to overlook the importance of adaptation and implementation processes. Actors should
be given enough freedom to adapt models according to their own liking, as a lack of freedom may lead to resistance and/or ineffective outcomes. When actors are given enough freedom they are more likely to facilitate the transplantation process. The ‘goodness of fit’ perspective underlines the importance of the starting situation in which a transplant is to be adopted. The starting situation should be acknowledged and taken into account when taking a model and adjusting it to one’s needs. Transplants do not necessarily need to occur between countries belonging to the same family of nations. Cross-family borrowings are possible as long as one is aware of the possible (in) congruencies between the donor (institutional transplant) and the host system (institutional context).

What is not highlighted in the book of de Jong et al., (2002) is the actual learning process itself, in other words how cities actually learn from each other. The two perspectives outlined above explain how the transplantation process occurs and what is crucial to its success. The ‘actors pulling in’ perspective gives importance to practical and administrative matters. While the ‘goodness of fit’ perspective places more value on matters of congruence. However, whether an institutional transplantation is successful or not depends also on the willingness of a city to learn. Policy innovations are most likely to be adopted by pioneering cities that have the capacities to do so (Kern et al., 2007). Factors such as city size, wealth, political institutions and their endowment with social capital seem to be crucial for a successful transplant. Consequently it can be assumed that innovations are more likely to be implemented by larger local authorities than by smaller ones, that richer cities tend to initiate innovation processes earlier than poorer cities, that certain political parties in the local government are more in favour of innovation than others, and that social capital (e.g. a social network) is an important precondition for the adoption of policy innovations. There is, however, little evidence on how cities learn from each other and even less on how this process occurs in the transport sector (Marsden, 2008). This makes it difficult to understand how to improve learning. There are three barriers which seem to hinder city-to-city learning (Marsden et al., 2009): 1) the lack of an institutional learning culture, 2) an unsystematic search for information, and 3) the lack of staff time and resources available for such searches. These barriers are closely related, as for example cities with stronger learning cultures (i.e. when within an organization new ideas and staff learning is actively encouraged) will make more resources available for learning. Cities should overcome these barriers in order to initiate policy innovation. Consequently, it seems that institutional transplantations are only successful when, besides practical and administrative matters (actors pulling in) and matters of congruence (goodness of fit), the learning capacities mentioned above are also taken into account.
2.4 Synthesis

Three theories have been discussed that together make up the theoretical framework of this research. The first theory (transport and land use interaction) has addressed the complex relationship between transport and land use. It has demonstrated that the cyclical relationship between transport and land use is not a closed one, but instead is influenced by many outside factors. In this thesis the node-place model (Bertolini, 1999) is used to further explore these relationships with a particular focus on station areas. More specifically, it is used to explore the spatial development dynamics of station areas in Tokyo. This is done at three different levels: 1) network, 2) the corridor and 3) the station. In chapter 5 the development patterns of station areas on a network level are analysed using the node-place model. Accordingly, these patterns are further analysed on a corridor level in chapter 6. This is followed by an in-depth analysis of three case studies of station area developments in Tokyo in chapter 7. The second theory (market-conscious planning) dealt with the role of the government and market in planning. It illustrates that the relationship between the government and the market is actually symbiotic, rather than dichotomous. Government planners are intricately involved in framing and reframing the market as they have the means to stimulate, regulate and shape market activities. Consequently, the public sector has the potential to re-make rather than merely accept market conditions. Government planners, however, often do not realize this and therefore are less effective in influencing land use developments, than when they would behave as market actors. Consequently, they should become more aware of the market and the driving mechanisms behind it. Using this knowledge they can determine the operation of the market, in regards to planning, by establishing requirements that the market must meet. These requirements can be enforced by planning instruments such as the incentive systems. This is the leading hypothesis behind the analysis of station area developments in Tokyo and the Randstad. This analysis takes place in chapter 4 where is described and explained how station areas are developed and what actors are involved, and in chapter 7 where this is demonstrated in practice. The third theory (institutional transplantation and learning) deals with the difficulties that emerge when trying to adopt and transplant ideas between two different countries. It has been demonstrated by two perspectives (i.e. the actors pulling in and the goodness of fit perspective) how a transplantation process occurs and what is crucial to its success. The first perspective stresses the importance of adaptation and implementation processes. The second perspective stresses the importance of understanding the existing setting in which a transplant is adopted. In addition, it has been shown that in order for an institutional transplant to be successful attention should also be paid to the learning capacities of a city or country. The latter seems to be particularly important for determining the extent to which a city or country can actually learn. This learning process is highlighted in chapters 9, 10, and 11. Chapters 9 and 10 describe the result of a series of focus groups and focused-group interviews that were held in the Randstad. The aim of which was to assess what and how the Randstad can learn from station area development practices in Tokyo. Based on the findings of the focus groups and focused-group interviews some additional
Chapter 2 - Theoretical and methodological framework

Interviews were held in chapter 11 with actors involved in the development of station areas in the Randstad. These interviews were structured by a number of hypotheses. The findings presented in chapters 9-11 are interpreted in chapter 12, taking into consideration the legal, cultural and political styles that characterize Japan and the Netherlands.

Figure 2-2 schematically demonstrates how these theories relate to each other. Central in the scheme are the node and the place, representing the transport and land use markets in which station area developments occur. Both markets, or rather the transport and land use changes occurring within these markets, influence each other as depicted by the arrows in the centre. This relationship is not a mutually exclusive one, as there are also external factors which intervene and influence these markets. These external factors are referred to as ‘context’ in figure 2-2. The focus of this research, however, is on providing a better understanding of the underlying relationships between transportation and property markets, i.e. the transport and land use patterns occurring within these markets. Both transportation and property markets are influenced by public and private actors and the interrelationship between them. Public and private actors both conduct policies and have instruments with which they can influence transport or land use patterns. For example, governments conduct transport and land use policies with which they can frame and re-frame transport and property markets. Private actors have their share in this with their investment policies in which they decide where and to what extent to invest. Public and private actors could opt to do this in an interrelated and even joint manner to profit from possible synergies between public and private sector targets. This is a typical feature of the market-conscious approach to planning followed in Tokyo, in which private sector investments are used to achieve public targets and public planning tools are used to achieve private targets.

The scheme depicted in figure 2-2 provides the framework against which institutional transplantation and learning between Tokyo and the Randstad could take place.
2.5 Methodological framework

The goal of this research is twofold: 1) to draw lessons from station area developments in Tokyo and 2) to explore how these lessons could be applied to station area developments in the Randstad. Two forms of research are used to address these goals. The part focusing on Tokyo (part two: chapters 4 to 7) uses explanatory science, while the part focusing on the Randstad (part three: chapters 8 to 12) uses design science (see figure 2-3). The characteristic features of both research types and their implications for this research are further discussed below.
Explanatory science versus design science

Explanatory science is characterized as being description-driven with a focus on understanding problems. Its objective is an explanandum or ‘something to explain’ and typically uses descriptions, explanations and/or predictions as its research products. Its focus is usually some kind of causal model in which dependent variables are explained and/or predicted by independent variables. The node-place model analysis carried out in this research can be considered a typical example of explanatory science. It is used in this research to explain the spatial development dynamics of station areas. Questions that are typical of an explanatory science research have been addressed, such as, ‘Which transport and land use factors are responsible for structuring station area developments, and to what extent?’ The node-place diagram resulting from this analysis should be seen as the causal model in which transport and land use factors (dependent variables) are used to explain the development dynamics of station areas (the independent variable). In a similar, i.e. descriptive-driven, way the spatial development dynamics of railway corridors and stations have been analysed.

Design science, a term used by van Aken (2004), has rather different characteristics. First of all, it is prescription-driven and focuses on solving problems. Its objective is a mutandum or ‘something to change’ and typically uses prescriptions (‘if you want to achieve Y in situation Z, then something like action X could help’) as its research product. Its focus is not primarily oriented towards a causal model, but rather to develop knowledge to solve construction problems (e.g. in architecture or engineering), or to develop knowledge to improve the performance of existing entities (e.g. in medicine or management). To be clear, this is not the same as applied science or basic science. As the aim of design science is not simply to apply knowledge generated by explanatory science, but rather to generate new knowledge (van Aken, 2005). The way that the potential of the Tokyo approach for the Randstad has been assessed can be considered a typical example of design science. It is used in this research to gain knowledge on how to improve the planning of station area developments in the Randstad. Also, questions that are typical for design science have been addressed such as ‘Can we learn from Tokyo in the Netherlands? What can we learn, or why can’t we learn?’ Through a series of focus groups, focused group interviews and individual interviews,
knowledge was developed regarding the applicability of the Tokyo approach to station area developments in the Randstad. This knowledge produced a number of potential solutions, i.e. lessons identified by the participants and observations made by the researcher, considered applicable to the development of station areas in the Randstad/Netherlands.

According to van Aken (2004) both types of research are needed in order to overcome the utility problem that exists between research and practice. In his view, the reason that academic research, in this case management research, is hardly used in practice is caused by its very nature. Management research, but also most natural and social sciences, is predominantly focused on understanding problems (descriptive-research), while it should be primarily concerned with solving problems (prescriptive-driven). Therefore, only half of the desired result is achieved. A next step is to develop (alternative) solutions (van Aken, 2004). Planning as a discipline is showing a similar problem. Just like management research its primary concern is oriented towards change. However, this is not reflected by academic research in planning, as most research is concerned with understanding planning practices (Straatemeier et al., 2010).

Central to design science is that the potential solutions given should be both tested in practice and grounded in theory. Without proper testing solutions remain recommendations that are the result of descriptive research and as such are not helpful in overcoming the earlier-mentioned utility problem. Testing means that the researcher has to apply the solution in his field to find out whether it works in practice. Grounding means that the researcher not only knows whether something will work in practice, but also understands why this is the case, and consequently connects these practical findings with wider available theories. Relevant innovations do not originate in an academic vacuum, but need to be developed in a co-production between academic researchers and intended users carried out in the context of an innovation’s intended use, as only then a reciprocal learning process between research and practice can be activated. The notion that practical knowledge can only be generated within actual experience has been further articulated and put into practice in the field of education by the experiential learning cycle of Kolb and Fry (1975). In the experiential learning cycle new knowledge is generated in a continuous flow in which ‘the observation of and reflection on concrete experiences’ leads to the ‘forming of abstract concepts’. These are then ‘tested in new situations’ and eventually result in the adaptation of existing practices, i.e. ‘concrete experience (see figure 1-2). The experiential learning cycle can also provide a useful framework for establishing a relationship between planning practice and planning research. Although in current planning practice all the activities from the learning cycle are present, they are often not linked, at least not systematically or directly (Marsden et al., 2009; Straatemeier et al., 2010). It is argued that a more direct and systematic link between these different activities (and the people and organizations behind them) would much improve learning processes and thus the generation of knowledge in planning research and practice (Straatemeier et al., 2010). Consequently, this would mean that researchers need to engage more in
practice (in ‘concrete experience’) and practitioners need to engage more in research (in ‘forming abstract concepts’).

The experiential learning cycle has provided a useful framework for structuring this research. It has been used to structure both the explanatory science part of this research (i.e. part two of this research oriented towards describing and explaining how station area developments in Tokyo are planned) and the design science part of this research (i.e. part three of this research oriented towards identifying prescriptions for how station area developments in the Randstad could be improved). In the descriptive part of this research the learning cycle was applied as follows. The researcher concerned carried out field work in Tokyo from 2005 till 2007 to see firsthand how station area developments are planned in Tokyo (‘concrete experience’). In addition interviews were held with several actors involved in station area development projects in Tokyo, ranging from national to local governments and from private developers to private railway operators. In addition, several documents were analysed (‘observation and reflection’). In this way the researcher was able to identify the driving forces behind station area developments in Tokyo (‘forming abstract concepts’). In figure 2-4 the experiential learning cycle is depicted combined with the specificities of the descriptive-driven part of this research.

*Figure 2-4  Experiential learning cycle as applied in the explanatory science part of this research*
In the design science part of this thesis the learning cycle was applied as follows. In a series of focus groups and focused-group interviews the driving forces identified in Tokyo were tested in a number of Dutch case studies (‘testing in new situations’). The identified driving forces were tested in multiple cases, as only through repeated testing can a proper understanding be generated of why or why not certain aspects of the Tokyo approach have potential in the Randstad, and to what extent context has played a role in this. The focus groups and focused-group interviews provided the researcher with an overview of the aspects of the Tokyo approach that the participants believed could have potential in the Randstad. These aspects were further explored through some additional interviews held with actors involved in station area developments in the Randstad/Netherlands (‘observation and reflection’). In figure 2-5 the experiential learning cycle is illustrated combined with the specificities of the prescriptive-driven part of this research.

Figure 2-5 Experiential learning cycle as applied in the design science part of this research