RAILWAY STATION, CENTRES AND MARKETS

Change and Stability in Patterns of Urban Centrality

ISBN 978-8559-142-9

Keywords: railway station, urban centrality, market, retailing

Printed in the Netherlands

RAILWAY STATION, CENTRES AND MARKETS

Change and Stability in Patterns of Urban Centrality

Proefschrift

ter verkrijging van de graad van doctor
aan de Technische Universiteit Delft,
op gezag van de Rector Magnificus prof.dr.ir. J.T. Fokkema,
voorzitter van het College voor Promoties,
in het openbaar te verdedigen

op woensdag 26 september 2007 om 10.00 uur

door

Camelia KUSUMO

bouwkundig ingenieur
geboren te Surabaya, Indonesië

Dit proefschrift is goedgekeurd door de promotoren:
Prof. ir. D.H. Frieling
Prof. ir. J.M. Schrijnen

Toegevoegd promotor: Dr. S.A. Read

Samenstelling promotiecommissie:

Rector Magnificus, voorzitter

Prof. ir. D.H. Frieling	Technische Universiteit Delft, promotor
Prof. ir. J.M. Schrijnen	Technische Universiteit Delft, promotor
Dr. S.A. Read	Technische Universiteit Delft, toegevoegd promotor
Prof. M. Batty	University College of London
Prof. J. Busquets	Harvard University
Prof. H.J. Rosemann	Technische Universiteit Delft
Dr. L. Bertolini	Universiteit van Amsterdam
Prof. ir. H.C. Bekkering	Technische Universiteit Delft, reservelid

CONTENTS

SUMMARY

RAILWAY STATION, CENTRES AND MARKETS
Change and Stability in Patterns of Urban Centrality

Railway stations have become hubs of networks due to their high accessibility by different modes of transport at different scale levels and have emerged as new central places in metropolitan cities in Europe. As major nodes of transportation networks that produce movements which offer sufficient opportunity for the development of commercial land use, stations are often automatically equated with nodes of socio-economic activities (Bakker, 1994; Bernick & Cervero, 1997; Bertolini & Spit, 1998; Jacobs, 2000; Groenemeijer & Van Bakel, 2001). The station becomes a new centre in the city.

Planners and designers put a lot of effort into transforming the railway station areas into urban centres. It is often assumed that the internal functional dynamic of a centre is determined by the attractive power of concentration of large programmatic units (Dickinson, 1947; Lynch, 1960; Jacobs, 2000; Groenemeijer, 2001). This idea has been adopted to create a high number of different functions in and around station areas by mixing land use or increasing the population density. While others have conceptualized the centre as an attractive node in networks working at relatively large regional and metropolitan scales (Groenemeijer & Van Bakel, 2001). The functions and accessibility are thus taken to be an indicator for the liveability of the centre.

Yet, function and accessibility information is not enough information for an urban designer to be able to (re-) design the urban master plan of a railway station area. Designing the station area is more than just designing the architectural shape of the station building and the public space around it, it is also important to pay attention to on how the station is integrated into the existing urban structure and the existing urban flows of the city (Koolhaas, 1993; Von Gerkan, 1996; Foster, 2001). Nevertheless in the case of designing the spatial layout of the area around the railway station, the designer is often left with statistical numbers of accessibility, types of function, population density or some city's beautification design guidance, and is expected to transform the railway station area into a beautiful and a successful urban space, an urban space that can attract socio-economic activities around the station. The role of the local urban spatial layout as a factor that influences the liveability of an urban area around the station is often not taken into account. The street pattern of the stations environment is taken for granted. This lack of understanding of the importance of the structural characteristics of urban space often results in design failure in a multi-million Euro project: the expected liveability of the area and an increase in economic value do not occur.

Therefore this research is an attempt to define urban design spatial frameworks for creating a liveable space in an urban area around the station. A liveable space is understood as a public space for high-street retail activities, full of the bustle of people moving, buying and selling goods and services and interacting around the railway station.

The research begins with an examination of the available research literature on the potential of railway stations for economic development in the city and existing theories in planning and economic geography. Problems arising from the planning and geographic framework are raised and highlighted by recent spatial – configuration theories, which have examined the importance of understanding the socio-economic distribution pattern in 'real' space. From these, spatial propositions are synthesized and formulated to provide a spatial framework, a useful instrument for analyzing the case studies and evaluating the new design proposal. Two main variables are used within this framework: first, the grid configuration and the measurement of the block size to uncover space-structural detail within the urban fabric as a field of movement and activity, and second, the dispersal of the shop location which was used as dependant variable. Station areas in Indonesia and the Netherlands are analyzed by a grid configuration analysis to uncover space-structural details within the urban fabric as a field of movement and activity. These different case studies are subsequently compared, to analyze how the different street configurations affect the economic activities around those stations.

It is argued that, configurationally, cities consist of regional, city- and local scale movement layers. As the analysis progresses, it becomes clear that, in spite of differences in cultural and socio-economic structures, all the cases studied confirm a relationship between spatial configuration and the distribution pattern of commercial activities. They are following the same spatial logic, namely that the interconnectivity between the movement layers does influence the distribution pattern of the commercial activities. The overlap of different scales of movement networks and their intensity provide a spatial condition, which can support mixed urban functions.

Furthermore, the analysis of these cases has clearly demonstrated that the clustering effect of retail activities in urban areas is very stable over time and in general corresponds with the direct physical connection between the neighbourhood and the city. The higher the permeability of the city-scale structure (towards the local grid) and the more direct the sightlines in the local urban grid, the more retail activities can permeate into the local grid which in turn triggers the clustering effect.

The research results presented in this dissertation also suggest that in order to generate liveability around the railway station area, the railway station needs to be physically

integrated into the city- and local-scale movement networks. It is evident in the cases of Delft Central Station and Leiden Central Station, that in spite of being highly accessible stations and attracting thousands of passengers everyday, there are only a few retail activities established around those stations. The regional accessibility quality of the stations does not have enough power to attract the retail establishments in the vicinity of the stations. On the contrary, the empirical research of two stations in Surabaya has shown that if the station is physically well integrated in its local urban configuration, the lively condition will emerge by itself and guarantees its sustainability without being dependent only on the power of accessibility to the station.

Therefore it can be concluded that in designing an urban area around the railway station, the regional network only is not enough to generate a vibrant urban place full of different kinds of commercial activities. Its attracting power is too limited and creates only one type of activity, the one that is oriented to regional scale only. This exploration by means of different case studies highlights the importance of integrating a railway station into different layers of movement (at least into the city- and the local scale networks) with small block sizes for a retail clustering effect, especially for urban-oriented stations.

Camelia Kusumo
September 26th, 2007

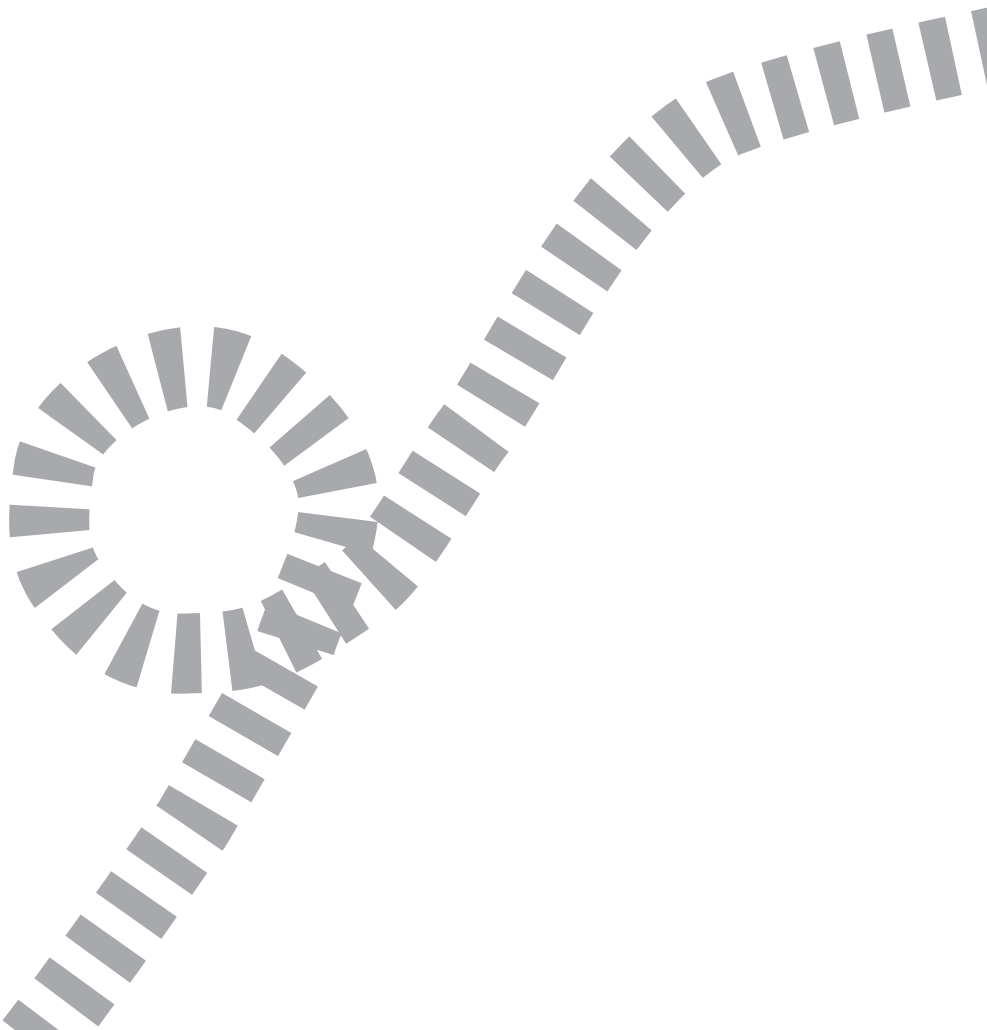
LIST OF ILLUSTRATIONS

FIGURES

TABLES

Chapter one

Introduction: The Railway Station, the New Centrality




Vertrekkende treinen
snacks
drinks
snacks
drinks
snacks

INTRODUCTION:
THE RAILWAY STATION, THE NEW CENTRALITY

1.1 BACKGROUND OF THE THESIS

Railway stations have become hubs of networks due to their high accessibility by different modes of transport at different scale levels and have emerged as become new central places in metropolitan cities in Europe. As major nodes of transportation networks, that produce movements which offer sufficient opportunity for the development of commercial land use, stations are often automatically equated with nodes of socio-economic activities (Bakker, 1994; Bernick & Cervero, 1997; Bertolini & Spit, 1998; Jacobs, 2000; Groenemeijer & Van Bakel, 2001). The station becomes a new centre in the city. Many railway stations used to be located at the periphery of the city, but along with the growth of the city, the station is now very often located at a more central strategic location. Moreover, the relocation of freight yards outside the city provides large vacant lands in railway station areas that are ready to be exploited. The redevelopment of railway station areas is often an important part of urban restructuring in metropolitan cities. This is because the station is usually located at a good position inside the city and in fact has an outstanding accessibility, connecting the city with its surrounding area regionally and even (inter-)nationally. It is a place where the mobility flows interconnect and have the potential for granting the diversity and frequency of human contacts that are still essential for many urban activities (Bertolini & Dijst, 2003).

Planners and designers put a lot of effort into transforming the railway station areas into urban centres. It is often assumed that the internal functional dynamics of a centre is determined by the attractive power of concentration of large programmatic units (Dickinson, 1947; Lynch, 1960; Jacobs, 2000; Groenemeijer, 2001). This idea has been adopted to create a high number of different functions in and around station areas by mixing land use or increasing the population density. While others have conceptualized the centre as an attractive node in networks working at relatively large regional and metropolitan scales (Groenemeijer & Van Bakel, 2001). The functions and accessibility are thus taken to be an indicator for the liveability of the centre. Since train stations produce a relatively large amount of people movement, a station's location offers sufficient opportunities for the development of retail land use. Their interior and exterior urban spaces increasingly serve various non-transport related functions such as retail shops, cafes, restaurants, supermarkets, clinics or even libraries, packed within a multilayered environment (Bakker, 1994; Paksukcharern, 2003).

Yet, function and accessibility information is not enough information for an urban designer to be able to (re-) design the urban master plan of a railway station area. The quality of the station's regional accessibility is often associated as the key factor in attracting commercial establishment. Nevertheless, accessibility remains a highly problematic notion. The critical point in all these contentions is the idea that an increase or decrease in physical accessibility will have direct, and proportionate, economic impact on local urban areas. But empirical evidence shows ambiguous relationships between accessibility and the economic urban development (Banister, 1995). The impacts usually are highly localized only inside the transport node (e.g. railway station or airport). There are stations with high accessibility but which failed to attract retail activities into it. While there are also other stations with low regional accessibility, but with a lot of retail activities surrounding it. Bertolini and Spit (1998) argued that accessibility only is not enough, but that accessibility is essentially a catalyst of development when other conditions are in place. These conditions include the quality of other transport connections, proactive public-private development partnerships, the state of the local economy, and the proximity of the existing city centre.

Designing the station area is more than just designing the architectural shape of the station building, it is also important to pay attention to on how the station is integrated into the existing urban structure and the existing urban flows of the city (Koolhaas, 1993; Von Gerkan, 1996; Foster, 2001). All urban designers need a clear understanding of how their various actions and interventions in the built environment combine to create high quality, people friendly, vital and viable environments or, conversely, poor quality, alienating or simply monotonous ones. While the scope of urban design maybe broad, and its boundaries often 'fuzzy', the heart of its concern is about making *places* for people. Nevertheless in the case of designing the spatial layout of the area around the railway station, the designer is often left with statistical numbers of accessibility, types of function, population density or some city's beautification design guidance, and is expected to transform the railway station area into a beautiful and a successful urban space, an urban space that can attract socio-economic activities around the station. The role of the local urban spatial layout as a factor that influences the liveability of an urban area around the station is often not considered. The urban space is taken for granted. It is as if it is a self-evident continuum that automatically emerges out of the pencil of the designer. This lack of understanding of the importance of urban space often results in design failure in a multi-million Euro project: the expected liveability of the area and an increase in economic value do not occur. As a consequence, vacant retail space and derelict neighbourhoods dominate areas immediately surrounding the station. This can often lead to quality degradation and an increase of criminal activity in the area (see for example Koper, 2003; Van der Poel, 2004).

Commercial activities seek continuity, growth and expansion in order to increase sales and profit. Retail strategies have an important *spatial element* since the retailer must decide both where future investment will be allocated and which strategies will be most effective at particular stores or locations. Whether selling goods or services, the choice of an optimal outlet location is perhaps the most important decision a retailer has to make. It is through the location that goods and services are made available to potential customers. The history of shops has shown that the urban space is not a passive backdrop for commercial activities, but it is an active site of consumption (Glennie & Thrift, 1996). The continuous occupation of urban space or streets by people is a condition for the liveability of retail activities and this occupation is influenced by the pattern of people flows which is in turn determined by the configuration of street patterns. Thus, in an effort to attract potential customers, the way how people move around the railway station area influences a retailer's choice of location. Since the urban street space, as medium of people movement and co-presence within an urban environment, has considerable effect on the flows and the presence of the potential customers for retail activities in the urban environment, it is necessary for urban designers to have spatial design knowledge in making places a viable environment for both people and commercial activities. In his study about the feasibility of establishment of shops in station locations, Bakker (1994) has shown that commercial function establishment around the station, are influenced by the movement routes between the station and the city centre. The problem is that so far, little is known about how to design a suitable spatial layout for commercial function in an urban area of the station. There is still a lack of knowledge on how the station influences the 'street level' distribution pattern of retail in its urban surrounding.

Therefore this research is an attempt to define urban design spatial frameworks for creating a liveable space. A liveable space is understood as a public space for high-street retail activities, full of the bustle of people moving, buying and selling goods and services and interacting with each other around the railway station.

1.2 RESEARCH QUESTION

The main research question of this thesis is: *what kind of spatial design configuration can support the urban buzz and high-street commercial activities around the railway station?*

Spatial design configuration refers to the physical design of the street pattern, as a medium of movement and a space for urban-buzz, whereas high-street commercial activities refer to a public space full of retail, market, catering and entertainment activities.

Thus to be able to answer the main research question, it is important to understand:

- *How is the distribution of retail locations in the city? Which factors influence the choice of location for retailers?*
- *How does the urban street pattern effects the distribution pattern of retail establishments? How does the street pattern influence the 'street-level' distribution pattern of retails and service firms? What kind of spatial conditions attract these economic activities? How does the movement pattern of people influence the establishment of retails in general and in the cases studied in particular?*
- *How does the station, as a node in regional networks, influence the presence of the shop or what is the relation between the station and the shop?*
- *What are the results of the empirical studies in both the Netherlands and Indonesia?*
- *What can be concluded from the cross-case study? What kind of design guidelines can be derived?*
- *How can we apply these design guidelines to an urban design proposal?*

This thesis is written from the urban design and physical layout planning perspective. Yet, this research is more than a facelift for design guidance. It examines in depth many other factors including issues such as circulation, spatial organization and the underlying structure of socio-economic activity in an urban area. It is not just focused on the superficial form of a city's beautification. This study precisely investigates the influence of the urban grid on the distribution pattern of retail and service firms around the railway station. Station areas in Indonesia and the Netherlands are analyzed by a grid configuration analysis to uncover space-structural details within the urban fabric as a field of movement and activity. These different case studies are subsequently compared, to analyze how the different street configurations affect the economic activities around those stations.

1.3 ORGANIZATION OF THE THESIS

This exploration of spatial layout of economic activities around the station is presented in seven chapters (see Figure 1.1). The study continues in Chapter 2 with an examination of the available research literature on the potential of railway stations for economic development in the city and existing theories in planning and economic geography. Since the retail activities around the stations are also embedded in the commercial structure of the city, it is necessary to understand the concept of a strategic location for retail in an urban area. During this discussion it becomes apparent that most of the studies remain at an abstract planning level. There is a knowledge gap in the 'street-level' distribution

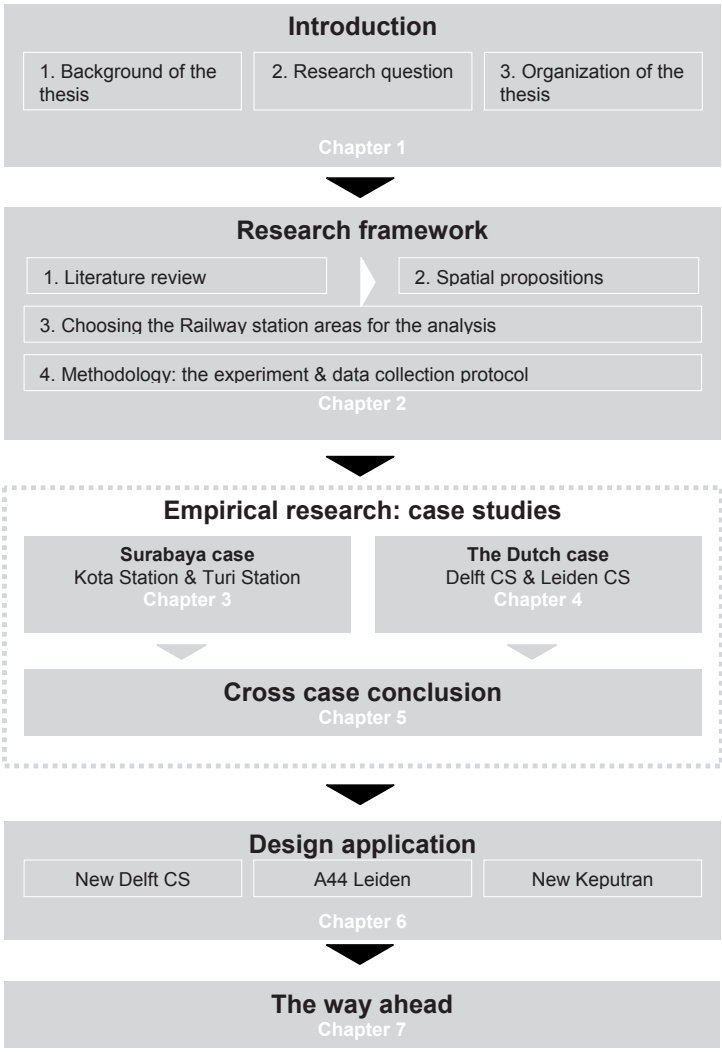


Figure 1.1 The research flow-chart.

pattern of retail activities. Problems arising from the planning and geographic framework are raised and highlighted by recent spatial – configuration theories, which have examined the importance of understanding the distribution socio-economic pattern in 'real' space. From these, spatial propositions are synthesized and formulated to provide a spatial framework, a useful building block for analyzing the case studies and evaluating the new design proposal. Two main variables are used within this framework: first, the grid configuration and the measurement of the block size to uncover space structural detail within the urban fabric as a field of movement and activity, and second, the dispersal of the shop location which was used as dependant variable.

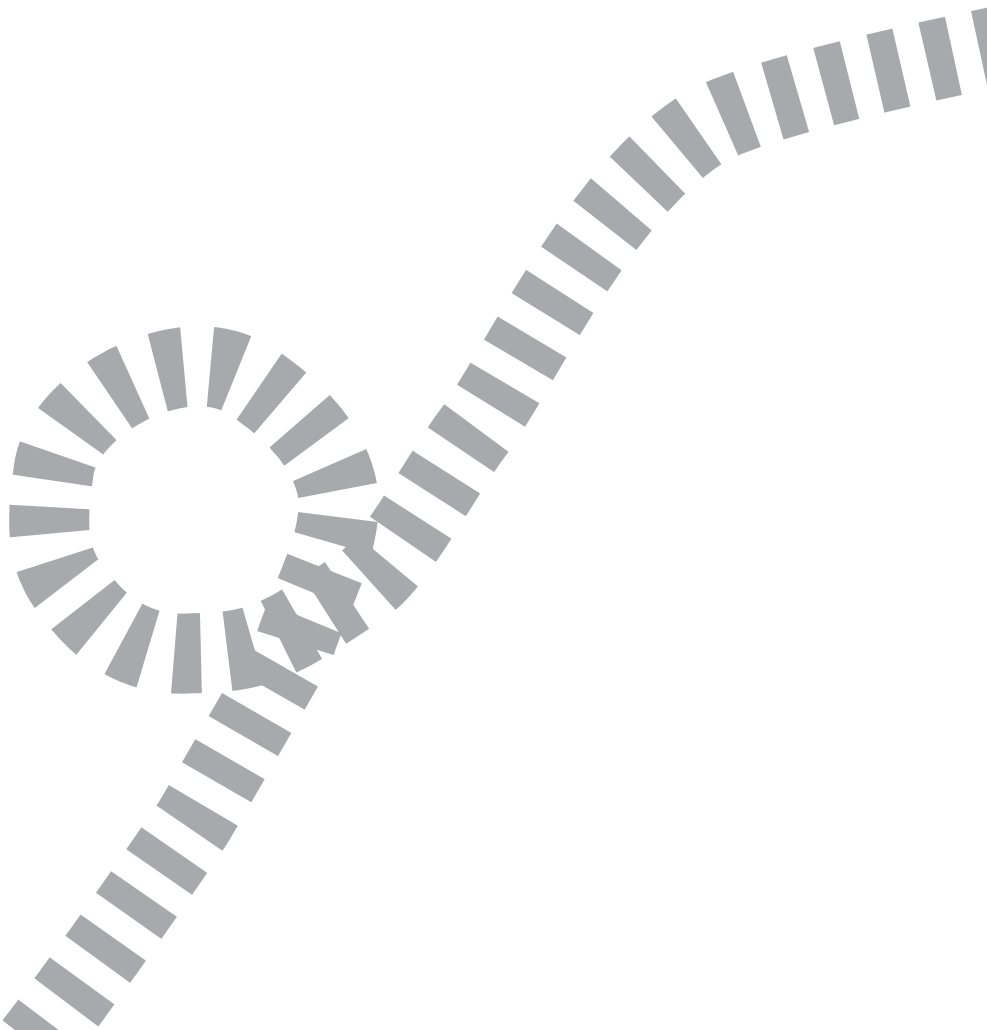
The first part of the analysis utilizing the grid configuration technique is undertaken in Chapter 3. The economic situation of Surabaya is briefly examined before analyzing the commercial spatial logic of the city. Throughout this section, close attention is paid to the role of markets as an important economic institution in Indonesia, and how the location of these markets have been influenced mainly by the configuration of the urban movement and the relationship between the railway station and the market. Chapter 4 continues with an analysis of the Dutch railway stations: Delft Central Station and Leiden Central Station.

As the analysis progresses, it becomes clear in Chapter 5 that, in spite of different in cultural and socio-economic structures, all the cases studied confirm a relationship between spatial configuration and the distribution pattern of commercial activities. This spatial guiding principle is then applied in Chapter 6, in evaluating and predicting the potential effect of different urban design proposals on the distribution pattern of commercial activities. Firstly, two possible master plans for the railway station area of Delft Central Station are analyzed using the spatial framework. Secondly, three planning alternatives are examined for the improvement of the regional scale connection, between highways A4 and A44, in the Leiden agglomeration. And thirdly, the spatial framework is used for analysing two possible locations for Surabaya's wholesale vegetable market. This exploration highlights the usefulness of the spatial framework for exposing possible future effects in order to help facilitate discussion, planning and for generating future design alternatives which may not otherwise be given serious consideration.

After synthesizing the main findings of the whole research study, Chapter 7 sketches a new spatial strategy principle in (re-) designing the space for urban economic activities and daily urban life. It concludes with remarks and recommendations for further research in urban spatial design.

Chapter two

Railway Station, Street and Shop




BUCH
SCHMIDL
PAPIER
KARL SCHMIDL
novotny
Kaufstrasse

RAILWAY STATION, STREET AND SHOP

> *Streets… the main public space of a city, are its most vital organs. Think of a city and what comes in mind? Its streets. If a city's streets look interesting, the city looks interesting; if they look dull, the city looks dull.*
>
> *(Jacobs, 1961, p.29)*

The purpose of this chapter is to establish the theoretical foundation for a discussion on distribution patterns of retail activities around a railway station.

Firstly, since retail activity around the station is also embedded in the commercial structure of a city, it is necessary to understand the concept of centrality in terms of strategic location for retail in an urban area. A brief introduction into different concepts in economic geography is provided, concerning the distribution pattern of retail locations in general, in order to answer the question where is retail located in an urban area.

Secondly, problems arising from the planning and geographic framework are raised and highlighted by recent spatial configuration theorists who have examined the importance of understanding the distribution pattern of retail in the 'real' space of the city. Thus, the theoretical discussion culminates in the identification of a number of different paradigms which have emerged to fill the theoretical impasse in the spatial logic of retail.

Thirdly, it provides an understanding of previous and current research concerning the attractiveness of the railway station as a potential location not only for transit functions, but also for the economic development of the city. Following this potential, some spatial planning researchers have explored the station area functionally and economically to transform it into an urban centre.

From these findings, new spatial propositions are formulated to provide a framework that is a potentially useful building block for analyzing spatial layout around the railway station. Finally, this chapter describes the spatial method that has been used to examine the influence of urban grid in determining the location pattern of retail around the railway station.

2.1 RAILWAY STATION AREAS AND RETAIL

2.1.1 The city and the shop

Before discussing further the relation between railway stations and distribution patterns of retail establishments, and in an effort to answer why certain locations are chosen as retail outlet places and which factors influence the choices of retail shops owners, it is important to explore the general theories on location strategies of retail activities.

Retailing is now an important force in shaping advanced economies, is among the major employer in many countries, and a publicly recognized index of economic health (through consumer confidence measures).[1] Commercial activities, to a certain extent, seek growth and expansion in order to increase sales and profit. Since the retailer must decide both where future investment will be allocated and which strategies will be most effective at particular stores or locations, retail strategies have an important spatial element. It is through the location that goods and services are made available to potential customers (Ghosh & McLafferty, 1987, p.1).

One of the early theories on the location strategy of a market is the Central Place Theory (CPT), known through the work of the German geographer Walter Christaller in 1933 and the German economist August Lösch in 1940. CPT explains the retail hierarchy of cities. A central place is a settlement or a nodal point that serves the area surrounding it with goods and services. The marketing principle of Christaller was to serve a

Figure 2.1 The model of the Central Place Theory (Source: Microsoft Online Encarta Encyclopedia, 2006).

1. Christopherson, 2004

certain number of consumers from a minimum number of centres. CPT is explained using geometric shape (Figure 2.1).

The locations are assumed to be located in a Euclidean, isotropic plane with similar purchasing power in all directions. The assumption of universality in the transport network was also established and all parts of the plane were served by the central place. Christaller's model was also based on the premise that all goods and services are purchased by consumers from the nearest central place.[2] The study of Takes (1948) provides a good example of the application of the CPT method in planning the new settlement centres in new polder land in the Netherlands. He proposed a pattern of A-, B-, and C-centres for the Ijsselmeer polders. A-centre is a village/settlement in the hinterland (with a population of less than 5,000 inhabitants and functioning as a service centre for its immediate surrounding hinterland). B-centre is a town with 5,000-15,000 inhabitants with a higher level of function than the A-centre, and C-centre is the largest

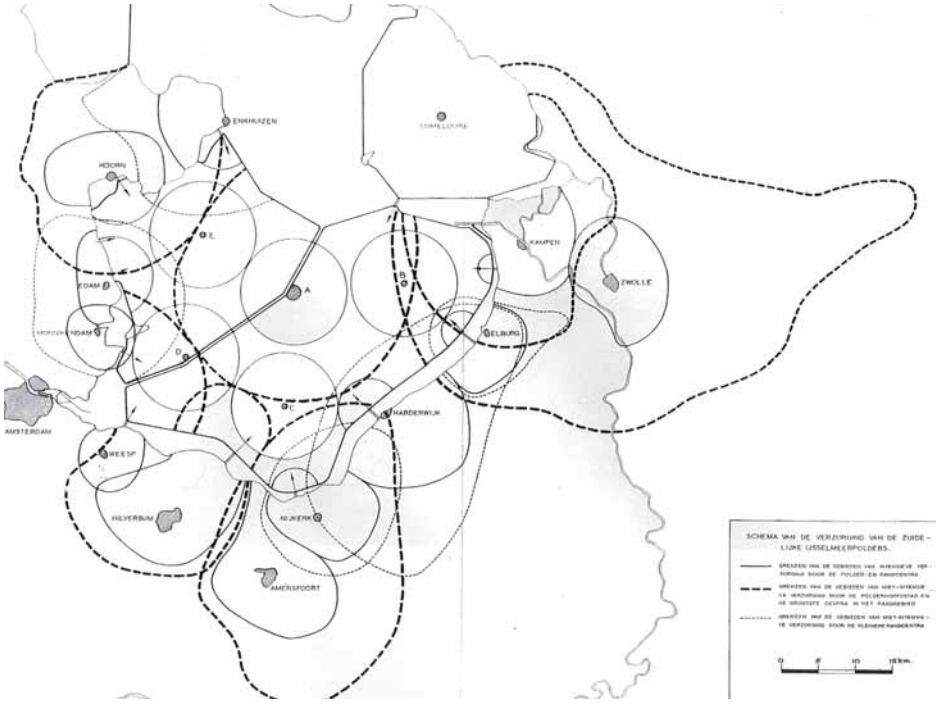


Figure 2.2 A-, B- and C-centres for the IJsselmeerpolders (Source: Takes, 1948)

2. A completely typical current manifestation of CPT is in the book by Fujita, Krugman & Venbles (1999) called The Spatial Economy, which concerned with trade theory and how this relates to central place hierarchies.

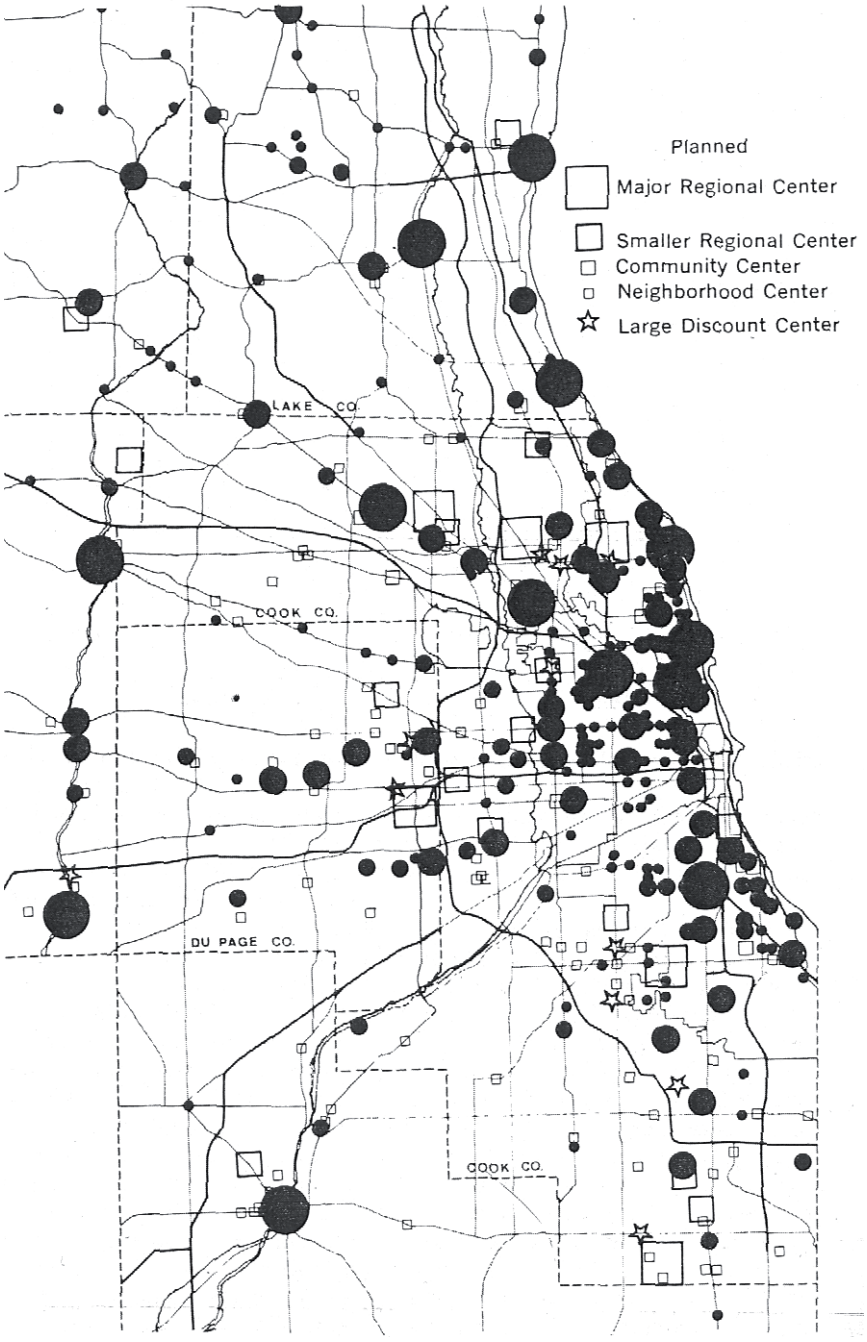


Figure 2.3 Berry's map, abstract circle lines describe all business centres in the Chicago region (Source: Berry, 1967).

centre that is a city or village with more than 25,000 inhabitants acting as the mid-point of the whole region (Figure 2.2).

The work of Christaller[3] was later rediscovered mainly by American geographers; in particular by Brian Berry in his book - *Geography of Market Centre and Retail Distribution*- published in 1967. He argued that commodity flows in a modern economy ultimately link producers and consumers and are articulated by the network of cities and towns (Figures 2.3). Cities and towns may arise as specialized producers themselves, but many are supported exclusively by their role as market centres. Retail and service businesses are the end of the chain of production and distribution and the beginning of the process of consumption. It is in the cities (or market) that the geographies of production and consumption interlock. The essence of the geography of retail and service business is the clustering of establishments in market centres which may be visited by surrounding customers. Consumers, who must visit the market place on regular basis, want a location that permits them to conduct their business with a minimum of effort. Therefore, 'centrality' is the essence of the point of focus. CPT attempts to explain the location, size, functional characteristics, and spacing of these clusters of activity. Therefore, Berry (1967) argued further that the CPT is the descriptive and theoretical base of the geography of retail and service business. However, the CPT tends to be used as a key to describing existing patterns rather than as a normative or prescriptive basis for identifying what improvements can and should be made in those patterns (Hanson, 1997). The deficiency of this model is its universal assumption that all locations have an evenly distributed population, resources and transport costs. Nonetheless, despite its inapplicability of the model to real situations, the Central Place Theory was still a breakthrough in an effort to predict and understand the hierarchical development of settlements.

In 1960 William Alonso completed a dissertation in which he tried to answer the question of how firms develop in the context of a free market. In 1964, he published "Location and Land Use", in which he defined a modelled approach on the formation of land rent in an urban environment. He adopted the von Thünen model of bid rent in an agricultural market, which produced circular land use zones around the market according to their ability to pay rent as a function of the trade-off with distance from the market, and then applied this to urban land-uses for the first time.[4] He also grounded the theory in micro economics and thus established the field of urban economics. Alonso (1964) argued that in order to obtain the largest possible profit, firms manipulate variable factors, such

3. Translated in English by R. Baskin in 1966

4. He was not actually the first, but his 1964 book popularised this.

as minimizing the transportation and production costs and the location or catchment areas of their customers. As an illustration of an optimal location for profit maximizing, he uses the famous example from Hotelling (1929) of ice cream sellers on a beach (Alonso, 1975). The first ice cream seller located himself in the middle of the beach because the position minimizes the total distance for all his potential customers. The second ice cream seller will also for the same reason locate himself in the middle of the beach, as close to the first one as possible. As soon as he locates himself more in one or another direction, he will firstly increase the total distance to his potential customers. Secondly, he will lose some of his customers located between him and the other ice cream seller. This is due to free competition. Alonso (1964) shows by this example why the location of shops has a tendency to concentrate in city centres.

Table 2.1 Checklist for site evaluation according to Ghosh and Mc Lafferty (1987)

Local Demographics	Population base of the local area
	Income potential in local area
Traffic Flow and Accessibility	Number of vehicles
	Type of vehicles
	Number of pedestrians
	Type of pedestrians
	Availability of mass transit
	Access to major highway
	Level of street congestion
	Quality of access streets
Retail Structure	Number of competitors in area
	Number and types of stores in area
	Complementary of neighbouring stores
	Proximity to commercial areas
	Joint promotion by local merchants
Site Characteristics	Number of parking spots available
	Distance of parking areas
	Visibility of site from street
	Size and shape of the lot
	Condition of existing building (if any)
	Ingress and egress quality
Legal and Cost Factors	Type of zoning
	Length of lease
	Local taxes
	Operations and maintenance costs
	Restrictive clauses in lease
	Voluntary regulations by local merchants

A more recent approach to the choice of a retail location is the 'location-allocation' model, proposed by Avijt Ghosh and Sara McLafferty (1987). In '*Location strategies for retail and service firms*', their model systematically evaluates a large number of potential store locations in order to find sites that maximize corporate goals such as market share or profits. They developed a systematic framework for formulating a strategy that balances corporate needs with the spatial dimensions of a market place. This framework first will assess the firms marketing strategy, to understand the customers, the competitors and the goals of the firm. Once the corporate and marketing programs are understood, the spatial aspects of the market (such as market selection and site) must be analyzed. In their site evaluation, they developed a checklist, which commonly includes a range of information from socioeconomic composition to traffic count and parking facilities (see Table 2.1). In spite of the thorough analysis by Ghosh and McLafferty (1987) in choosing a store location at both a regional and a particular site, the site evaluation does not go further than the checklist. It does not answer the question concerning optimal localization in an urban area. For instance, the question of on which street a store should locate itself remains un-answered.

2.1.2 The street and the shop

Retail and leisure-sector developments are frequently market-led and have been important in the long-run refashioning of both the physical and the social spaces of towns. However, to consider the urban form as passively reflecting successive waves of consumerism would be unjustified (Blomley, 1996; Glennie, 1998). The history of shops and shopping has shown that it is based on a reflexive relationship between consumers, shopkeepers, and the *sites of consumption* (understood as streets, markets, shops, galleries, and so on), sites which act as an active context rather than a passive backdrop (Glennie & Thrift, 1996). Urban space, as an active site of consumption, constitutes the medium of movement and co-presence within the urban environment, and it is this movement and the occupancy of urban space which has been associated with ideas of urban liveability. Besides the obvious factor of accessibility, factors such as functional diversity, high street economic viability, and more generally the 'working' or 'functioning' or the 'urbanity' of urban areas have been linked by some theorists (for example Jacobs, 1961; Alexander, 1966; Hillier, 1988) with the continuous occupation of streets by people, especially with people on foot, moving freely, and engaged in a variety of activities.

A recent study by Dasselaar (2004) confirmed the importance of understanding this active site of consumption and the pedestrian movement (circular) pattern in order to

prevent the structural vacant retail space[5] in several shopping areas in the Netherlands. While the rent price, type of owners, urban design quality, amount of supplied retail floor space per inhabitants, accessibility of parking space and newness of buildings have no correlation with the emptiness of the retail space, the bad location and pedestrian movement routing are seen as the major causes for empty retail space in the Netherlands (Dasselaar, 2004, p.100). It is found that in the locations where there are fewer pedestrians, there are more empty retail spaces. Therefore, the route or pattern of pedestrian movement in a shopping area is an important factor in ensuring the life of a shop. She found further that the anchor retail[6] cannot always guarantee its (pedestrian flow) attracting power. In the course of time, the anchor shop often looses its attracting power and this brings the risk of loss of profit, not only for itself, but also for other smaller retailers around it that depend on the anchor's attracting power. However, if the location site is well chosen and the pedestrian route is well planned then the success of the smaller shops becomes less dependent on the anchor store.

Therefore, if the route of pedestrian movement influences the viability of the shops and if the pattern of movement is influenced by the street configuration, then the configuration of the street pattern has also an influence on the liveability of the retail shops.

2.1.3 The street and Space Syntax

Hillier and his colleagues at the Space Syntax laboratory – the Bartlett School, University College of London, proposed that there is a relationship between the physical form of cities and the economic processes taking place in them. They suggest that socio-economic forces shape the city primarily through the relations between movement and the structure of the urban grid. Well- functioning cities can therefore be thought of as 'movement economies'. That is, space and movement have reciprocal effects on each other (and not, for example, programmatic policies or aesthetic or symbolic intentions) and the multiplier effects on both that arise from patterns of land use and building densities are themselves influenced by the space-movement relation. In fact this gives cities their characteristic structures and gives rise to the sense that everything is working together to create the special kinds of well-being and excitement that we associate with cities at their best (Hillier, 1996). Hillier (1984) also argues that while we may find movement and attractors (functions or land-uses which benefit greatly from movement and by themselves are capable of generating movement, such as retail shops) highly related to each other, we cannot assume that movement can be explained by attractors

5. Structurally vacant retail space: empty retail space for more than 2 years.

6. The anchor retail is often considered as the main pedestrian movement attractor.

until we can be sure that the configurational properties of the grid have not influenced both the presence of movement and the presence of attractors.

The relation between grid and movement in fact underlies many other aspects of urban form: the distribution of land uses such as retail and residence, spatial patterning of crime, the evolution of different densities and even the part-whole structure of cities. He argued further that the influence of the fundamental grid-movement relation is so pervasive, that cities are conceptualized as 'movement economies', in which the structuring of movement by the grid leads, through multiplier effects, to dense patterns of mixed use encounter that characterize the spatially successful city. The urban grid, through its influence on the movement economy, is the fundamental source of the multi-functionality that gives life to cities. The distribution of function is dependent on the spatial configuration of the street network. Hillier, Penn, Hanson, Grajewski, and Xu (1993) maintain that configuration, movement and attractors are the three determinants of where retail owners situate their shops within the urban network. First of all, shops present themselves in streets where most people move. Shops also tend to become attractors for the people's urban movement. Attractors and movement may influence each other, but they do not influence the configuration of the urban grid; whereas, the grid certainly does seem to influence movement and attractors.

This may be difficult for some to accept, because it seems to propose a primary role for the relatively static variable of spatial configuration in urban dynamics and ignores the effects of other factors such as specific attractors, land-uses and development densities (Ratty, 2004). However, recent empirical studies have shown that movement influences land-use patterns according to their demand for being close to or avoiding movement (Hillier & Penn, 2004, p.506). Changes in land-use patterns, and especially the shifting of 'live' centres towards the edges of urban areas, can often be shown to follow the evolution of the pattern of integration in the axial map as settlements grow and change (see for example, several papers in Hanson, 2003; Van Nes, 2005).

Furthermore, recent research on the viability of the shops in several cities in the Netherlands has shown that commercial activity, as an attractor, is not always capable of generating movement (Dasselaar, 2004). When we locate 'the attractor' (shops) at the 'wrong place' from the point of view of grid configuration and movement in the course of the time they would close down and move their retail establishment to the 'right place'. Often this 'wrong place' has occurred where an intervention has failed to build spatial patterns of natural pattern movement implied by the spatial structure.

Figure 2.4 a. Basic map of G-town, b. Axial map of G-town (Source: Hillier & Hanson, 1984).

To describe a spatial configuration for the purpose of analysis, the city is considered as a set of open spaces. On the basis of the space plan of G-town (Hillier & Hanson, 1984) in Figure 2.4a, the 'axial map' of the area is drawn (Figure 2.4b). The axial map of an urban area consists of the smallest number of longest possible axes that can be drawn in the open space. Once the space system is represented it can be analyzed as a system of syntactic or topological relations.

Using a computer, integration value of each line is calculated on the basis of the relation of the line in question to all the other lines in the system. One product of this measurement is an integration map (Figure 2.5), which summarizes the integration values for all pathways in the village. The streets marked by a solid line depict the town's *integration core* –- these streets are the most related to all the other lines in the system – they are related with the least depth (the least number of intervening lines) to all the other lines in the system. These streets have the most chance for being alive with street activity,

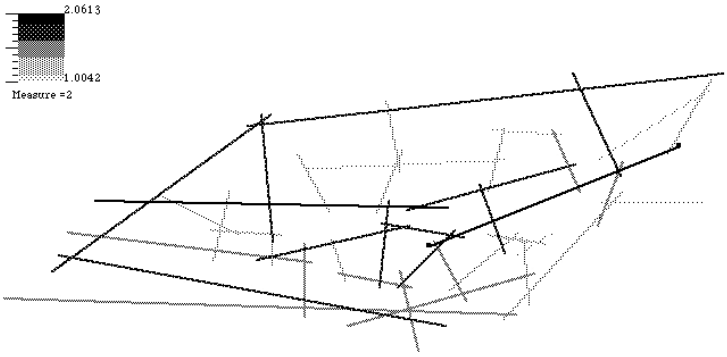


Figure 2.5 Integration map of G-town (Source: Hillier & Hanson, 1984).

public life and commerce, since this is where the most through movement passes by. In contrast, the hatched lines identify G-town's *segregation core* - the streets that deflect activity away from them and therefore indicate pockets of quiet and seclusion that are typical for a residential character.

These integration values have been shown to correlate with observed densities of various sorts of traffic (or movement) in the equivalent spaces of cities. The basic method has been tested in a number of cities (e.g. Hillier, Burdett, Peponis, & Penn, 1987; Hillier et al., 1993; Peponis, Hadjinikolaou, Lieratos, & Fatouros, 1989; Read, 1999) and has been successfully used as an urban design tool, predicting changes in pedestrian flow at the scale of the local design intervention. The model's predictive capacity suggests something about a principle of space use within the city. In general, it is those spaces, which are 'shallower' (in terms of numbers of changes of direction to the rest of the system) or more 'integrated' in relation to the spaces within their connected spatial environment that are used more.

Using the Space Syntax method, Van Nes (2003) further exploited this model. Her study investigated the effects of the ring road development on the distribution pattern of retails in several cities in Europe, such as Coventry, Bristol and Wolverhampton. By comparing the distribution pattern of shops before and after the implementation of a ring road, Van Nes (2003) found that the implementation of a ring road could affect the integration value of the spatial structure. Since shops tend to locate themselves along the most integrated streets, the location pattern of shops will change when the most integrated core changes. She argued that this change depends on how the ring road is spatially imposed on the urban structure. The structure and functions of town centres depend on how the ring road is connected to the street grids it is imposed upon. By utilizing the space syntax's global and local integration measurement, it is found that if

the ring road is well connected to all the streets in its vicinity, it will not affect the pattern of the shops in the town centre, as is the case of Bristol and Wolverhampton in the United Kingdom. However, if the ring road has few connections to the grid it is imposed upon and also cuts off streets that lead to the town centre, then shops tends to close down in areas located outside the ring road, as is the case for Coventry.

The Space Syntax offers a good way to understand the complex effects of the city's physical infrastructural movement networks. Nevertheless, it has two weak features: first, its tendency to treat the urban object as a thing bounded by the limits of the densely built fabric of the centre; and second, it treats all movement spaces equally[7] even though it is clear that different classes of physical space in the fabric of the city perform different urban experiences of space and time (Read, 2004).

Research conducted by Read (2000, 2002) on the spatial structures of Dutch cities has brought about a different way of understanding centrality issues. It is argued that

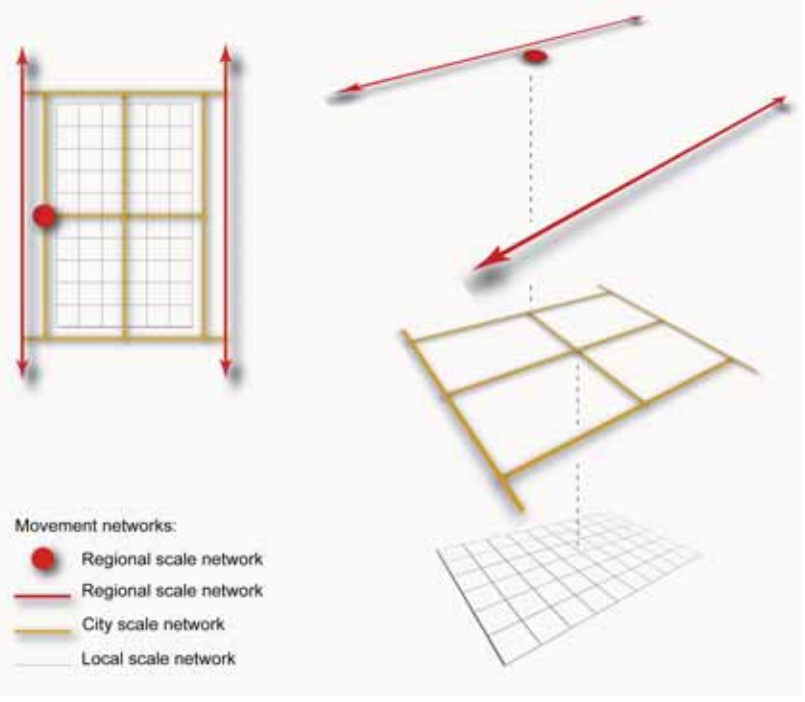


Figure 2.6 Movement layer diagram: regional-scale, city-scale and local-scale networks.

7. All axial lines are treated equally in using the space syntax as an instrument of urban analysis.

configurationally, cities consist of 'layers' of different scales of movement organized into relatively coherent movement 'grids'. These grids are layered, distinguished by the scales of mobility and are designed to convey different scales of movement (Figure 2.6). As illustrated in the Randstad example (Figure 2.7), the hierarchy or functional layering built into the shape of the urban grid of Dutch cities includes first, the regional movement network that conveys movement at a scale with cities as points or destinations within it (e.g. railway network, highway network). The regional scale appears locally most often in a nodal node: stations, metro stops, parking garages. Second, the urban grid includes the city-scale movement network which is a set of spaces in the urban fabric that are suited by their geometry for carrying traffic over a medium distance. The city-scale grid is more often linear and continuous, and functions as the main back bone of the movement structure of the city. It has been found that these city-scale spaces show a very significantly greater volume of traffic relative to other streets local to them (Read, 2001). These streets are empirically distinguishable from local streets on this basis. Furthermore, these networks are established on the basis of some quite straight-forward spatial geometries. This includes 'fast' routes through the spatial

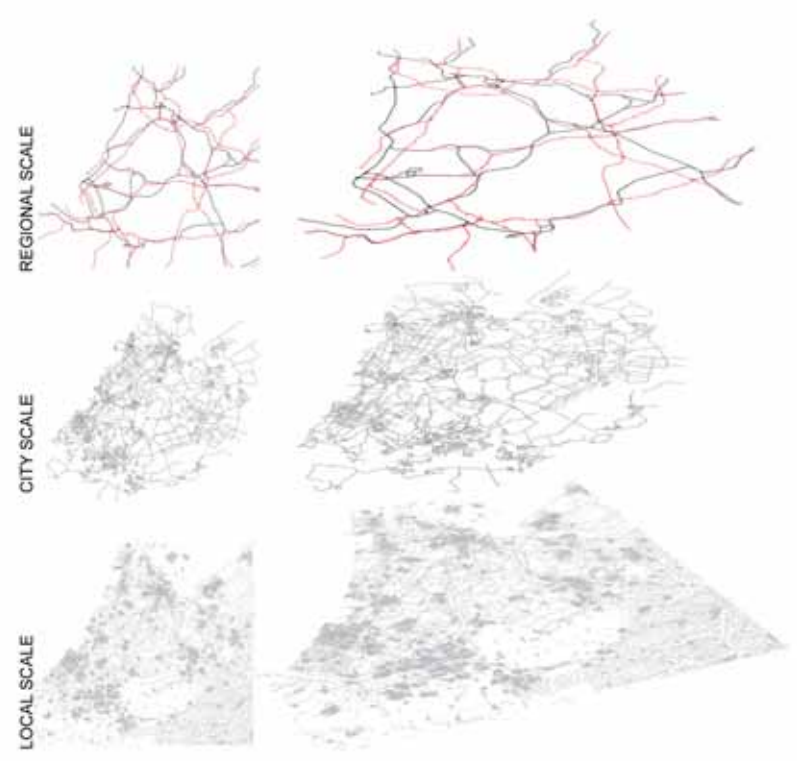


Figure 2.7 Movement layer diagram in the Randstad.

pattern established by these geometries (corresponding to spaces and continuous series of spaces which have a strong linearity and continuity, and have sightlines which are long in relation to the general length of sightlines in the city) that tend to condense and concentrate movement to themselves, establishing a higher order subset of space in the city which is specialised for medium and long distance movement. This subset of urban space, forms a continuous network facilitating this longer distance movement – and coincidentally establishing a relatively less complex, relatively more legible and 'mentally mappable' spatial pattern serving the bulk of movement (and orientation) needs of city users (Read, 2000b, p.2).

And the third component of the urban grid is the grid at the scale of neighbourhood or at local scale. This scale is represented by the neighbourhood's street and block or spatial layout, which through its shape either promotes activity within the interior of the area or inhibits it and, vitally, facilitates movement interaction between the local grid and the city-scale network.

Based on the studies of different cities, it is suggested further that urban liveliness is a product of the layering of these different movement layers (see for example Read, 2002; Kusumo & Read, 2003; Budiarto & Read, 2003; Pinilla & Read, 2006). Thus, to produce an urban centre-like activity, the location needs to be systematically connected (through a well distributed network) to the local urban scale as well as to the city and regional scale of the networks.

2.1.4 The street and the urban grid

The review of urban spatial configuration as outlined in the previous section suggested that it is necessary to understand the local scale as well, the fine-grained fabric of street space that we experience everyday.

Jane Jacobs (1961) pointed out, in her world famous book *The Death and Life of Great American Cities*, the importance of small blocks as generators of diversity (see Figure 2.8). As an economist and the local inhabitant of Manhattan New York city, Jacobs emphasizes the importance of the small block size and frequent streets in supporting the liveability of the city centre and the presence of the small shops. She argued that most of the uses of diversity depend directly or indirectly upon the presence of plentiful, convenient, diverse city commerce. Long blocks, in their nature, prevent the potential advantages that cities offer to incubation, experimentation and many small or special enterprises, in so far as these depend upon drawing their customers or clients from much larger cross-sections of passing public. She opposed the myth that plentiful city streets are 'wasteful', the theory held by the advocates of the Garden City and Radiant

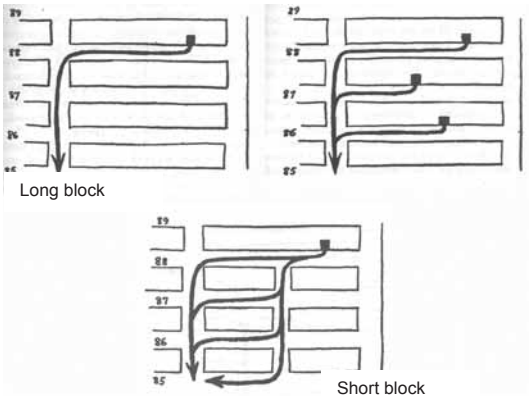


Figure 2.8 Sketch from Jacobs (1961): the long and short blocks.

City who decried the use of land for streets, which in their view should be consolidated instead into project prairies. Jacobs argued that frequent streets and short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of a city neighbourhood. In other words, frequent streets are effective in helping to generate diversity only because of *the way they perform*.

Jacobs (1961) provided a convincing description of the important role of the streets. Unfortunately, however, she is not clear about the (more precise) spatial conditions that make some streets busy and full of life and others deserted.

Arnis Siksna (1998) elaborated this idea further. He did comparative studies of block sizes and forms in eight North American and Australian city centres. The centres of those cities offer examples of initial layouts being subjected to immense and rapid changes in land use, building forms and transportation modes in a relatively short period of time. Although they all have managed to adapt to different requirements, it is possible that cities having certain block forms and sizes may have adapted more easily and may perform better today, than others.

In his research, Siksna (1998) found indeed that some block forms and sizes were better than others in making a city centre layout more amenable to adoption, or more robust in meeting varied development needs over time. It is demonstrated that small square blocks, of about 60-80m, perform better than larger blocks because they produce finer-mesh circulation patterns, more potential frontages, more coherent block fabrics and finer-grained, continuous urban fabrics, and both low- and high-rise buildings.

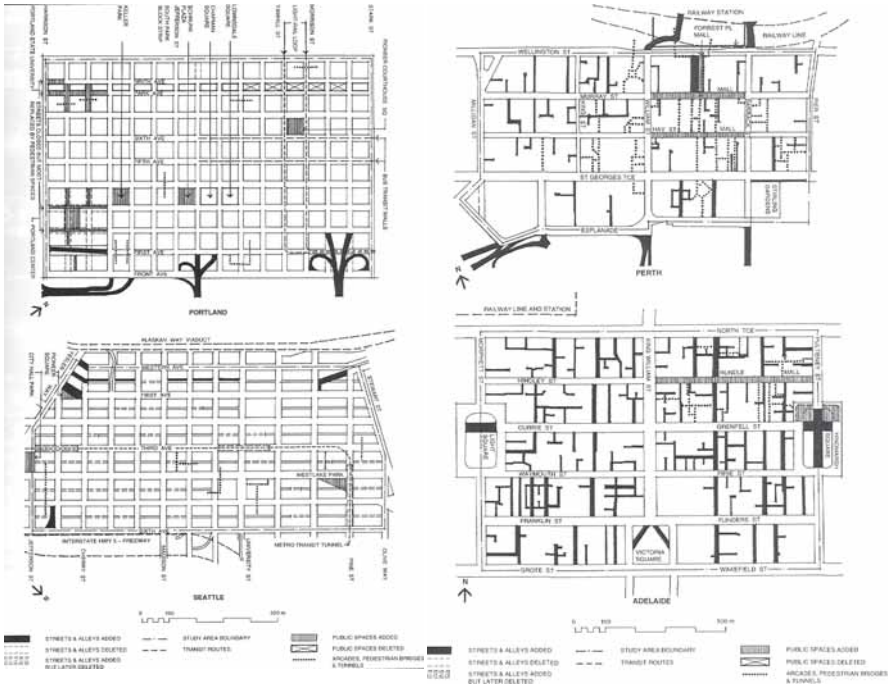


Figure 2.9 Examples of cases studied by Siksna (1998) in Portland, Seattle, Perth, and Adelaide, showing the modifications to original layouts (Source: Siksna, 1998).

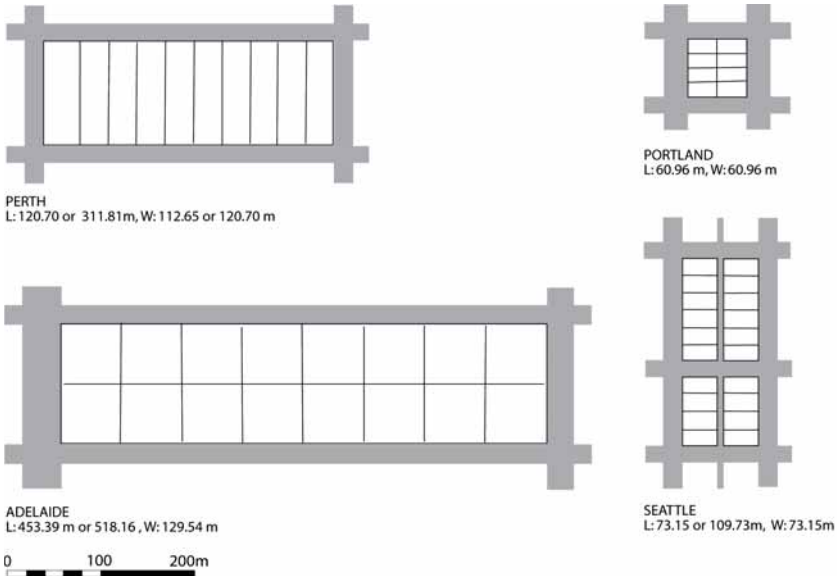


Figure 2.10 Size of the original blocks in Perth, Adelaide, Portland and Seattle (Siksna, 1998).

Furthermore, in cities with small or medium initial blocks the street and block layout has remained intact, whereas in cities with large initial blocks the layout has been considerably modified by the addition of streets and alleys, creating smaller blocks and sub-blocks. For example as shown in Figures 2.9 and 2.10, Adelaide's originally huge blocks (58,700m^2 to 67,100m^2, the equivalent of about 240 to 260 meter squared) are subdivided now into four or five smaller blocks (5,200m^2 to 19,500m^2), and Perth's original blocks (13,600m^2 to 37,635m^2, the equivalent of about 210m by 120m) now contain two or three smaller blocks (9,600m^2 to 19,200m^2). By contrast, cities with small blocks (less than 6,000m^2) and a fine initial circulation mesh such as Portland and Seattle have undergone few changes, and can be regarded as having an optimum block size. This study in fact confirms the findings of Moudon (1986) on residential blocks, namely that large deep blocks are intensified by inserting alleys and subdividing the block interior, and that small lots produce more predictable building forms and fine-grained block fabrics. These findings are also found to be generally valid for city centre blocks.

Siksna (1998) concluded that small or medium blocks, in the range of 3,600 to 20,000m^2 (or 60 to 140 meter squared) are more suitable for the general functioning of city centres than larger blocks. Layouts with small blocks produce finer-meshed circulation networks than layouts with large blocks. The number of intersections, affording change in travel direction, is a good indicator of the level of circulation convenience. Finer-mesh pedestrian networks are appropriate in areas of intense pedestrian activity, particularly in the retail core blocks. Thus, it can suggested, that if certain block forms have worked well, or have produced particular effects in the past, there is a reasonable expectation that they will perform similarly in other cases in the future.

In further study by Hess, Moudon, Snyder, & Stanilov (1999) investigated the effects of neighbourhood site design on pedestrian travel in mixed-use, medium-density environments (Figure 2.11). A quasi-experimental method is used to study the pedestrian volumes into twelve neighbourhood commercial centres in the central Puget Sound region of the United States. A pedestrian travel catchments area is defined by a 0.8 kilometre (0.5 miles) radius. The land use characteristics of all twelve sites create a high potential to support pedestrian travel. Each site has a gross residential density of approximately 25 people per hectare. This population lives within 0.8 kilometres (0.5 miles) of a neighbourhood commercial centre oriented towards convenient retail services. Controlling the population density, income and land use mix and intensity, the volume of pedestrian trips is three times higher in urban sites with small street blocks (with a mean block size of 11,102 m^2, the equivalent of about 90 by 120 m) block than in suburban sites with large blocks (with a mean block size of 120,396 m^2, the equivalent

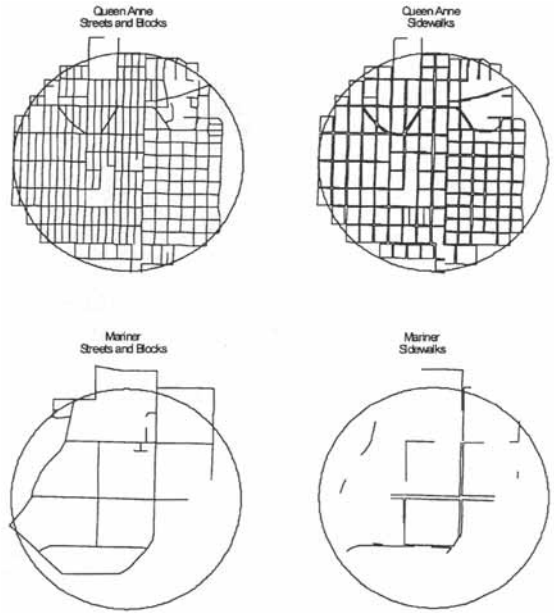


Figure 2.11 Example of the case study of Hess et al. (1999).

of 305 x 396 m block). This demonstrates that population density, income and land use mix are not sufficient to predict pedestrian volumes.

The research of Hess et al. (1999) shows that pedestrian volumes are related to neighbourhood site design. Specifically, the three measures traditionally employed to predict pedestrian volumes - population density, income, and land use distribution and intensity – are, individually and together, insufficient to explain pedestrian volumes neighbourhood site design, and specifically block size also must be considered. All urban sites studied with small block size (an average of 11,102 m^2) studied have a higher volume of pedestrians than the suburban sites. In a way, the mean block size here confirms Siksna's idea (1998) of the 'usefulness' of small urban block sizes (between 3,600-20,000 m^2). Thus, Hess et al. (1999) suggests that neighbourhood site design (in particular the size of the urban blocks) plays a determinant role in supporting walking as means of transportation.

Accordingly, Read (1996) and Marshall (2005) argued that continuity of street pattern and the high level of connectivity and permeability in an urban grid determined the density of moving people in the public space. Finely meshed grids offer many different ways to get from place to place within the grid. In countries and regions with a long history of incremental urbanisation, most urban grids are 'deformed' and often described as

'organic' (Carmona, Tiesdell, Heath, & Oc, 2003). Therefore, in a complex urban settlement of contemporary cities, eye visualisation only is not enough to determine whether an urban street pattern of a city neighbourhood is physically permeable or not.

Stephen Read (1996), utilizing the space syntax theories, developed a method to measure the orthogonality of the urban street pattern in its relative relation with the whole city structure of the urban grid. The orthogonality is measured by 'area integration' (a measure designed to highlight areas in the city with a high general level of radius-3 integration[8]). It was used to further reveal the local potentials of the fabric. His empirical research (reported in depth in Read, 2000a), relating space syntax grid shape parameters to movement densities of people in the public space in 36 neighbourhoods in five Dutch cities, has established that the density of moving people in the public space of those neighbourhoods is strongly determined by shape characteristics of the layout of those neighbourhoods. It is found that the density of moving people is much higher in neighbourhoods with an orthogonal layout than in urban areas with a less orthogonal pattern (see for example Amsterdam in Figure 2.12). In general, he argued that local concentrations of high radius-3 integration (the redder or darker patches in the area integration map) reflect high levels of social interactivity. This relationship is represented in Figure 2.13 where each point represents a neighbourhood with activity rates in the public space of the neighbourhood as a whole on the vertical axis and the space syntax measurement of local integration, again for the public space of the neighbourhood as a whole on the horizontal axis. No account was taken of any other factor, but the shape and connective characteristics (as measured by space syntax) of the area layout in reaching this result, and no relationship at all was found between either population densities or housing densities of the areas considered and rates of activities in their public space. Read (2000b) argued further that a grid with a high general connectivity between its streets that is where all sightlines tend to cross a relatively high number of other sightlines, will tend to be one which supports a high rate of activity in its public space. An ideal geometric figure made up of straight elements with a high level of connectivity is of course the simple orthogonal grid. Since the transparency offers possibility for people to acquire quickly information about an environment and its possibilities for further movement, people tend to use a layout grid more concentratedly when it is more transparent or orthogonal. In fact this finding can be read alongside Siksna's idea (1998) that transparent local scaled grids tend to promote intensity of use even though it measures directly grid transparency rather than grid size.

8. Radius-3 integration is one of the Space Syntax measurements. It is an integration measurement, in axial map, from any line to only those lines that are up to three lines away from it, which localised the importance of a space for access within a particular part of an urban network.

Figure 2.12 Area integration (orthogonality measurement) of Amsterdam, the detailed grid structure of the Pijp neighbourhood and commercial activities inside the inner grid of the Pijp. Red colours denote more orthogonal grids.

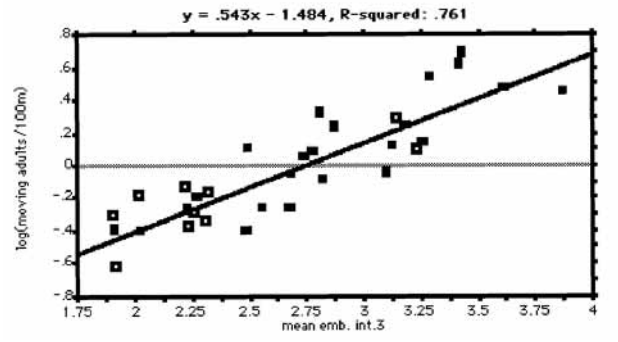


Figure 2.13 Correlation between local 'integration' measures for whole areas and the averaged occupation of that public space by people in 35 neighbourhoods in Dutch cities (source: Read, 2000b).

2.1.5 The railway station and the shop

Often, a study on a station area focuses only on its regional accessibility and neglects its integration into the local urban area surrounding it. Smulders' study (2000) on the Delta Metropolis area in the Netherlands provides a good example. His study focused on the accessibility of the transport nodes (i.e. railway stations or highway exits) and of their attractiveness as a *Central Business Pattern*[9]. This study analyzed the travelling time efficiency within different transport nodes in the Delta Metropolis region and the basic support of these main nodes, in terms of population, jobs and their potential as a transfer node. However, it did not discuss how the node should function as an urban centre and how to integrate these transport nodes into the existing or future urban structure.

In 1998, Luca Bertolini and Tedjo Spit argued that accessibility ('how many destinations, within which time and with what ease can it be reached from an area') is not the only feature of a transportation node such as a railway station, but the station is also a place of activities ('how many and how diverse are the activities that can be performed in an area'). Therefore, Bertolini and Spit (1998) introduced a 'Node-Place' concept (Figure 2.14). The node represents *the accessibility* (the more people, the more interaction) and the place corresponds to the *intensity and diversity of activities* (the more activities, the more interaction is happening). As node and place, a public transportation node and its surrounding are part of a system of both competing and complementary nodes and

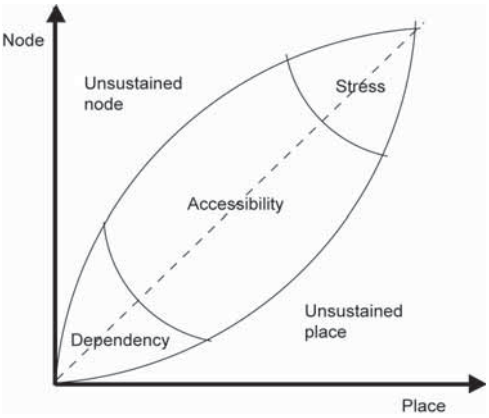


Figure 2.14 Node-Place model by Bertolini (Source: Bertolini,1999).

9. The immediate area of the transport nodes consists of the largest concentration of international/metropolitan functions.

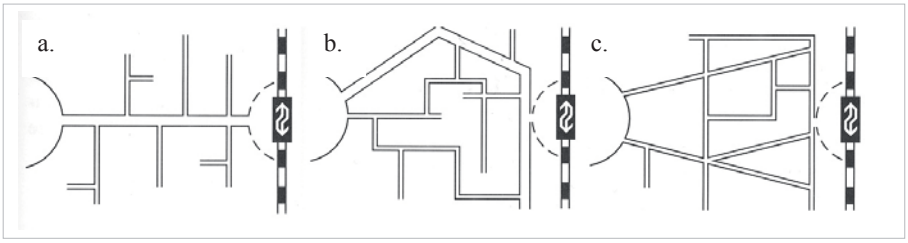


Figure 2.15 The structure of the 'connection' between the railway station and the 'centrum' (core shopping area): a. A clear axis between the station and the centrum; b. No clear axis, but there is a clear route; c. No clear axis and no clear route (Source: Bakker, 1994).

places. The node-place model offers a conceptual framework for the exploration of the (re)-development potential of station areas in an urban region.

A good example of a Node and Place location is a railway station. On the one hand they are (or may become) important nodes in emerging, heterogeneous transport and communication networks. On the other hand, they represent a 'place.' A 'place' is consider a temporarily and permanently inhabited portion of the city, that is often a dense assemblage of diverse uses and forms accumulated through time, which may or may not share in the life of the node. Yet a railway station as node and place has some dilemmas, and one of them is a physical dilemma. In the compressed space of station areas, growing amounts of node-related and place-related structures must be accommodated, catering both to passengers passing through as well as residents, employees and visitors living in the area. The property development, which would be ideal for maximum infrastructure flexibility, must find an improbable synthesis. In order to realize synergies and manage conflicts, very creative planning, architecture and engineering solutions are required. Station areas could be seen as potential 'centres of centres' within the region and as links between the region and the (inter-)national space: that is, between the local and global.

Leon Groenemeijer and Maaike van Bakel (2001) exploited this model further, to analyze the future potential of different transport nodes in the Delta Metropolis (the Netherlands) and to position them in a 'sustainable' way into the model. They described the 'place' at the nodes as the numbers related to various functions, such as population density, number of jobs and the potential of the development area (for future housing and office space) in square meters. Thus, they measured the quality of the 'place' statistically, the higher the number, then the higher is the place's value.

The node-place paradigm calls for integration between the transport function and the urban function in a railway station area. This approach seems to be useful for

planners since it provides an indication of how many and what kind of functions are to be developed in the future railway station area. Furthermore it eventually helps to identify opportunities for intensification and differentiation of urban activities around (strengthened) public transportation nodes. However, the problem with this approach is that the notion of 'place' is merely translated into statistical numbers (number of houses, people, jobs or surface area), but the spatial-physical problem is not resolved, nor is it explained how to translate the different functions into an urban master plan.

In terms of design of places around transit nodes, Transit-Oriented Development (TOD), a North-American based movement to combat traffic congestion and urban sprawl by encouraging riding public transit, has prescribed some urban development guidance for the neighbourhood adjacent to public transport node such as railway station (Dittmar & Ohland, 2004). Peter Calthorpe (1993) has pioneered much of the thinking on how TOD's areas are best designed, though some others note the roots of all contemporary TOD designs are influenced by Ebenezer Howard's celebrated work "Garden Cities" of over a century ago (Bernick & Cervero, 1997). However when it comes to design matters, there are approximately 50 manuals on TOD available in North America. Basically TOD manuals provide some guiding principles in designing the neighbourhood area around the transit nodes such as 'high-density', 'mixed land use compositions' and 'quality of public environments' (Cervero et al., 2002). In a similar manner, Bach (2006) has recently published a design toolbox for traffic-safe in environmental-friendly urban area in the Netherlands, including the urban space around transit nodes.

This review of literature on stations, then, provides some evidence of the possibility of a station as a potential location for economic exploration of the city. Nevertheless, it is also clear that most of the studies are either at an abstract planning level and do not go further than the issues of 'mix-function', 'density', and 'regional accessibility,' or are concerned with the city beautification level such as TOD's design guidelines. The integration of the station area into the whole urban system, the 'spatial' issue on how the arrangement of these functions is made and how the design of the spatial layout accommodates commercial functions are not well explored.

To tackle these issues, Bakker (1994) did a much closer investigation into spatial aspects of retailing around the station. In his research - *Stationslocaties: Geschikt voor Winkels*? - [Station location: suitable for shops?], he investigated the possibilities of establishing retail activities around the railway station. Joining the discussion on the densification of the railway station area in the Netherlands, he argued that it is important to have a better understanding on how to provide the space for retail shops, service firms and catering establishments (hotels, restaurants and cafés). Using two main variables, functional and

spatial, he performed an empirical study on 70 railway stations located in cities with more than 30,000 inhabitants in the Netherlands. He later compared them with several stations in Switzerland and Germany. He found that a high number of passengers and extended opening hours like in Germany and Switzerland to serve commuting passengers are having an influence on the shops. However these factors were not highly correlated with the presence of the shops. Furthermore, he found that the urban structure at the station areas influences the presence of the shops (Figure 2.15). There are more shops around a station with a clear axis-view or straightforward route from the station to the *centrum*. The *centrum* is the Dutch word for city centre that is often identical with a historical inner city and a core shopping area in the Netherlands). Additionally, he mentioned the importance of a relatively close distance between the station and the core shopping area, so the station can benefit from the pedestrian flow of the core shopping area. This means that the retail activities around the station have in fact a double market: on the one hand, the station passengers (regional consumers) and on the other hand, the passers by (the strangers) or local inhabitants (local consumers). The station needs the connectivity and the proximity with the existing and well-established shopping structure of the city. It is thus suggested that the railway station is unlikely to be successful as an independent attractor for retail activities without the support of the existing economic structure of the city.

2.2 THE SPATIAL PROPOSITIONS

It is often assumed that the socio-economic dynamics of the urban area around the railway station are determined by the attracting power of the nodes in networks working at relatively large regional and metropolitan scales. This idea has been adopted to create a large number of different functions by mixing land use or increasing population density. But accessibility at the regional scale only is not sufficient in attracting the presence of economic activities around the railway station (Bertolini & Spit, 1998; Bakker, 1994; Paksukcharearn, 2003). The place aspect is also a crucial factor.

From this literature review, it becomes clear that in planning and designing a retail location in and around a railway station, urban spatial design is a crucial procedure, along with key management, financial and policy instruments, in securing successful urban regeneration (Bakker, 1994; Paksukcharearn, 2003). In fact, the spatial configuration of the street network influences, to an important extent, the high street economic viability, the urban buzz and the distribution pattern of retails (e.g. Jacobs, 1961; Hillier, 1996; Siksna, 1998; Hess et al., 1999; Van Nes, 2003; Read, 2002). These spatial studies have

become building blocks for the spatial proposition that is going to be elaborated in this thesis, namely that:

1. High-street economic viability (specifically the commercial activities distribution pattern) is influenced by the spatial configuration of the street network.
2. The permeability, connectivity, orthogonality and small block size of the layout of the local urban grid influences the clustering effect of commercial activities in urban areas.
3. The centrality of a specific part of the city (or of the urban grid) is defined by the way the various networks (local, city and regional) are interconnected.
4. Because of this, if we want to create a lively urban space around the station, then the regional centrality of a railway station alone is not enough to generate the liveability around the railway station area. The railway station needs to be physically integrated into its local urban surrounding, i.e., to be integrated with its local urban street pattern at the city and the local scale.

These hypotheses build upon the strengths of the spatial configuration, as an active site constitutes the medium of movement and co-presence with the urban environment, in which has been associated with ideas of urban liveability and high-street economic activities. To examine this spatial proposition, empirical research with different case studies is carried out. In Chapters 3 and 4 the distribution pattern of retails around well-established stations in different cities is analyzed using this spatial framework.

2.3 CHOOSING THE RAILWAY STATION AREAS FOR THE ANALYSIS

In order to provide real examples, against which the theoretical ideas concerning the attractiveness of retails in the station areas may be measured, four railway station areas are selected for case study. Schofield (2002) has argued that a finding, which emerges from the analysis of several *heterogeneous* sites, would be more robust and increases the generalisability of qualitative research. Such finding is thus more likely to be useful in understanding various other sites than one emerging from the study of several very *similar* sites. Heterogeneity can be obtained by selecting sites that will provide maximal variation or by planned comparisons along certain important dimensions. Therefore, two contrasting situations of railway stations are chosen. The first situation represents highly accessible stations (in terms of frequency and number of passengers) at a regional scale. This situation is looked at in order to examine whether a highly accessible station at the regional level is truly capable of attracting commercial activity to settle around it. The second represents a less accessible one and is taken to have a contradictory situation, in which the role or accessibility of the station is declining (fewer passengers, less

frequent trains), in order to evaluate whether such a condition will drive out or decrease the economic activities from that area.

There are various ways of categorizing different types of railway stations into typologies (Krings, 1985; Bertolini & Spit, 1998; Vákár & Snijder, 2001; Spek, 2002). Since the research mainly focuses on the relation between the railway station and its local urban context, the typology that tends to postulate the station type based on the physical impact of the station on the urban area is chosen. There are three different types of position and function of railway stations, which have different consequences for the physical composition of their immediate urban area (Krings, 1985; Vákár & Snijder, 2001):

1. **Terminus station**: a station that lies at the end of a railway line, e.g. Den Haag Central Station, King's Cross Station in London, Gare du Nord in Paris
2. **Through station**: a station where the railway lines continue to other stations. Usually the tracks of a through station run parallel to, what used to be, the boundary of the city. As cities grew over time these stations were often surrounded becoming more centrally located in the city. However, the urban fabric of the city was often divided into two parts. Examples of through stations are 's-Hertogenbosch Central Station, Rotterdam Central Station, Bruxelles Midi in Brussels.
3. **Cross station:** a station which is located at intersecting railway lines that enables passengers to transfer quickly from one line to another. Usually these stations break up the city into four parts, forming a huge barrier in the urban fabric. Examples are Duivendrecht Station and Sloterdijk Station.

A number of criteria emerge when comparing the actual cases studied. First, all the cases are "through" stations where the tracks usually run parallel on the periphery of the old city centre; over time as the city grew around the station these tracks became a barrier and divided the urban fabric into two parts. The second criterion is the 'physical' time (or historical) dimension to ensure that the station has been established long enough to have a natural influence on the land use composition.[10] Thus the station should be one that was built in the 19th century (at the beginning of the railway era) and still functions today. Third, the location of the station should be inside the city. So it should be a station that used to be a typical 19th century periphery station, which, along with the urban growth, is now immersed in a dense functionally mixed and historically stratified urban fabric (or located in the centre). Fourth, the station should be located in the proximity of the (old) core shopping area to ensure that the presence of the shops is due to the natural market demand and less influenced by planning policy.

10. It is argued that if the station is established long enough, even the strict planning policy will adjust itself to the market demand of certain land use.

Figure 2.16 The aerial view of the chosen case studies: Delft Central Station, Leiden Central Station, Kota station (Surabaya), Turi station (Surabaya) (Source: Google Earth).

With these criteria in mind, two stations in the Netherlands – Delft Central Station and Leiden Central Station - are chosen as examples of highly accessible stations. As less accessible cases, two railway stations in Indonesia – Surabaya Kota Station and Turi Station - are selected where the numbers of passengers using railway transport are declining (Figure 2.16).

The Netherlands has a well-advanced planning system. It can even be said that the Dutch territory is literally covered with physical plans (Bertolini & Spit, 1998). On the one hand, this provides a high degree of certainty for developers, but on the other hand, it constrains the flexibility of planning. Since the 1990's, the Dutch government has promoted the redevelopment of railway station areas. This has resulted in huge urban transformations in (and around) many stations. The redevelopment of railway stations has a high priority in the Dutch political agenda, in the Fourth and Fifth planning reports, and has gained attention as urban key projects. Since they were also aimed as a trigger of urban redevelopment, these key projects resulted in a huge transformation in those cities. Therefore, to fulfil the requirements for a case study, a city which has not been touched by such huge transformations as an urban key project, is more suitable. For this purpose the cities of Delft and Leiden are selected. Both are medium-sized

cities in the Randstad (also called Delta Metropolis), which are neither industrial centres nor the focus of socio-political desires. In spite of their good accessibility on a regional scale, the urban configurations of these railway station areas have not experienced an extreme urban transformation since their establishment in the 19th century. Since the external and internal pressures for change were not strong enough to destroy the intrinsic structure of the old city, the old fabric of these cities managed to preserve their original urban character.

As one of the metropolises and the second largest city in Indonesia, the urban development of Surabaya is marginalized in comparison to the capital city Jakarta. Collapse of sugar exports during the 1930s, economic depression followed by the Japanese occupation, revolution, and the centralization policy after Indonesia's independence brought a long period of stagnation of economic development in Surabaya. Yet, this stagnation saved the city from a harsh engineering urban transformation, which would most probably alter the city to be completely different. With the export boom of the 1990s, Surabaya regained prominence as Indonesia's leading metropolis. As far as planning is concerned, Surabaya is a less-planned (more spontaneously developed) traditional metropolis when compared to the medium sized and well-planned Dutch cities selected for this research. The first city plan after independence - Master Plan Surabaya 2000 - was only formally presented in 1978 (Dick, 2002). This lack of planning and maintenance has caused a rather chaotic public transportation system in Surabaya. The Surabaya municipality closed the electric tram network in 1965 requiring tram passengers to use motorized vehicles such as public buses, mini buses and taxis. The poor quality of public transport and the rapid growth of private vehicle ownership have further weakened the role of public transport in the city. These factors, together with the rise of air transport by the end of the 1990s have decreased the role of railway transport in Java. There are less and less passengers using the train and at the same time the accessibility of the station is decreasing. Therefore, railway stations in Surabaya provide a suitable contrasting example for case studies of declining stations.

2.4 THE EXPERIMENT AND DATA COLLECTION PROTOCOL FOR THE CASE STUDY

The experimental part of this work intends to compare the logic of spatial networks against distribution patterns of retail. There are two important issues that this experiment intends to address. The first is to use the simple ability of spatial configuration logic to predict and evaluate the pattern of commercial activities within the settlement, in order to answer the question whether the spatial configuration of the street network

influences the distribution pattern of commercial activities. And the second is to try to identify in more detail spatial features that characterize the concentration of retail activities around stations, in order to answer the question whether the station or the spatial configuration influences the retail establishment, and also to explore in more detail the spatial character that fosters the high-street economic activities around stations.

There are two main variables used in these analyses. The first is the grid configuration analysis using movement-layer techniques as explained in section 2.1.3, and the quantification of the orthogonality of the grid, by using area integration measurement, to uncover space-structural detail within urban fabric as a field of movement and activity. The area integration measurement will be generated by computer program Axman[11], to analyse the orthogonality of the street pattern in its relative relation with the whole city structure of the urban grid. The grid configuration analysis will study in detail the configuration of different layers of movement networks at the regional, city and local scale. It then analyzes the interaction between these different layers of movement in the whole urban structure of the settlement. This configuration of street patterns is used as an independent main variable. The second main variable is the dispersal of the location of the shops; and other land use information is used as the dependent variable. The retail activities are chosen as the main data for the dependent variable, because they are one of the land-use functions which benefit greatly from pedestrian movement and by themselves are capable of generating movement, and tend to establish independently from the planning process.

It is argued further that, while centrality (in relation to the whole city) must by definition be a function of the whole city-scale, the local scale may play a crucial role in facilitating some of the qualities we associate with urban centrality (high densities of co-present interaction for example) – allowing these qualities to emerge. Therefore in addition to this grid configuration analysis, the spatial configuration in immediate surrounding of the station (within a radius of 1 kilometre) will be studied carefully, to analyze in detail the shape, density and dimension of urban fabric around the station.

Only mapping and measuring spatial configurations is not sufficient. For that reason the topological analysis has to be compared with actual usage of space in the analyzed area. For this purpose the registration of the location pattern of retails and other land use

11. Axman is an application used to analyse axial maps of urban space. Axman constructs a graph of the configuration of axial lines, interpreting the lines as the graph's nodes and connection between lines as the edges of the graph. It was created by Nick Dalton at the University College London.

will be drawn as an independent source for a comparison with the spatial configurative analysis. Specifically, the land-use analysis will show, first, the location of commercial land-use (retail shops, market and service firms) in the whole settlement, and second, a detailed map of observed numbers of retail shops and service firms on each line segment of the spatial configuration map in a one kilometre radius.

For the registration of land use, a good city map and topographic map can indicate where most of the industrial buildings, religious buildings, schools, public buildings, leisure, hotels and institutions are located. Yet for retail land use, a special map is needed. For the Dutch cases, the availability of the data from Locatus B.V.[12] made it possible to provide a retail map for the whole settlement. But in the Surabaya case, due to the limitation of data availability, it is only possible to present a rather general categorization of the land use, based on the 'commercial' land use map from the local municipality. However, the precise location of shops and other commercial activities are difficult to find on the maps. Therefore, the direct observation of the location of shops and service firm's can contribute to exact mapping. The observation activity for this research was conducted in the year 2003 for the Dutch cases and in 2004 for the Surabaya cases.

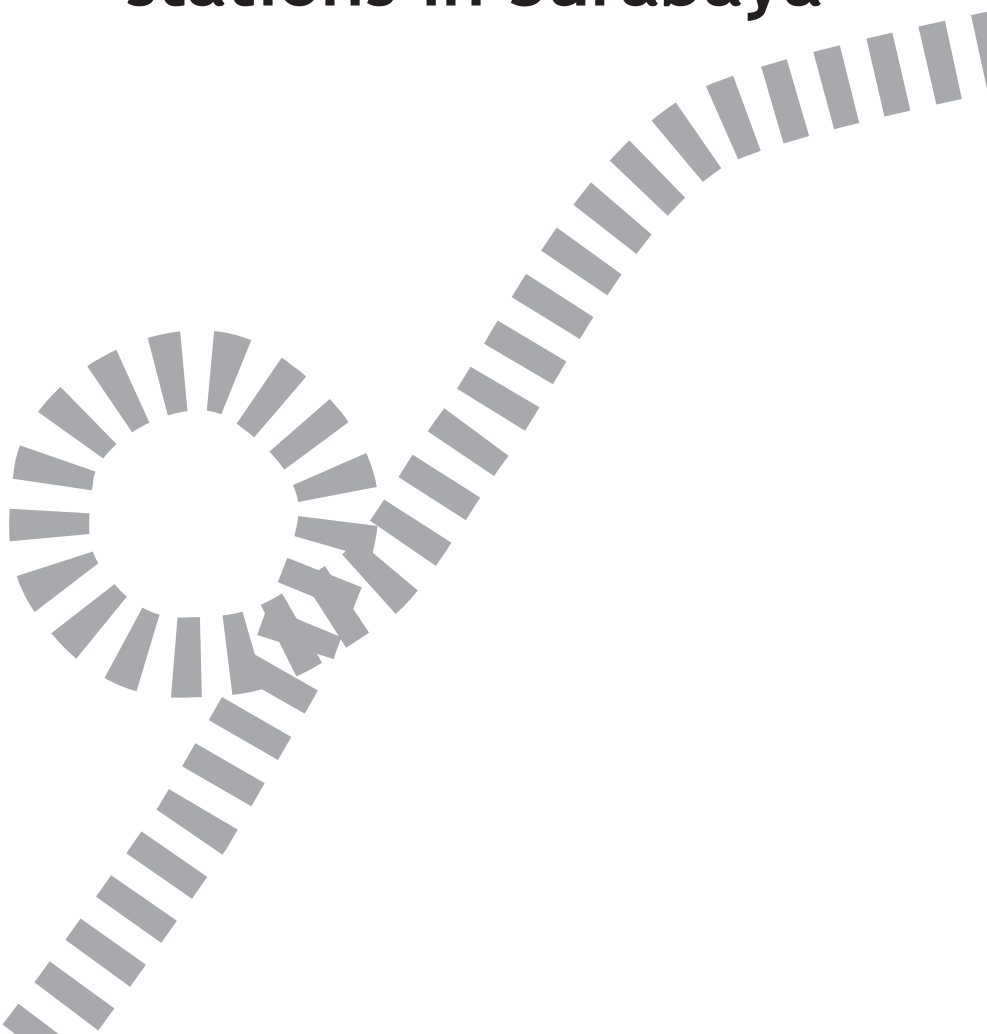
All the parameters above – spatial configuration at different scales, the orthogonality and the need of small blocks – form the critical essence, the building blocks of the proposed *spatial framework* for analyzing the existing pattern and predicting the future distribution pattern of retail land use in and around the station. Such a framework must acknowledge the essential need for issues relating to planning policy to be incorporated. In some cases, the planning policy has determined the location of certain functions and likewise excluded some other functions from certain areas. This policy can preclude the opportunities for new retailers and shops to establish themselves just where they want. With these factors in mind, Chapters 3 and 4 continue the discussion with an examination of the spatial configuration and economical functionality in which my study of railway station areas is framed.

12. Locatus B.V. is an independent company who provides information about retail shops in the Netherlands.

Chapter Three

Surabaya's Markets and Railway Stations:

Spatial configuration study of the area around the railway stations in Surabaya



SURABAYA'S MARKETS AND RAILWAY STATIONS: SPATIAL CONFIGURATION STUDY OF THE AREA AROUND THE RAILWAY STATIONS IN SURABAYA

The establishment of the railway infrastructure at the end of the 19th century brought economic change to the people of Java. The railway provided the hinterland an access to the consuming population of the city. The farmers from the hinterland could easily bring their cultivated products to the city by themselves. Due to the centrality which the station provided the farmers, markets started to emerge around the three stations in Surabaya. The railway station became an ideal meeting place for producers, who sought to supply consumer demands. Today there has been a sharp decline in rail transport; it is currently less than road transport, partly because of the decline of the local narrow-gauge railroads, many of which have been discontinued. Nevertheless, these markets are still there, and they are providing a more prominent place as market centres in Surabaya.

I suggest that this continued success of the markets has to do with having a (good) place, i.e. a spatial location that is capable in maintaining the liveability of the market. This might be one of the reasons that keep these markets still in their place even after the decline of rail transport and the station as a node. Therefore this chapter investigates the spatial condition that supports the sustainability of the markets activities around the railway stations in Surabaya. The areas around the stations were analysed spatially, to uncover the space-structural detail within the urban fabric as a field of movement and activity. The findings demonstrate that an intelligible spatial configuration of the area around the railway station is an important factor that sustains a vibrant market place within the urban fabric of Surabaya.

3.1. SURABAYA: THE RAILWAY AND THE MARKET

Surabaya has long been an important trading centre due to its strategic location as the gateway to the fertile valley of the Brantas River.[13] It has a well irrigated hinterland which was suitable for sugarcane and other tree-crop production, such as coffee and rubber in the highlands. The importance of the Surabaya harbour began with the Cultivation

13. One of the biggest rivers in Java, which is also the waterway for the fertile hinterland in East Java.

System[14] of the Dutch colonists in 1830, which triggered the rapid growth of commodity production in the hinterland. The entire agricultural production, from the Lower Brantas Valley as far as Jombang, Kediri and Madiun, was exported through Surabaya. In the 1890s, the scope and productivity in Surabaya was further expanded by the provision of steam tramways to supplement the state-owned railway system in East Java. Thus by 1900, Surabaya had become the busiest port and largest city in the Netherlands East Indies (Dick, 2002).

The construction of a railway brought a change in the economy for the people in Java. In spite of being a colonist tool of exploitation,[15] the train was widely accepted by the local population because it created the possibility of transporting products to the city. The construction of the railway network in East Java was completed with remarkable speed. The first section line, from Surabaya, Sidoarjo and Bangil to the sugar port of Pasuruan, was completed in mid-1878. A westward line from Surabaya up the Lower Brantas Valley reached Madiun in mid-1882 and two years later connected with the Central Java system at Solo. Meanwhile, a branch line following the Brantas River upstream to Kediri had been extended as far as the southern hills. Thus by 1884 the most fertile and populous regions of East Java had been linked into a single state-owned rail network centred around the port city of Surabaya. In the 1890s, the rail network was supplemented by rural tramways acting as feeder lines to the main system. The densest networks were in the Brantas Delta below Mojokerto and around Kediri and Madiun, which allowed sugar cultivation to extend in a broader and denser band from rivers or main rail lines. The construction of railways, especially the State Railways, increased the efficiency of the system for the transport of sugar. Railways and tramways also consolidated Surabaya's control over its hinterland at a critical time. Despite more or less running parallel to the main rivers, which were also the axes of settlement, railways were the faster and more reliable mode of transport than the rivers. In the lowlands, railways and tramways extended the hinterland for production of export crops, especially sugars (see Figure 3.1).

The railway provided the hinterland an access to consumers in the city and market economy of the nation. Because the railway station provided a central meeting point for the farmers, market activity started to emerge around the stations in Surabaya. Later

14. It is a "form of agro-industrial exploitation of Java whereby the government used its authority and influence to force the peasantry to grow tropical export products in return for unilaterally set, low payments; these products subsequently were sold for the benefit of the treasury" (Fasseur, 1975).

15. The railway infrastructure was built with the aim to speed up the transport of agricultural product from the hinterland to the harbour for export.

Figure 3.1 Railway and tramway network in Eastern Java, 1939 (Source: H. W. Dick, 2002).

Figure 3.2 Declining railway stations and its infrastructure (clockwise direction: Rail line to the west of Kota Station; dismantled platform at Kota Station; Demak station building and platform closed for operation).

on, the government formally recognized these markets which have become important market centres in Surabaya today.

Rail transport is declining today partly because of the old and inadequately maintained infrastructure, but also because of competition with other modes of transport such as road and air transport. As shown in Table 3.1, all modes of transport in Indonesia experienced reasonable growth during the period 1999-2003 except for rail transport. For passenger and cargo land-transport, the bus, private vehicle and truck are much more common modes of transport. As can be seen in Table 3.2, the most common mode of regional passenger transport in Surabaya is bus, with more than 34 million passengers

Table 3.1 Growth rate of transportation in Indonesia, 1999-2003 (Source: Departemen Perhubungan Republik Indonesia, recompiled, 2005)

Mode of transport	1999	2003	Growth rate (%)
Road transport			
Length of roads in Indonesia (km)	274.783	328.314	19,48
Number of passenger motor vehicles	16.595.618	29.716.711	79,06
Number of trucks (cargo transport)	1.628.531	3.058.218	87,79
Railway transport			
Length of railway tracks in Indonesia (km)	4.615.918	4.564.600	-1,11
Number of railway stations in Java-Madura	439	437	-0,46
Number of railway passengers Java-Madura	183.976	149.832	-18,56
Number of railway cargo/freight in Java-Madura (ton)	5.324.000	4.719.000	-11,36
Water transport			
Number of water transport passengers through ferry port	36.051.016	39.664.889	10,02
Number of water transport cargo (ton)	10.615.310	14.611.139	37,64
Air transport			
Aircraft movement production of domestic flights	435.391	775.595	78,14
Aircraft movement production of international flights	68.494	76.050	11,03
Passengers production of domestic flights	14.093.690	41.548.480	194,80
Passengers production of international flights	7.799.261	8.512.757	9,15
Cargos production of domestic flights (ton)	251.143	401.220	59,76
Cargos production of international flights (ton)	247.316	237.222	-4,08

Table 3.2 Number of passengers departing from Surabaya (Source: Biro Pusat Statistik Kotamadya Surabaya, 2004 and Port Administrator of Tanjung Perak, n.d.)

Departure from:	1998	1999	2000	2001	2002	Growth rate (%)
Juanda Int'l Airport	1,139,576	998,397	1,160,001	1,528,783	2,047,990	79.72
Railway stations (Kota, Turi, Gubeng, Wonokromo)	3,771,820	4,333,398	4,671,275	4,347,154	3,797,721	0.69
Bus terminals (Purabaya, Tambak Oso Wilangun)	-	-	28,848,429	33,182,390	34,961,160	21.19
Sea Harbour (Tanjung Perak, Ujung Kamal)	-	-	7,985,074	7,164,255	7,363,595	-7.78

in 2002 compared to only about 3,8 million train passengers. Most of the regional (inter-city) busses enter Surabaya via Purabaya terminal, which is also the southern terminus of the city bus lines, and Tambak Oso Wilangun terminal, located at the West gate of the city (see Figure 3.5). From these main terminals, the regional passengers can move further around the city with a variety of smaller vehicles (i.e. city bus, mini bus, angkot, bemo, angguna, becak, taxi, etc.).

The municipality of Surabaya has divided the urban public transport into two systems: the primary and the secondary. The primary system, the main network of the city's public transportation, is served by the city busses[16] (18 routes), which due to their size only serve along the north-south central corridor of the city. The secondary system consists of the complementary network of *angkot* (city mini busses) that serve the rest of the city through smaller roads and alleys in the *kampungs17*. Additionally, the public transport network is also made up of semi-private vehicles such as taxis, becak and angguna,[18] which in spite of their public character serve individual needs to arrive at specific destinations.[19]

16. The city busses are the successor of the electric tramway network which was closed down in 1965 (Dick, 2002)

17. This term refers to Urban village

18. A specially designed motor vehicle that can be used for transporting both for passengers and goods.

19. There are about 4896 taxis and 765 angguna in Surabaya (http://www.surabaya.go.id/transportasi.php)

Figure 3.3 Street vendors, becak and mini busses (public transport) around railway stations in Surabaya.

Airplanes show the fastest growth as a regional passenger carrier during this period. The number of departing passengers increased by almost 80% in 2002 when compared to 1998. Since the start of the price war in the airline industry in 2002, many train passengers have changed their mode of transport to the low-cost airplane. For instance, for the route of Jakarta-Surabaya in 2005, the number of train passengers has decreased by 50%[20]. To illustrate: at this moment the cost of a one-way train ticket Surabaya-Jakarta is about Rp 190,000,-, with 10 hours travel time. Meanwhile by airplane the travel takes about one hour and it costs about Rp 350,000,-[21]. In addition, airplanes to Jakarta are more frequent than trains. In 2005, at least 46 flights departing to Jakarta were operated daily by 8 different airlines compared to 6 trains per day. These circumstances obviously caused many railway lines to be discontinued and many train stations to be closed.

Nevertheless, the market activities still survive in the railway station area despite the decrease in the number of passengers and the decline in regional accessibility of the

20. Wiyana & Kartini, 2005

21. The ticket price difference in 2005 is larger than in 2004. In 2004 the airplane ticket was only Rp 60,000 more expensive than the price of a train ticket.

station. If the markets were there because of the regional accessibility of the station, why then has the market activity not also declined near the station?

I suggest that the place, where the station is located, plays a dominant role in sustaining the market activity. Therefore in this study, I tried to explain the spatial logic of the distribution pattern of commercial activities in the fine-grained urban fabric of Surabaya and the spatial conditions that trigger and sustain the presence of the market activities in certain locations.

Since the market activity around the station is also part of the commercial structure of the city I will first examine the role of the market in Surabaya in order to better understand the market's function and importance in Indonesian society and then secondly to explain the spatial logic of commercial or market activity in Surabaya.

3.2. THE MARKET IN SURABAYA

By 1900, Surabaya boomed as the service centre headquarters and port for an expanding, plantation based, export economy. As a result of the expanding economy, the city started to experience an acute housing shortage within the 19th century's city walls. In 1870 the decision was taken to demolish the city wall and the urban area began to expand southward to marginally higher ground. The city's expansion southward was enhanced by a steam and electric tram service that connected the southern part of the city with the port area in the North (see Figure 3.4). The city became elongated as a ribbon of development grew from the North extending to the South following the old axis along the Kali Mas River. However, the boom in Surabaya did not last very long. The world depression in 1930, the Japanese invasion in 1942 and the subsequent revolution destroyed the plantation-based export economy of Surabaya. During these times the plantation sector had lost the ability to generate growth and employment; and no new leading sectors had emerged to take over that role. In addition, after Indonesia's independence, the centralization policy with investment directed heavily towards Jakarta, which made the economic condition of Surabaya even worse.

In fact the trade percentage of the urban economy in Surabaya is extremely high since almost one third of the workforce in the city is involved in trading of some kind (DHV Consultant & PT Tritunggal, 1999). It has an extensive retail sector, with major shopping centres, public markets and major concentrations of shops at several locations. While modern malls, such as *Plasa Tunjungan*, *Mal Surabaya*, *Mal Galaxy*, supply a wide variety

Figure 3.4 Map of Surabaya in 1958 with important stations and tram lines (Source: Yossihara, A., Suharsiningsih, A., & Ambrosius, H.M., 2004).

of products and entertainment, the old traditional markets, or *pasar*[22] in Indonesian, such as the *Pasar* Turi, *Pasar* Pabean and *Pasar* Kapasan remain the largest whole sale markets for clothes, electronics and food products in East Java. These markets attract both merchants and buyers not only from the hinterland of Surabaya, but also from other eastern Indonesian's islands which, in turn, generates further economic activity.

Thus, Surabaya is still a market place today where products from its hinterland and the Outer Islands are brought for sale. Currently more than 170 markets operate in Surabaya. Yet, only 81 of them have formal recognition from the local government. The remaining markets operate with an informal status. In spite of the growing number of supermarkets and shopping plazas, markets still fill an important niche in the urban

22. This term probably comes from the Persian 'bazaar' by the way of Arabic.

economy of Surabaya. Markets, in general, are still a fundamental economic institution of urban life in Indonesia. It is in a market where social and economic interaction takes place. In general the functions of *pasar* in Indonesia are manifold; they act as an institution of economic distribution, they provide for the daily needs of inhabitants, a general mode of commercial activity reaching into all aspects of Indonesian society and serve as a working place (Geertz, 1963). As an economic distribution institution, markets sell their products to the internal market (local economy), other Indonesian islands or the international market. They serve as collecting point for these goods, redistributing those destined for local consumption in small retail transactions and providing bulk loads for the cities and selling them wholesale by the truckloads. Traditionally, all markets were actual places where goods were displayed for sale, as buyers and sellers met face to face to haggle over prices and quantities. Nowadays, the larger town markets, such as in Surabaya, do the wholesale trading as well as retail (the same person often does both simultaneously). There is not the sharp distinction made between retail and wholesale normally found in western trade.

As working place, the market provides a place for economic survival in times of crisis. It provides unconditional employment and the access to work in the market is free; in fact anybody in need of cash may, without any restriction of age, education, or even experience, seek employment in the *pasar*. The 'right to make a living'[23] at the market is commonly respected. Furthermore it is regarded as a place where a beginning trader can gain experience and even the money needed to establish his own business outside the market, such as a shop. The market provides an opportunity for everybody to gain basic knowledge needed to embark on a more sophisticated, and as far as material prospects are concerned, more promising career in trade (Mai, 1984).

The question is why has the traditional market continued to survive and thrive in Indonesia despite its contact and economic interdependence with the western world for over two hundred years? Dewey (1962) explained that the situation in Indonesia limits the applicability of modern western techniques in making economies with large scale-operations. In the modern western economy, the mechanization, standardization and centralization allow the economies of size to increase efficiency and decrease the costs. In Indonesia, there is little standardization of production and not much demand for it by the consumer, who is not accustomed to it and in any case has the time to inspect his purchases and choose those most suited to his needs. The *pasar* also has lower operating costs than the large scale more developed commercial organization in terms of capital expenditure. Much of the handling cost is met by unpaid labour supplied by

23. Dewey, Peasant Marketing in Java, p.82

Figure 3.5 Map of Surabaya in 2000.

individual traders. Another factor is the flexibility of the *pasar*. The small unit traders are individually more sensitive/susceptible to bankruptcy, especially in bad economic times or with rapidly fluctuating prices, but as a whole, the *pasar* has greater resilience, because any number of separate traders can fail without affecting the total system, since their finances are entirely independent of each other. These then are several ways in which a multiple-unit market system serves the needs of the economy more efficiently than a large-scale, centralized and mechanized organization. Since it can supply the services demanded cheaper than the more developed commercial organizations, the *pasar* survives despite its relative technological inefficiency.

Besides analysing the market on its own, attention is also given to the importance of the spatially central location for market activities Dewar and Watson (1990) have noted that markets are extremely sensitive to pedestrian flows and concentrations of traffic. Therefore the agglomerations of small traders will collect at a point where population movement is the greatest. Dewey (1962) and Lilananda (1997) pointed out that *most of the markets are located in the spot where two or more main routes into town cross*. Furthermore important village roads are frequently chosen as an informal gathering place where the villagers bargain with people carrying goods into the town markets. If the crossroad is heavily travelled, traders may establish themselves there and the government may give formal recognition to the market, collecting entrance fees/taxes for maintenance of the market grounds. Thus it is suggested that market activity occurs as a result of certain movement patterns of the people, concentrated particularly at spots where two or more main movement lines cross each other. For very important market centres, sheds and buildings are erected on government property. However, the government almost never arbitrarily establishes and directs people to use a market in an area where trade is not customarily carried on. Most markets either are quite old or are offshoots of old markets which have developed as a response to the demands of an increasing population.

3.3 UNDERSTANDING THE COMMERCIAL-SPATIAL LOGIC OF SURABAYA

In an effort to understand the spatial logic of market activities in Surabaya, the correlation between the market location and the movement layer network is analyzed. Figure 3.6 shows the location of the main markets in the city (the yellow dots represent the market) in relation with regional scale movement networks of Surabaya (which consists of rail-, road-, water- and air-infrastructure lines). As can be seen, these main markets (*Pasar* Turi, *Pasar* Dupak, *Pasar* Pabean and *Pasar* Kapasan) are all located in the vicinity of a regional connection, with the exception of the *Pasar* Keputran. This is obvious

Figure 3.6 The relation between the regional-scale movement network and the locations of the main markets in Surabaya.

because the markets need the proximity to this scale of network, since either their production resources or their distribution destinations are located outside the city. Production costs need to be minimized by minimizing the distance and the time to both suppliers and consumers.

Pasar Pabean, for example, is a market specialized in fish, spices and other food products, such as rice, beans, etc. It was named 'Pabean', which means 'customs' in Indonesian, because in the beginning of the 20th century it used to be the location for collecting taxes for any river boat transporting agricultural products (the main export cargo) from and to the hinterland of Surabaya. *Pasar* Pabean obtains its supply not only from the hinterland of Surabaya, but also from other islands in Indonesia. For this reason, the market is located at one of the regional connection nodes, precisely at the meeting point of the River Mas, the main river in Surabaya, with the Java Sea. *Pasar* Pabean is one of the main markets in Surabaya and operates 24 hours. From morning till afternoon, as an agricultural distributor, it trades onion, chilli and all kinds of spices, poultry, meat, eggs and fruits. After 18.00 PM, fish from the ponds in the hinterland and from fishermen arrive; this activity reaches a peak at midnight. The *Pasar* Pabean is the main fish distributor in Surabaya. After midnight, vegetables begin to arrive and before sunrise the market vendors from smaller markets have finished their transactions and distribute their goods to smaller markets in Surabaya for local consumption. Thus, both the proximity of the fresh-product producers/suppliers (i.e. the fishermen, farmers from the hinterland and Outer Islands) as well as the easy access for the consumers (i.e. the vendors/retailers from smaller markets and local city inhabitants) are important for *Pasar* Pabean.

Another example is the *Pasar* Kapasan, located in Kembang Jepun - Kapasan Street, one of the major arteries in Surabaya with a good regional connection. *Pasar* Kapasan is specialized in trade in garments and distributes garments regionally not only to East Java, but also for Outer Islands in Eastern Indonesia (such as Nusa Tenggara, Lombok, Madura, Maluku, Sulawesi etc.). For this reason, the proximity of the highway exit at Tanjung Perak and Dupak, and also the Tanjung Perak harbour (about 4 kilometres from the market) are important. Besides acting as a regional wholesale distributor, *Pasar* Kapasan also serves as retailer for local inhabitants, so basically anyone can just go there to buy a t-shirt or a trouser for personal use. Thus it is also important for Kapasan to have a good local connectivity for the city inhabitants. Kapasan needs to be located in the city-scale network so the market is intelligible for both city inhabitants as well as for the regional buyers.

Figure 3.7 Retail activities in *Pasar* Kapasan.

Figure 3.8 Vendor activities in *Pasar* Keputran.

However, not all markets in Surabaya are located in the direct vicinity of the current formal regional network. *Pasar* Keputran is an example of this. As the main vegetable distributor of Surabaya[24], where domestic markets and retailers obtain their supply, their operation is mainly at night. From midnight until 05.00 AM many trucks from the hinterland of Surabaya are arriving and supplying the market with vegetable products

24. The turn over value of this market is more than US$3,000,000/day (Pasar-pasar tradisional, 2004).

to fulfil the demand of Surabaya's households. Similar to Pabean, before 06.00 AM, the smaller market's retailers/vendors, with all kinds of city-vehicles (i.e. becak[25], motor cycle, minibus, little pick-up), have obtained their produce supply from this market and distributed it to all corners of the city. For this function in the city-scale network, the market is in fact located in an outstanding place. It is the most central place in Surabaya which in a way reflects the importance of the market for the city.

In its early establishment, the Keputran market was actually located at the West bank of the Mas River and it was well connected to the East bank of the river with the pontoon (Figure 3.9). As shown in Figure 3.10, at this moment, *Pasar* Keputran is located in the crossing of two main axes of the city-scale network (North-South and East-West direction). For the vegetable distribution system this means, that the transport vehicles (truck, minibus, becak, motorcycle, bicycle, etc) can move through the city easily and reach their destinations efficiently, with the least time and distance, minimizing costs. Especially for the smaller market vendors, the necessity to be in the proximity with the wholesale is very essential, since they often cannot afford the higher cost of a private (expensive) vehicle to transport their goods.

Since *Pasar* Keputran serves as supplier, distributor and retailer for the domestic markets and obtains its goods from a regional scale distribution system it is important to have easy access both to the city- and regional-scale network. As the city's main supplier and retailer, it is indeed located at one of the most central places in the city-scale network. But being located in the middle of the city on Urip Sumoharjo Street, it seems that Keputran lacks proximity to the regional network. However, when we observe the map in the 1980's before the highway network was established, we can see that in fact the Urip Sumoharjo Street was the regional network thoroughfare (Figure 3.9a). It was the main street to access Surabaya from the south. It was only later on the highway on the west side of the city replaced this role, so that the Panglima Sudirman - Urip Sumoharjo street does not act as a regional axis anymore, but has become one of the main city conveyor's for the city-scale movement flows. At this moment, it is one of the busiest main thoroughfares in the city. Since the market activities mainly take place during the night, as the city sleeps, the bulky trucks from the hinterland can easily use this old regional network to deliver their goods to *pasar* Keputran. The *Pasar* Keputran, as the vegetable wholesale distributor, is located at the same time on the (old) regional movement network and in proximity to important main thoroughfares crossing the city

25. A velotaxi, also known as a pedicab, cycle rickshaw or trishaw (from tricycle rickshaw), is a human-powered vehicle for hire, usually with one or two seats for carrying passengers in addition to the driver.

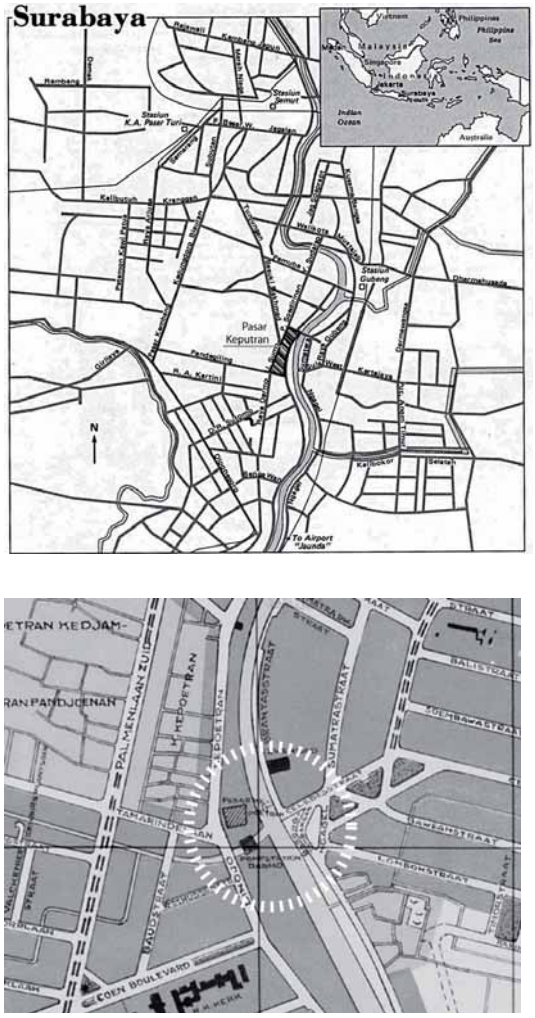


Figure 3.9 a. The map of Surabaya at the 1980's; the hatched area is *Pasar* Keputran (Source: Library University of Texas Library, n.d.). b. The location of *Pasar* Keputran in 1925 and the crossing pontoon that connected the two sides of the city (Source: Topographische Dienst, 1925).

(Figure 3.10).). It is therefore not surprising that the efforts to relocate the market to the edge of the city were met with a lot of resistance from the market traders (Urban Poor Linkage Indonesia, 2005; Kompas, 2006). Intuitively they know that this location is the best place for them in terms of the connectivity and the catchments area.

Figure 3.12 presents the two city-spatial systems that consist of two levels of city-scale movement networks along side the location of the railway stations and the markets. The first (white lines) serves mostly faster vehicle movement (motorized vehicles: cars,

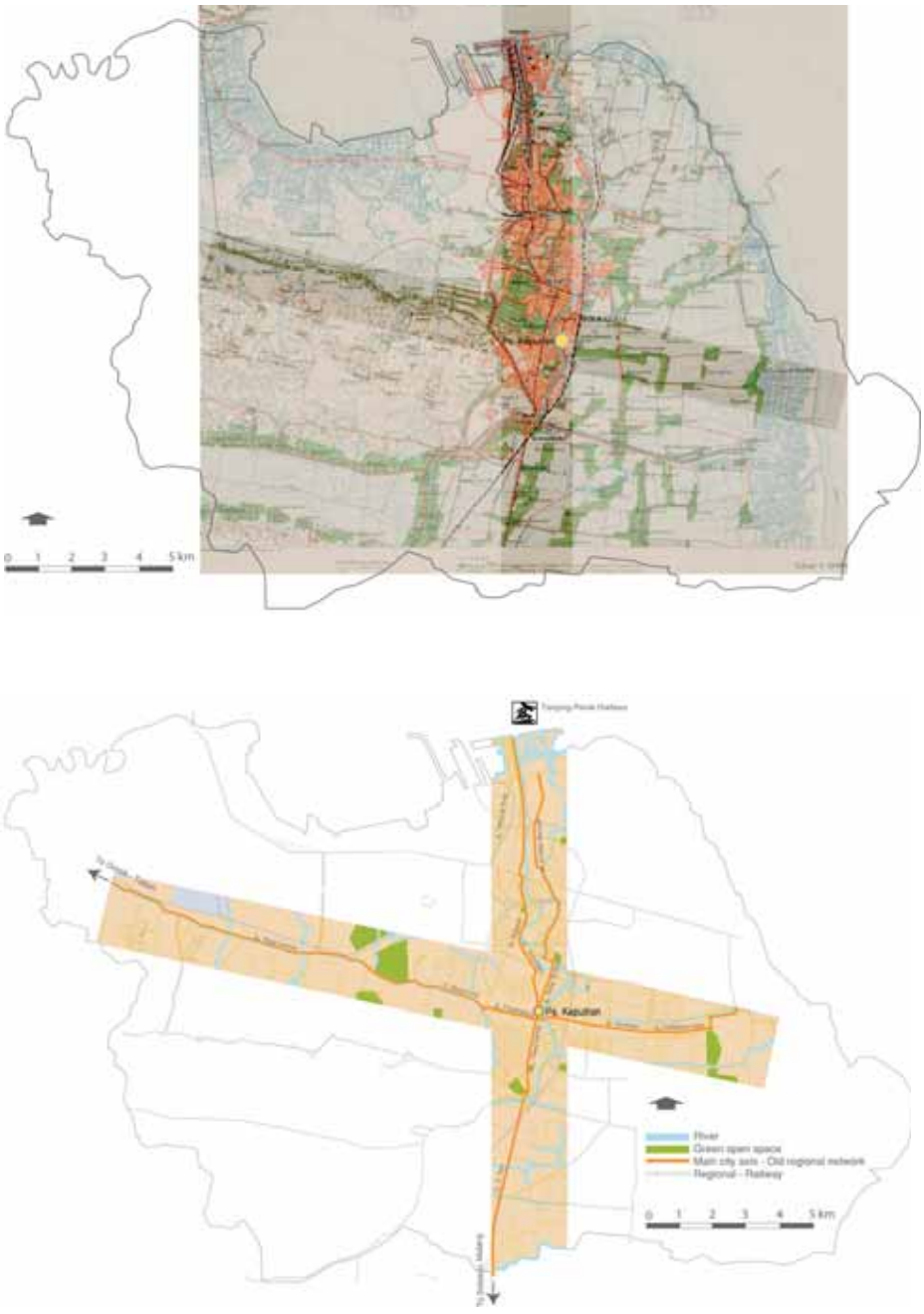


Figure 3.10 Keputran, in the junction of the two main axes of Surabaya (above in 1925 and below now).

Figure 3.11 Public space usage in Jalan Semarang.

busses, motorcycles). This system organizes the functional pattern of large formal activities along the first level of the city-scale network which are characterized by large formal public institutions (high-rise and government buildings, shopping malls, etc.). Face-to-face interaction on these street spaces are exceptional cases and it is usually forbidden for slow-speed vehicles (becaks, bicycles, horse/cow carts) to move around in the first city-scale network. They act as the main city axes and as a feeder for the regional network. Meanwhile 'urban buzz' activities occur mostly on the second level of the city-scale network (grey lines). The everyday social and economic life of the majority of the city's inhabitants, i.e. street vendors, food stalls, the use of non-motorized vehicles such as the becak or bicycle and pedestrians rather than cars, are located in these spaces. Somehow the second city-scale network serves as a feeder for the first one, connecting the local neighbourhoods (kampung) with the first level city-scale structure.

A good example illustrating the difference between the first and the second city-scale networks is the difference in activities at Semarang Street and Bubutan Street (see Figure 3.13). Semarang Street runs parallel with Bubutan Street which is Surabaya's major thoroughfare where most of the formal public buildings stand. Walking down these two streets undoubtedly presents one with very contrasting experiences. Since most of the sidewalks are left empty, street level activity and pedestrian movement is less common on Bubutan Street, while Semarang Street is crammed with stalls and peddlers attracting passers-by to stop. The traffic speed drastically slower down, due to the stalls and street hawkers that spill over, even into the middle of the road.

It suggests an explanation why the Bubutan-Pahlawan-Gemblongan axes, while unmistakably being the most prominent street of Surabaya, is lacking compared to Semarang Street when factors like the use by people of public space and public use of side walks is taken into account. Those main arteries are especially engineered for vehicles and in fact they are almost sterilized from any street-hawkers activities. Around the mid-1970s,

Figure 3.12 The city-scale networks – 2 levels (white and grey thick lines) and the location of city/domestic market (yellow dots) in Surabaya.

Figure 3.13 Detailed map of Bubutan and Semarang street.

most of informal commercial activities and non-motorized vehicles (e.g. becak, horse/cow cart) were forced off the main arterial roads, and in some cases even prohibited. The limited access of the street as an important public space other than allowing motorized movement caused the sidewalk to remain empty and to prevent the presence of mixed users. As far as the city-scale is concerned, Bubutan Street and other main thoroughfares in Surabaya function well by bearing urban movements at the city-scale and by being a prominent centre. However when considered at the neighbourhood scale, these routes are perceptibly not the centres of public life for various reasons, such as inaccessibility of pedestrian oriented activities or lacking the context with respect to the surrounding area.

The relation between the distribution patterns of domestic markets in Surabaya with its city-scale networks is revealed in Figure 3.12. The domestic markets are located mostly at the crossing of these city-scale networks. The markets are positioned at the crossings because here they can catch most of their potential customers; it is the place where most of the pedestrian traffic takes place. Thus they can maximize their selling serving the city inhabitants and the local neighbourhood at once. The commercial activities tend to concentrate in city-scale networks, obviously because they are the busiest streets in the city (as the main streets), carrying most movement in the city. Moreover, most of the city-scale networks in Surabaya used to serve as a regional network, connecting smaller

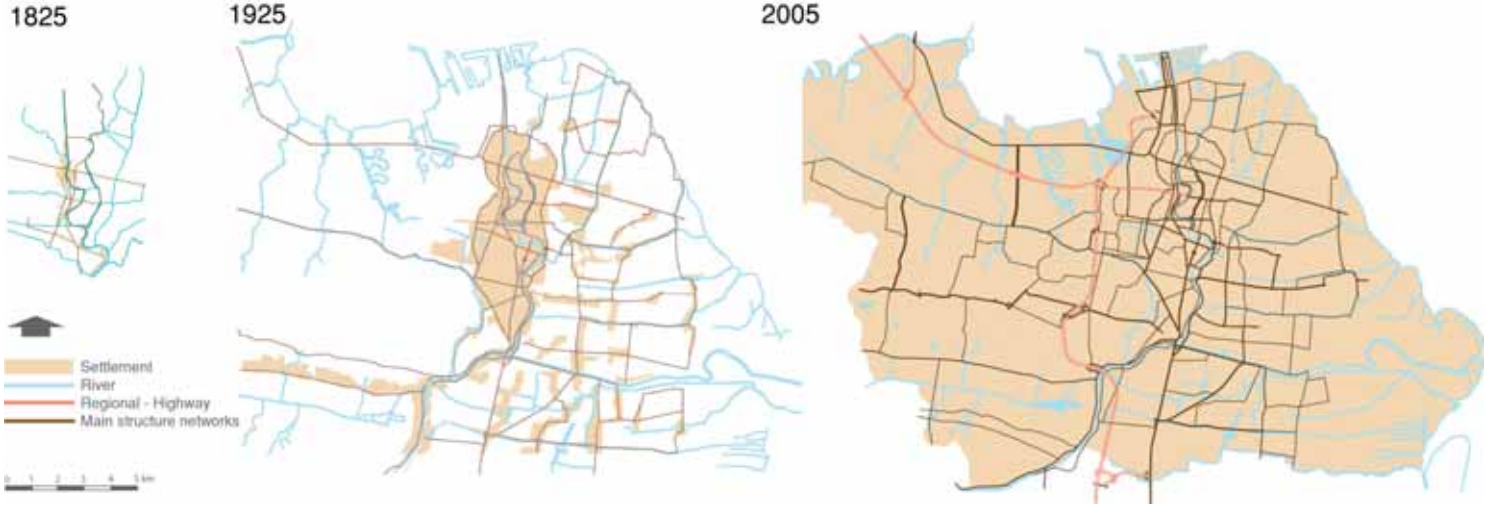


Figure 3.14 Structural development of Surabaya from 1825 till now.

Figure 3.15 The commercial land use pattern superimposed on the city-scale networks (white lines) of Surabaya (Land use information is obtained from the website of the municipality of Surabaya: http://www.surabaya.go.id).

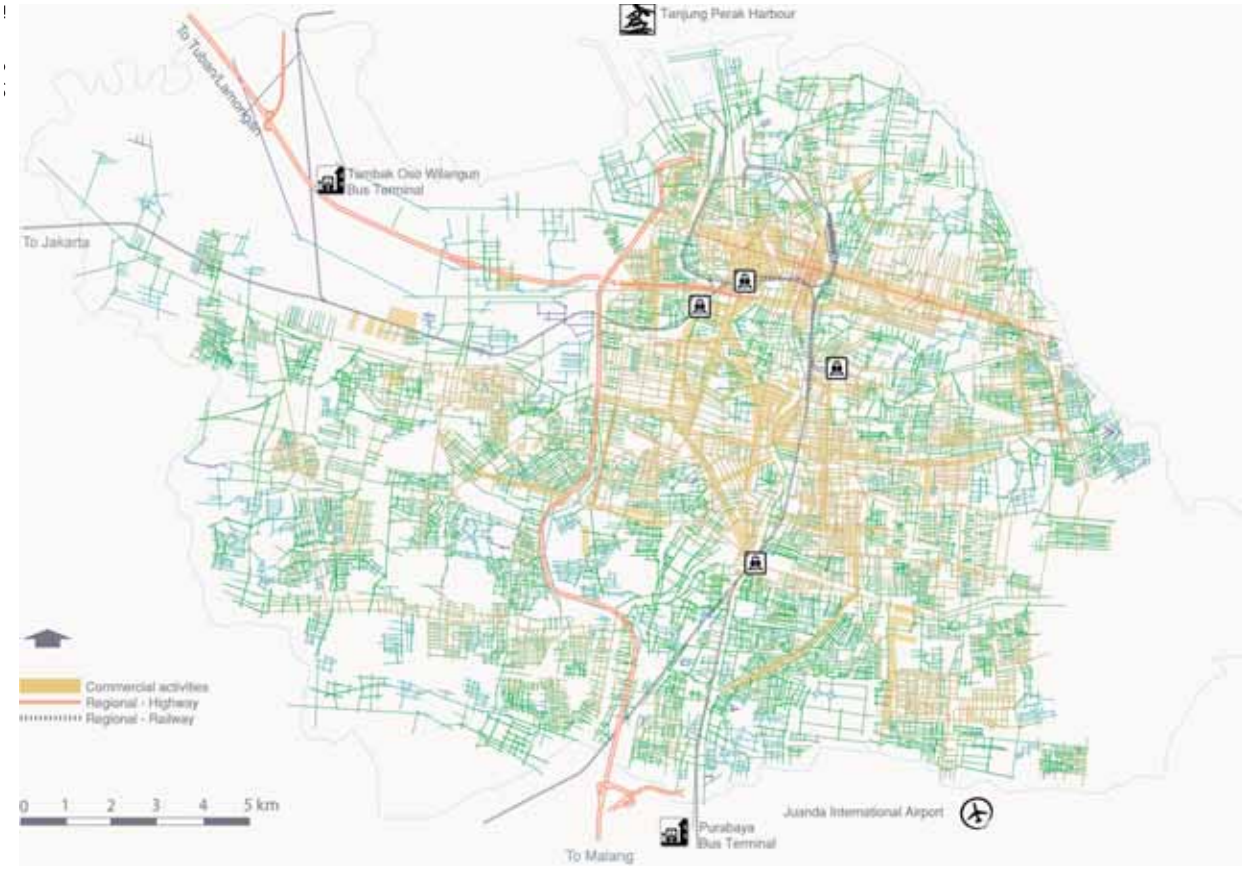


Figure 3.16 Orthogonality analysis (area integration measurement); redder colours denote a higher potential of the urban space for commercial activities.

towns and villages, before they merged together as one Surabaya conurbation (Figure 3.14). This confirms the earlier statements by Dewey (1962) and Lilananda (1997) that the spot, where two or more main regional networks cross, is frequently chosen as the location for market activities.

In fact not only the market locations follow the spatial logic of the city, but also the distribution pattern of the general commercial land use in Surabaya. It can be seen in Figure 3.15 that the distribution pattern of economic activities in the city is not dispersed but mostly concentrated, with a strong linear pattern, along supergrid axes. The linearity is closely affected by the pattern of city-scale spaces, since the majority of commercial activities are concentrated along main arteries where accessibility is at its best. And it is mainly concentrated especially where there is a high concentration of supergrid axes – thus where many supergrids cross each other.

Figure 3.16 shows the results of the grid orthogonality analysis (area integration map) of Surabaya. It reveals that many of the local urban neighbourhoods in Surabaya have a relatively high local potential (redder patches in the area integration map). As shown in Figure 3.15, Surabaya is a metropolitan area that emerged from the conurbation of many kampungs (urban villages). Usually, the spatial configuration of kampung settlements, which nowadays represents the basic units of city neighbourhoods, is quite simple and straight forward. This explains why most parts of the city have quite permeable spatial configurations. Interestingly, even though the grid orthogonality is distributed almost equally over the whole settlement, the clustering of commercial activities was only found in the area where these permeable grids are attached to the city-scale network, especially where they are is overlapping with a concentration of city-scale networks. This implies that the permeability of the local grid is not enough alone to generate retail activities, but its integration with higher scale networks is the one that generates the commercial activities.

3.4 SPATIAL CONFIGURATION AND RETAIL ACTIVITIES AROUND THE STATION

The distribution pattern of retail activities and its relation to the spatial configuration of the urban area around two railway stations are analysed in further detail. The first station, Kota Station is the oldest and was formerly the main railway station in Surabaya. In spite of the decline of the railway station, the area around this station is very vibrant and full of retail activities. The area is one of the places in the city that is in most demand for commercial activities, and some parties have even proposed replacing the station

Figure 3.17 Retail activities inside the inner grid (neighbourhood) of Bongkaran (above) and Gembong (below).

with a shopping mall. The Kota station is located at the crossing of two important main thoroughfare streets: Indrapura - Kebon Rojo - Stasiun Kota[26] Street and Bunguran – Pengampon – Undaan Street (see Figure 3.18). Since its establishment in 1878, the Kota Station has been always connected relatively well with the rest of the city despite being at the edge of the 19th century Surabaya. Stasiun Kota Street was a continuation of Buitenweg (now called Indrapura Street), one of the main thoroughfares at that time. Meanwhile Bunguran – Pengampon – Undaan Street was a continuation of the long street along the Pegirian River.[27] The river before the 19th century was one of the old regional networks of Surabaya since it was the conveyor of regional movement. Thus in addition to the station attractiveness for commercial activities, the intelligibility of the city-scale spaces around the station had attracted retailers and vendors to establish themselves over there. Or in other words, the centrality of the station and the city-scale space has enhanced each other in providing an attractive location for the emerging of market activities around the station. As the city grew, these two (regional) streets were becoming more centrally located (becoming part of the city-scale network). What used to be the periphery, has now become central. As a consequence, these city-scale spaces became the main thoroughfares in Surabaya. This has made these spaces even more

26. It is a long street with three different names.

27. One of the two branches of Brantas River in Surabaya, stretching from the hinterland in the South until the Java Sea. It was part of the old regional networks before rail- and road-transport replaced it.

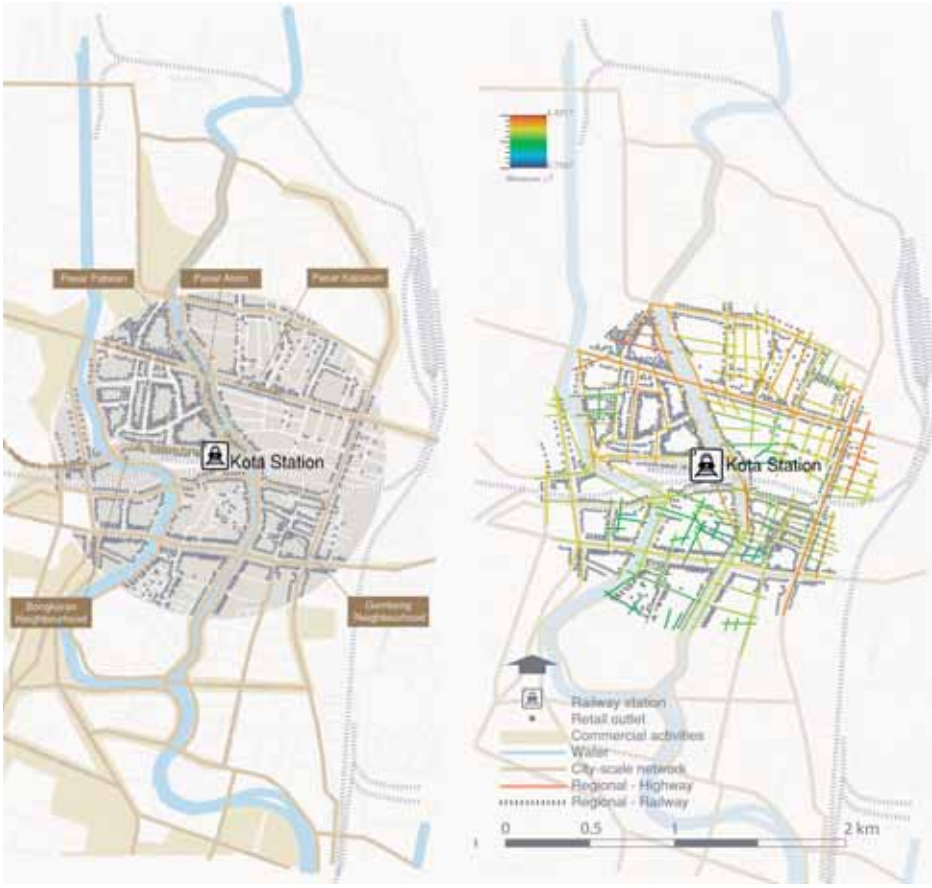


Figure 3.18 Distribution of retail and market (pasar) activities within one kilometre radius of Kota Station, superimposed on the city-scale network (left) and orthogonality analysis (right).

attractive for retailers and street vendors since they are looking for high pedestrian and traffic volume. Thus even though the centrality of the station is fading away, the city-scale space centrality is the one that sustains the attractiveness of this place.

Let us further examine the spatial configuration around Kota station. Since I deal mainly with pedestrian oriented retail, a walkable radius is chosen as the research boundary. This means that the railway station is identified and a circular area radiating from the railway station is drawn that is considered to be a 'walkable distance'. In this case I adopt a walkable radius of one kilometre.

Figure 3.18a selects a one kilometre circle around Kota Station and assigns numbers of retail and market activities on each line segment (representing a street space) on the map. It shows that in the vicinity of the station, there are 3 main markets: *Pasar* Atom,

Pasar Kapasan and *Pasar* Pabean. Those three markets are located quite well in the city-scale network (brown lines) and of course in the vicinity of regional network due to their operational scale area. The prominence of these markets has attracted other retail activity. It makes this location a place where the wholesale distributors co-exist with the street vendors. The first market, *Pasar* Atom, located just in front of the railway station, is a regional and city distributor and retailer. In fact, of these three markets, the Atom market is the one that emerged as a direct result of the establishment of the station. Today, *Pasar* Atom is one of the 'one-stop shopping centres' in Surabaya with a huge arrange of merchandise, from clothes to wedding souvenirs. Meanwhile, the other two markets (Kapasan and Pabean) in addition to their function as a regional wholesale market, also serve as retailers for the city inhabitants so basically we can just go there to buy a t-shirt or a trouser or a fish for personal use[28].

Today, the retail activities invigorate the whole area[29], and these trading activities are not only particularly concentrated along the city-scale spaces, but are also distributed in some parts of the local neighbourhood in Bongkaran and Gembong. Further study of the spatial configuration of these two neighbourhoods shows in general three important spatial characteristics. Firstly, those two neighbourhoods are both bordered by the city-scale spaces on all sides; consequently they are easily accessible for the city-scale network users. Secondly, as reflected by the orthogonality analysis as a highly integrated area (Figure 3.18b), the pattern of simple orthogonal grids and direct sightlines (ladder structure form) between two city-scale streets, which directly run deeply through the neighbourhood, theoretically make most of the spaces in the neighbourhood intelligible for passers by, so in one or two turns they will be able to come back to the main streets. Thirdly, their block size is rather small (in average of 12,350m^2); as it has been explained earlier, a smaller block size provides more potential façade for the retailers to attract customers and smoother movement for pedestrians (potential shoppers) to browse the merchandise. It is quite obvious that in the other neighbourhoods, which do not have these spatial characteristics (un-transparent, large block size and not surrounded by the city-scale network) the retail 'spilling effect' does not occur since the grid is not permeable and intelligible enough for pedestrian movement.

The second railway station, Turi, is located at Semarang Street. This street used to be named *Nederland Indische Spoorweg (NIS) – laan*, because the station was built by NIS. The Turi station was established (in 1900) outside of 19th century city. However, because

28. An extended explanation and analysis of *Pasar* Pabean and *Pasar* Kapasan can be found in section 3.3

29. It is the Kembang Jepun - Central Business District, the oldest CBD in Surabaya.

of the sugar boom and city expansion at the beginning of the 20th century, the NIS-laan became a main thoroughfare connecting the downtown with the new housing area in the South. This street was further enhanced when the steam tramways were added. Similar with the Kota Station, the upgrading of Semarang Street into a prominent street at the city-scale level enhanced the attractiveness of this street as a market place. Nowadays, the role of the Turi Station is declining; there are less passengers and cargos using the station. Nevertheless, the intelligibility and connectivity of the city-scale structure in the neighbourhood around the station is capable in maintaining the vibrant character of this area. Not only street traders and other informal economic activities are flocking to this location, but also the large developers are coming[30], attracted by the centrality of the space that maintains the liveliness of economic activities in this area.

Figure 3.19 selects a one kilometre radius around Turi station. *Pasar* Turi, the main market in this area (with inter-island trading area, distributor and supplier of Surabaya's hinterland and other islands), is located at the crossing of Dupak and Pahlawan Street and is surrounded by the main arteries of Surabaya connecting the centre to the south and east and west part of Surabaya. *Pasar* Turi originated from the *Pasar* Besar (Great Market), a main market in Surabaya in the 19th century. *Pasar* Besar used to be located in the area between Pahlawan Street (Aloen-aloen straat) and the Kali Mas River (the crossing between the Mas River and the regional land road to the east villages (coast) and West villages/towns), before it moved to its present site of *Pasar* Turi in 1905 (Dick, 2002). Being one of the main markets in the city, *Pasar* Turi attracts customers with a variety of merchandise, from food products to electronic home appliances, are sold both in the market building and the sidewalk.

Concerning the relation between the economic activities and spatial pattern around the Turi Station, observation in one kilometre radius around the station shows that the local grid is less orthogonal and has lower integration value than the Kota station area. However, the Turi station is located on the long city-scale network (*Semarang street)* and surrounded by rather dense city-scale spaces (in the one kilometre radius there are more than five city-scale spaces criss-crossing the area), which has had the result of making this area one of the commercial centres in Surabaya. Nevertheless, most of the (in) formal retail activities are only concentrated along the city-scale spaces and do not infiltrate into the interior of the grid, despite the dense commercial activities at the city-scale spaces. The retail activities are particularly concentrated along Semarang Street and *Pasar* Turi Street. The interior of the neighbourhood areas (such as Koblen,

30. One of the newest development is 'Pasar Turi Trade Center', located at the old industrial terrain of Perumka (The state-owned railway company).

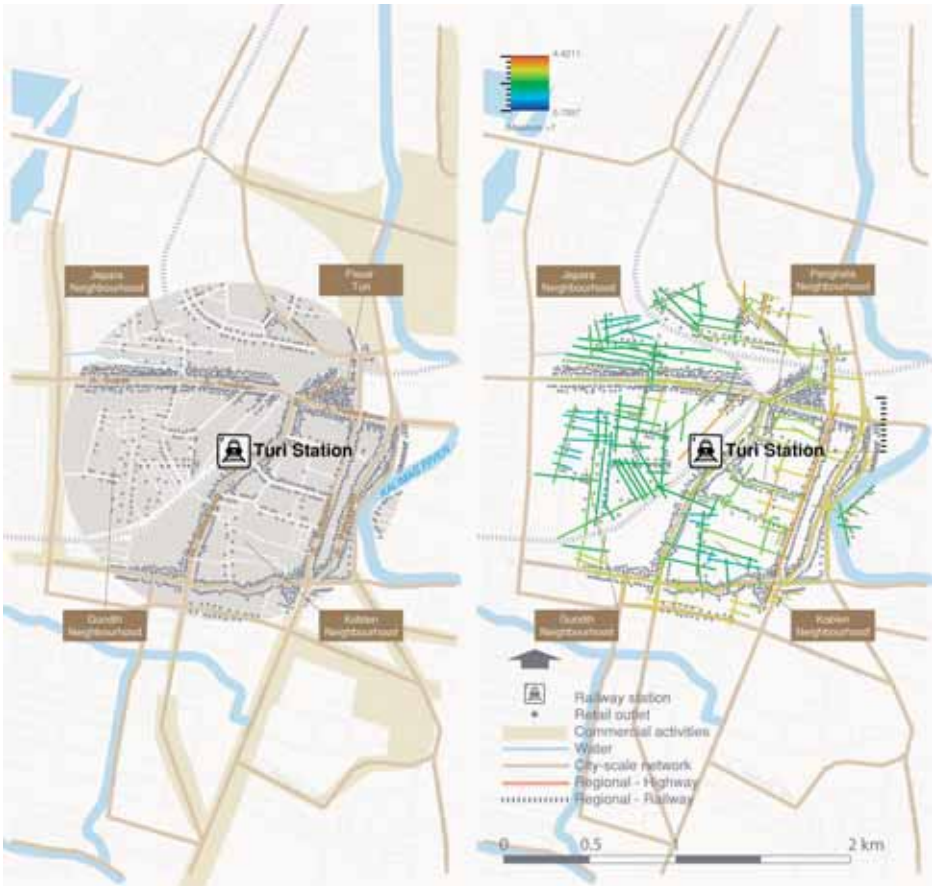


Figure 3.19 Distribution of retail and market (pasar) activities within one kilometre radius of Kota Station, superimposed on the city-scale network (left) and orthogonality analysis (right).

Penghela, Gundih and Jepara) are mostly dominated by domestic activities such as baby sitting, chatting, cooking, etc. by local inhabitants and not by commercial activities. Spatially, these neighbourhoods have a less transparent and permeable structure compared to the Bongkaran and Gembong neighbourhoods. Because the neighbourhoods are segregated by railway tracks, there are only few direct sight lines from the city-scale network to the interior area of the neighbourhoods. This makes these areas less exposed to outsiders and used mostly only by the locals.

3.5 CONCLUSION

It is evident that the distribution pattern of commercial activities follows the spatial logic of the movement network to a certain extent. The spatial logic of urban commercial

Figure 3.20 Market activities in *Pasar* Turi (above) and *Pasar* Atom-Semut (below).

Figure 3.21 Turi Station (left) and Kota Station (right).

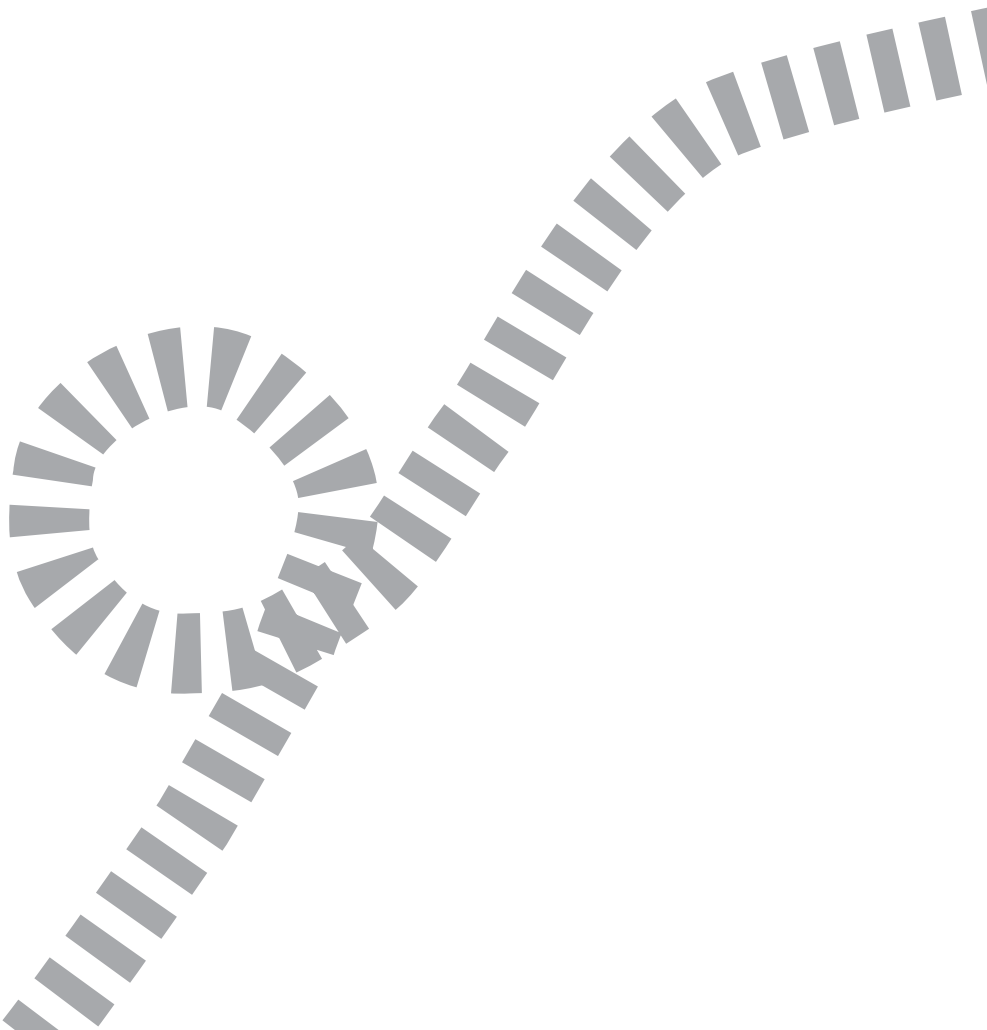
activity is quite simple; the location of retail activity corresponds to its movement necessity. It has to do with simple spatial topologies. Thus, the market or commercial activities that play a role at the regional level will tend to find a location with a good connectivity to the regional movement networks. Meanwhile, markets and retail stores that supply the demand of the city inhabitants require a location with outstanding connectivity to the whole city and preferably also a good connectivity with the local movement network, in which 'orthogonality' factors are also important for pedestrian friendliness because of the way these increase 'area integration'. Since the main markets in Surabaya are

playing a double role, as retailers and wholesale distributors, an intelligible location in both regional and city-scale networks is necessary.

This empirical research has shown that the presence of the retail activities around the railway station in Surabaya may have originally depended on accessibility to the station, but their continued presence is also conditioned by the spatial configuration of the street patterns around the station. A configuration that consists of a dense city-scale movement network and a transparent-permeable local grid has provided a vibrant place, a place that can sustain commercial activities even without the continued draw of the station. Furthermore, it demonstrates clearly that the clustering effect of retail activities in urban areas in general corresponds with the direct physical connection between the neighbourhood and the city. The higher permeability and the more direct the sightlines, the more retail activities can permeate into the local grid, in turn triggering the retail clustering effect. Both of the railway station's locations in Surabaya possess this spatial condition, which has made it possible for the retail activities to survive in the area around the railway station, regardless of the volume of passengers using the station. Thus it does not matter for them whether the railway station is operating or not, a good spatial condition – position in the street pattern at different scale levels - is more determining factor for the retailers to choose that location.

Chapter four

The Delta Metropolis - [Randstad] - Case



THE DELTA METROPOLIS - [RANDSTAD] - CASE

This chapter investigates two railways station areas located in the southern wing of the Delta Metropolis in the Netherlands (Figure 4.1). This area is more commonly known as the Randstad and stretches from Amsterdam in the north to Rotterdam in the south. In this chapter first, a brief introduction into the context of the redevelopment of railway station areas in the Netherlands is provided. Second, the discussion turns to analyze the spatial logic of the distribution pattern of retail and service firms in the cities of Delft and Leiden. Then the areas around the Central Stations are examined in detail by analyzing the functional and movement logic of the urban fabric.

4.1 INTRODUCTION

The extraordinary relationship between the Dutch and their landscape has engendered a culture of planning quite unlike that anywhere else in the world. The effort put into winning land from the sea, and the unequivocally manmade character of the environment means that in the Netherlands the landscape is understood as a much less neutral background to development activity. The technocratic mindset of the Dutch environmental engineer will tend to see the landscape as organised by planning structures and regulations before seeing it as an integral part of a more comprehensive social organisation. The landscape is intended to be utilized for the placement of functions, which are then connected one to another by various connective means of transport infrastructure. Social and economic patterning are presumed in the first instance to follow this logic of placement and access unproblematically, though it is well understood that the consequences of planning decisions can be other than what is originally expected.

The planning idea of the Randstad is one which, since the middle of the last century, has played a huge role in co-ordinating and directing planning decisions in the context of the entire urban agglomeration of the western Netherlands. This urban agglomeration has developed from a sprinkling of relatively autonomous social, political and economical urban units in the 17th, 18th and even the 19th centuries, to the much more interconnected, integrated entity it is today. The idea of the Randstad was a step in the process of understanding the urban agglomeration as a higher scale metropolitan unit in its own right, but the huge increase in personal and public mobility, as well as in connectivity through communications technologies over the last few decades, has provoked an even more radical rethinking of the urban landscape as a functional unity. While there is plenty of discussion - and much disagreement (see for example De Boer, 1996; Van Brussels, Daalhuizen, Van Eck, Van Oort, & Raspe, 2006) - about the

Figure 4.1 The location of Delft and Leiden in the Delta Metropolis region.

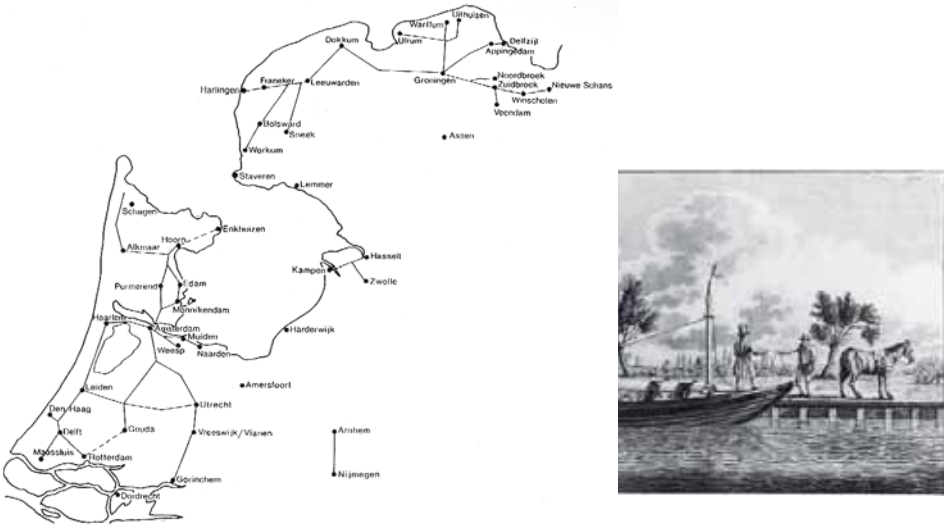


Figure 4.2 Map of barges network (Source: De Vries, 1981) and drawing of barges with aquatint by C.C. Fuchs, ca. 1810 (Source: Museum voor Communicatie, 2006)

viability of such a metropolitan idea, there is a growing consensus within at least the spatial and economic planning professions, that the present situation of small individual cities and the low urban densities of the western agglomeration seen as a whole, works against the positioning of the Netherlands within a global economy articulated through a network of global cities (as theorised by Sassen, 2001). A period of discussion has been established within the planning profession and among local and national politicians which aims at working towards the shifting of planning ideas and priorities, and the exploration of the idea of a strategic concentration of development activities in the region which already contains major urban centres, towards the development of a metropolitan city - Delta Metropolis - in the urban agglomeration of the western Netherlands (see Frieling, 2003).

4.2 THE REDEVELOPMENT OF RAILWAY STATION AREAS IN THE NETHERLANDS

The introduction of the railway in the Netherlands in the beginning of the 19th century replaced barges, the previous mode of inter-city passenger transport. Since the early 17th century, the Dutch made use of frequent and cheap regional passenger transport through a network of canals (see Figure 4.2). The *Trekschuit* (barge), a boat on the canal towed by horse(s) on an adjacent towpath, connected cities at some times with even hourly services. The first railway track in the Netherlands was opened in 1839, connecting the cities of Haarlem and Amsterdam. Nevertheless, the barge continued to struggle to survive and the difficult terrain (the marshy land and vast amounts of drainage canals) which railways had to cross resulted in a slow progress in the construction of railways (Schmal, 2003). It was not until the 1860s that the government took the initiative to construct a national railway network, which was finally completed in 1880. Today the length of the railway tracks linking most of the cities and towns in the Netherlands (Figure 4.3) has reached more than 3000 kilometres (Nederlands Spoorwegmuseum, 2003).

As in most cities on the European continent, the railway stations were originally situated at the city's fringe and near one of the city gates. However, as the cities grew they often enveloped the stations. Today those stations are immersed in a dense, functionally mixed and centrally located urban fabric. The stations have become a new centre in the city. The redevelopment of the railway station areas is often an important part of urban

Figure 4.3 Map of Dutch railway networks (Source: Nederlandse Spoorwegen, 2006)

restructuring which makes the station area becoming an attractive location as a trigger for urban restructuring. This development is partly stimulated by the Dutch national spatial policy. For instance, the Fourth Report on Physical Planning/Extra (Ministry of Housing, Physical Planning and Environment, 1991) pays special attention to compact cities and promotion of public transport issues. On the one hand, there are policies to promote environmentally sustainable transportation and land-use patterns. The most explicit policy of this type is the so-called ABC-location policy, with its main objective to promote the concentration of activities that generate passenger traffic around public transportation nodes (to reduce the use of automobiles). On the other hand, there are policies to regenerate local economies by restructuring the urban fabric. This implies that railway station areas, as one of the public transportation nodes, are increasingly perceived as urban districts with more than a transport function. They are seen as objects of property investment as well as subjects for the exploration of socio-economic activities.

However, the ABC location policy had its critics. It was seen as having both a too narrow objective – the reduction of car use - and a too limited scope – the regulation of new business locations (and for instance not the location of homes, but significantly also not the location of retail development). It was also too inflexible and too much top down (Romkema, Uitzetter, & Verkennis 1994; Bertolini & Dijst, 2003). The later Dutch national spatial planning agency has been concentrating on the elaboration of 'urban networks' (Ministry of Housing, Physical Planning and Environment, 2001). It is potentially a more articulated and flexible concept than the ABC policy.

According to the new policy, the Province of South Holland has adopted an ambition to strengthen the urban networks within its region by introducing the *Stedenbaan* project (Zuidvleugelbureau, 2003); a project that integrates the infrastructure networks (railway and highway) with the urbanization around a transport node. This project stimulates not only the densification of the area around the railway stations, but also improves the integration of the railway system into the urban network (Provincie Zuid Holland, 2004).

While the national and provincial government have been defining the criteria for the allocation of subsidies, the initiatives for specific projects have been typically taken up by the municipalities (in most cases). The project for a new Delft Central Station is a good example of how local municipalities took initiative to restructure its urban core, while utilizing the *Stedenbaan* idea of the Province (Figure 4.4).

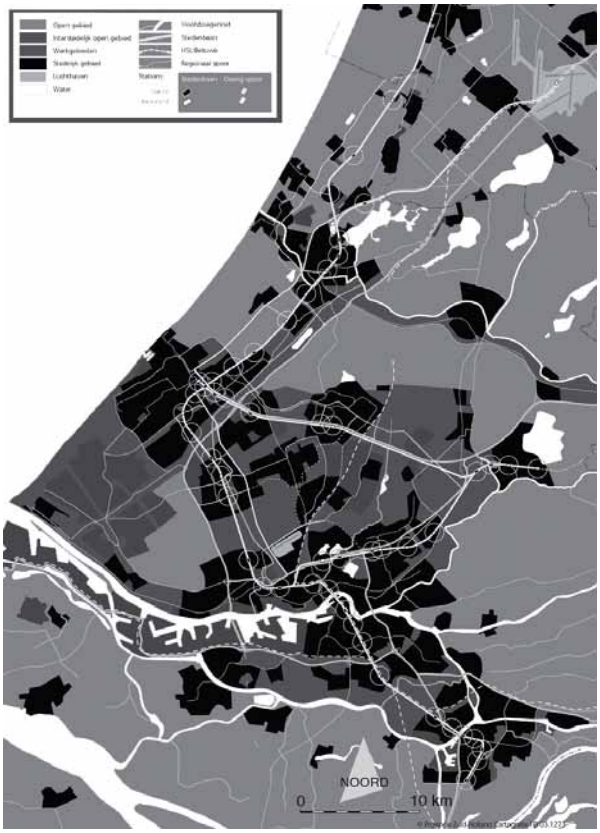


Figure 4.4 Map of the *Stedenbaan* project in the Province of South Holland (Source: Zuidvleugelbureau, 2003)

In the Delft Central Station area, the municipality took the initiative to make a proposal for an urban restructuring project around the station. In order to double the number of railway tracks and create a better environment and spatial quality in the urban core, they proposed building an underground railway tunnel which would also provide the opportunities for restructuring the urban area in and around the station. Therefore, they assigned Joan Busquets, an architect and urban designer from Barcelona, to design the new master plan of Delft Central Station. This master plan is intended to increase urban functions around the station and integrate the railway station area with the existing urban network of the urban core.

Unlike in Delft, the municipality of Leiden did not employ this *Stedenbaan* opportunity. The municipality did not take the initiative to restructure the urban area around the Leiden Central Station in spite of the fact that the station has a higher accessibility (in terms of the train frequency) and higher number of passengers (Table 4.1) and is

located only 15 minutes from Schiphol International Airport. Instead of developing an integrated urban design framework for the urban area around the station, they divided the station project into two sides: The *Zeezijde* (sea side, which refers to the west side of the railway tracks) and the *Stadzijde* (city side, which refers to the east side of the tracks). This project is in fact just a compilation of different fragmented building projects and the development of the station facilities (such as the car- and bicycle – parking place, etc)[31]. The projects were conducted without reference to each other and to the context making the local impact difficult to identify and to manage.[32]

Table 4.1 Number of passengers in Delft CS and Leiden CS (Source: Central Bureau voor de Statistiek; Gemeente Delft, 2003a; Gemeente Leiden, 2005a)

	Delft	**Leiden**
Population	96,606 (2003) 100,200 (2010)	118,745 (2004) 119,829 (2020)
Commuter	53,462	58,694
Train passengers /day (departing & arriving)	22,480 (2002) 40,000 (2010)	56,694 (2003)
Other public transport passengers/day	Bus & tram: 17,110 (2003)	Future RGL: 57,313 (2010)

4.3 SETTING THE SCENE: RETAIL IN DELFT

Delft is a densely populated, medium sized town with 95,036 inhabitants (Gemeente Delft, 2005). It is located 10 km from The Hague, the administrative capital of the Netherlands, and 15 km from Rotterdam.

The first settlement at Delft was established in the 11th century (Raue, 1982). But only in the year 1246 was Delft officially recognized as a town. Since then Delft has been an important market place. It fulfilled the function as a central market place for its surrounding farmlands, where agricultural products and cattle were traded and the farmers could buy the products that they did not produce by themselves. One of the conditions necessary to be successful as a trading place is a good connection with the outside world. Delft was not only quite well connected via the water network with its surrounding productive hinterland, other towns and even the world via the North Sea. Delft was well connected to its surrounding farmlands by different canals that crossed the town, such as the *Buitenwatersloot* (Outside Water Ditch) to the Westland, the *Krommewatering*

31. More information about the station's project can be obtained from http://www.leiden.nl

32. H. Reijnen, Project leader As Leiden Katwijk, personal interview June 21, 2006.

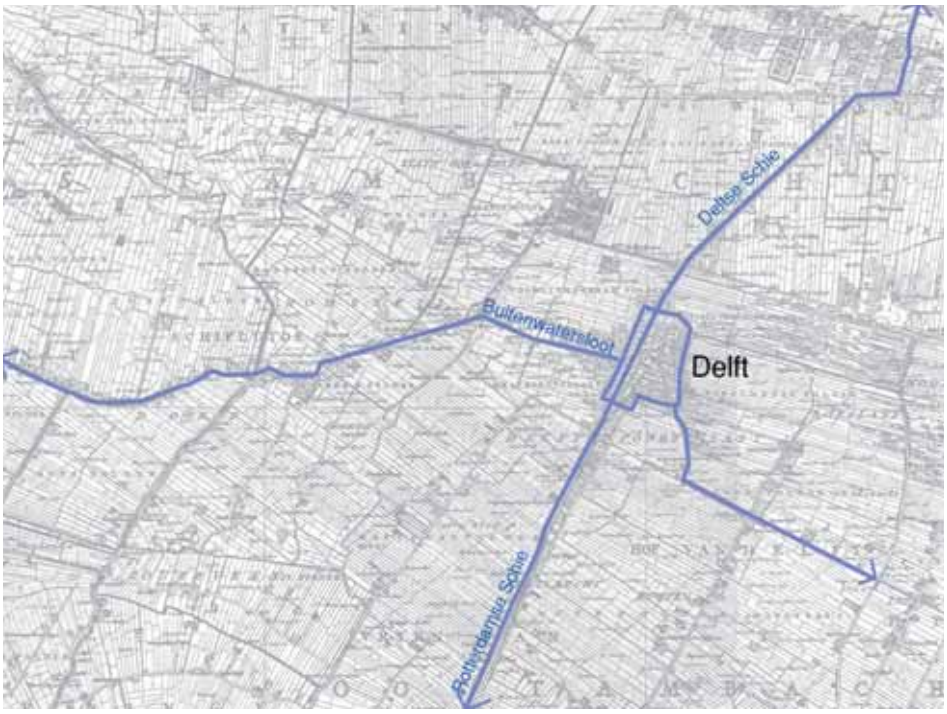


Figure 4.5 The main water networks in Delfland before the 20th century (Source: De Bont, 2000).

(Curve Water course) and *Nootdorpse Vaart* (Nootdorp Canal) to the East. *De Vliet* canal connected Delft with The Hague and Leiden and further to the river *Rijn* (Rhine) to the North. The southern connection was served by the *Schie* canal, which connected Delft with Schiedam, Rotterdam and the river *Maas*, where Delft had its own seaport *Delfshaven*. Goods were transported via these two main rivers, *Maas* and *Rijn*, to the North Sea and to the rest of Europe and since the 17th century to the rest of the world. Thus by being located in the crossing of these important trade routes, Delft became a strategic location for markets activities (see Figure 4.5).

Figure 4.6 shows the structural development of the main movement networks in Delft since the 11th century. As we can see, the first settlement in Delft was established along the *Oude Delft* (Old Delft), the North-South drainage canal. Most of the movement's carrier was water and the *Oude Kerk* (Old Church) is one of the earliest buildings in Delft. Following the reclamation of the polder at the East-side of Delft, the settlement started to grow more to the East, and the second canal, the 'New Delft', was dug parallel to the first canal. When the city expanded further, the water network was not only used as a transport system, but also as a defence system together with the city wall which was built to protect the inhabitants. In the 19th century, the *Oude Delft* started

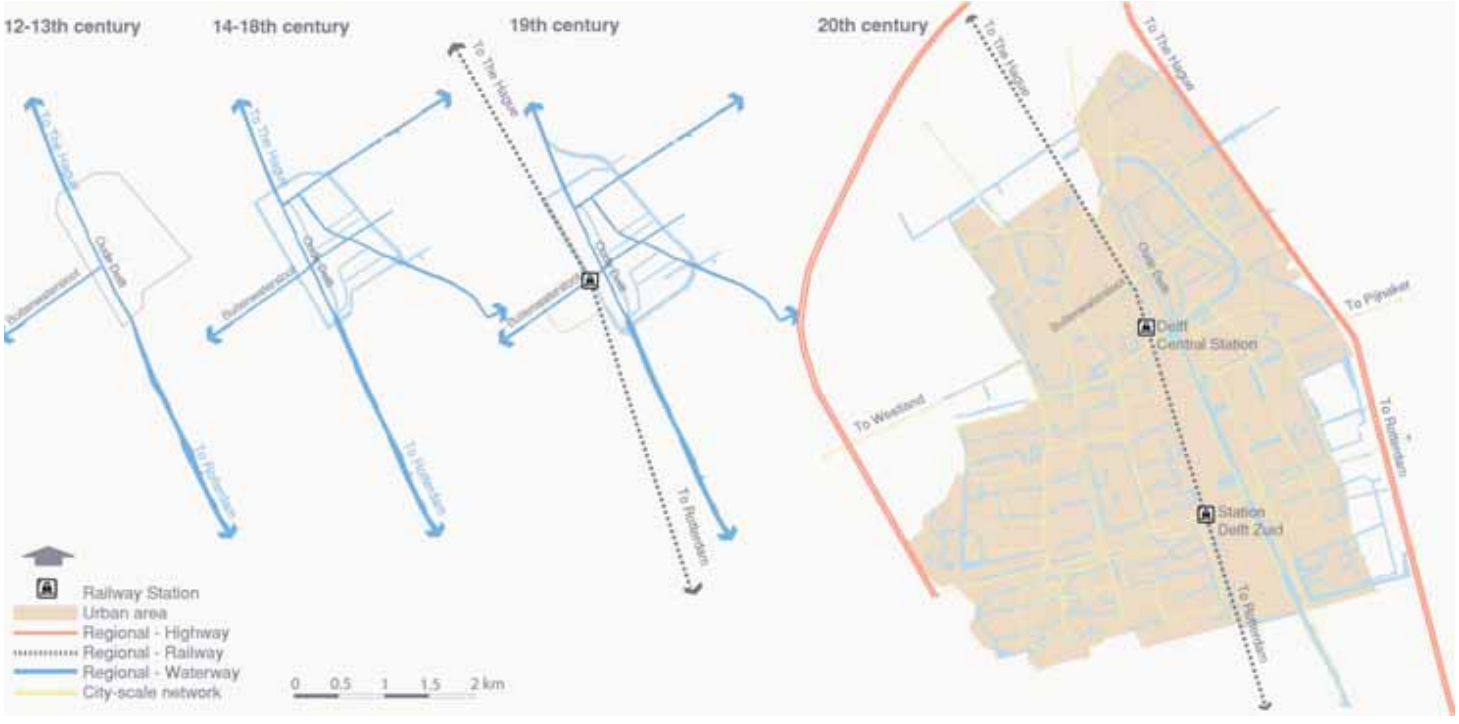


Figure 4.6 Structural development of main movement networks in Delft from 1100-2000

to loose its role as the main regional water structure due to the need of a wider canal system for bigger boats. The *Oost Singel* (East Town Moat) became the main structure along the demolished East-Wall of the city.

The coming of the railway network at the beginning of the 19th century started to compete with the regional role of the barges network (De Vries, 1981). The 20th century is marked by the coming of the automobile and an increased growth of the city. The population of Delft has since then grown fourfold from 25,000 to almost 100,000 inhabitants by the end of the 20th century. The railway and highway networks were superimposed on the city and replaced the role of the water network as the main movement conveyors.

The automobile networks nowadays not only dominate the regional structure, but also Delft's main city structure. The city became automobile-oriented. This caused congestion that had consequences not only in terms of pollution and traffic safety, but also of transport costs. To solve this, new regional roads were constructed in the 1930's. The water network slowly lost its function; many of the canals were closed and transformed to roads. This substitution of the regional network, together with the more recent demand to create a car free area inside the city, has led to the disruption of the continuity of some of the old regional routes, such as *Oude Delft.* As shown in Figure 4.10 most of the old regional routes of Delft at this moment only function as local streets, and have lost their role as regional conveyors, with the exception of *Buitenwatersloot* that still preserves its continuity to the Westland area.

4.3.1. The open market

To have a better understanding of the spatial economic structure of the city since its establishment, the location of different open markets in Delft is mapped (Figure 4.7), based on the article *"Ach Lieve Tijd Delft, 750 jaar Delftnaren en hun rijke verleden"* (O dear old Delft, 750 years of the people of Delft and their rich past) *(*Gemeente Archief & Gemeentemusea, 1996).

Grain was traded since 1280 at the *Poelbrug* (Poultry Bridge), at the *Haverbrug* (Oats Bridge)-*Binnenwatersloot* and at the wheat market along the street called *Koornmarkt* (literally this means 'wheat market'), where imported grain was sold. The agricultural products that were traded at the wheat market came not only from the local farmland, but also from the East-Sea area and Northern France.

Since grain was one of the main resources for making beer, Delft was also known for its beer brewing. Hops plants as one of the raw materials for making beer became also a popular trading good and was traded at the '*Hopstraat*'. While turf (dried out peat

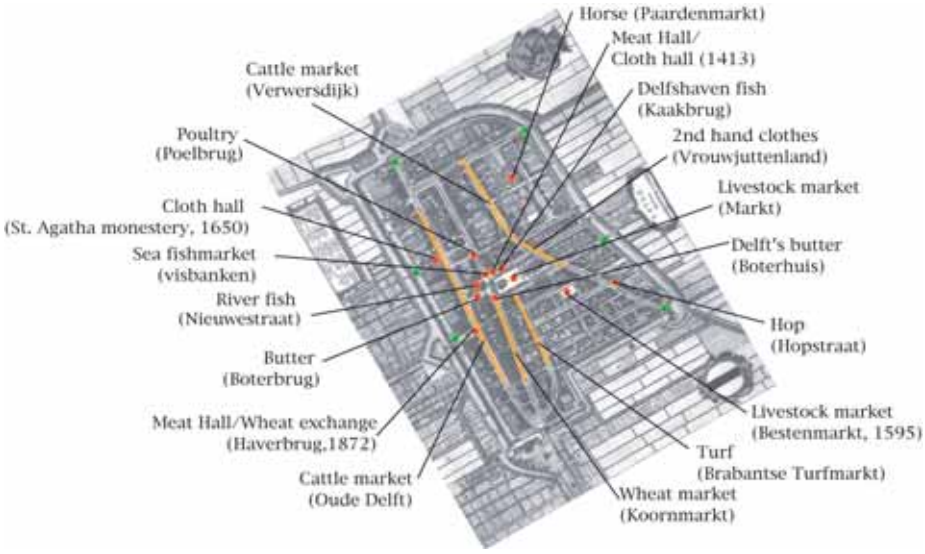


Figure 4.7 The location of old open markets in Delft

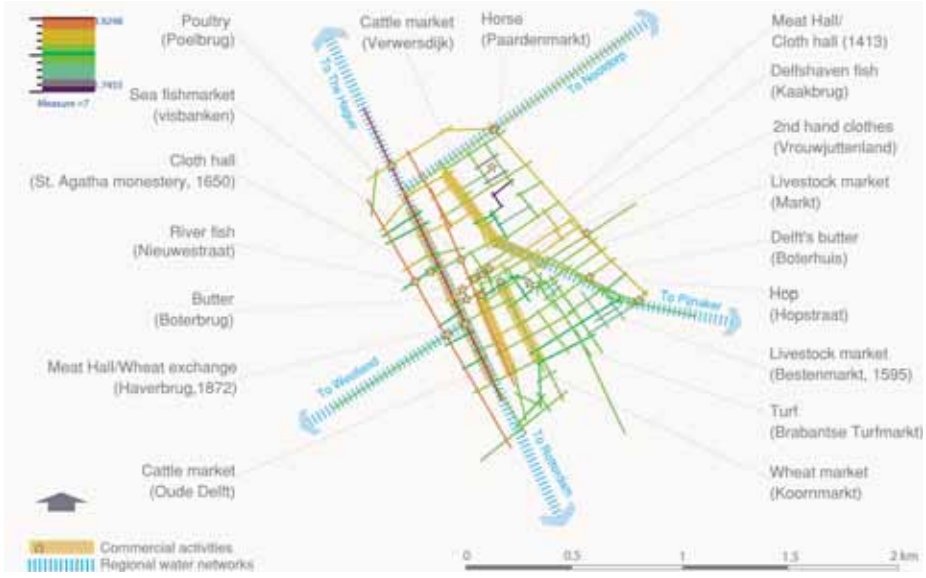


Figure 4.8 The movement layer networks (regional water networks, which functioned also as city-scale network, and orthogonal analysis of the local network) superimposed on the location of the open markets in the 18th century

sods), which were used for fuel for the beer brew-kettle, were sold along 'the *Brabantse Turfmarkt*' canal where the boats from Brabant were docked.

Livestock was offered at a weekly cattle market that took place at the *Markt* (Market) Square. The *Markt* Square was smaller than in the present situation, therefore in the 14th century, cows were also allowed to be traded at the west side of *Oude Delft* Street. This of course annoyed the local inhabitants of this street, and in 1557 the cattle market was moved to the east side of *Verwersdijk* Street. However, not to everyone's satisfaction, the inhabitants of this street were not happy either with the market in front of their homes. The market was then moved to the churchyard of the *Nieuwe Kerk* (New Church) before it finally moved to the *Beestenmarkt* (cattle market) square in 1595. This market lasted until 1972, and was finally closed due to the competition with the livestock market in Rotterdam. Horses were traded separately at the *Paardenmarkt* (Horse Market) Square.

Fish could be purchased from three different locations: the river fish market at *Nieuwstraat* (New Street), the sea fish market at *Visbanken* (Fish Market) at the corner of *Hypolitusbuurt*, which still exists today, and a market at the *Kaakbrug* for the *Delfshaven's* fishermen, at the start of *Voldersgracht*, next to the *Visbanken.*

The butchers sold their meat next to the *Visbanken* (fish market) at the beginning of *Camaretten* Street. In 1413 they shared a trading hall with the cloth merchants. Later on, to improve the quality control of the meat and in order to raise tax revenues, the local municipality built a special Meat Hall at the end of *Binnenwatersloot*. But in 1872, when the meat was allowed to be sold at the shops, the Meat Hall lost its function and the "Wheat Exchange" took over this hall.

Butter was an important trading product in Delft, since its butter was famous for its good quality. To maintain its quality, the packing and selling of Delft's butter was centralized at the *Boterhuis* (Butter House), a building located behind the town hall. Butter from outside Delft together with a small amount of Delft's butter was traded along the *Koornmarkt* Street. In 1556, this market moved to *Mijnsheerenbregge*, a bridge that later was called *Boterbrug* (Butter Bridge). Other dairy products, such as cheese and eggs, together with some bacon and fowl were also sold here. At the beginning of the 20th century, the consumption of butter was partly replaced by margarine and the demand for Delft's famous butter declined.

Vegetables and fruits were mainly traded seasonally at the *Warmoesbrug* (vegetable bridge) at the end of the *Nieuwestraat*. In addition there were also a lot of fruit peddlers at the gates of the town (*Oostpoort, Koepoort, Vestpoort, Bastian-poort, RodeLeeuwpoort, St.Joris*). However, from the 17th century, the vegetable market disappeared, after the itinerant sellers were allowed to offer their products directly door-to-door. Since

the end of the 19th century, vegetables were grown in greenhouses, meaning that the trading could go on for the whole year (regardless of the season).

Once the railway came to Delft, trading activities in the railway-harbour for vegetables increased. It was there the vegetables auction was opened. The vegetables from the Westland and other farmlands were brought and auctioned and then directly transferred to the train wagons. But the auction only lasted until 1921 when it was moved to Den Hoorn.

4.3.2 The shift from open market to shop

The markets started to lose their role as trading place in the second half of the 19th century. The trading of agricultural products was slowly overtaken by auctions and larger enterprises. The rise of specialized wholesaling stimulated the rapid rise of retail shops and the growth of large retail enterprises. Nowadays in Delft only the Thursday and Saturday markets for basic merchandise are held at the *Markt* Square and *Brabantse Turfmarkt*.

As it is typical in most modern western economies, large-scale commercial operations replaced these local trading activities. The mechanization, standardization and centralization of production have allowed the western economy to increase its efficiency and decrease cost. The more developed shops (varying from local grocery shops and butchers to supermarkets) have largely replaced the role of the street vendors and market traders. For instance, the dairy factories started to replace the role of farmers in producing cheese, butter and other dairy products. In the 20th century, the distance between the producer (farmer) and consumer (users) has increased. The factories sell their products to the consumers via multiple retailers. The direct transaction between the producer and consumer that used to happen at the market started to disappear.

This spatial tracing of open markets demonstrates the long-run shift from open markets to shops in the retailing and consumption process in Delft. Interestingly all of these former open market locations are currently also where most of the retail service firms (including service firms, such as financial service, consultation office, design office, etc.) are located in Delft.

At this moment, there are five main shopping centre areas in Delft (Gemeente Delft, 2003), of which three are located in the historical inner city (Figure 4.10). The shopping centres *De Klis* and *In de Sted*e are located in the heart of the inner city, around the market square, and have a fun-tourist shopping character. *In de Veste* (built in the 1960's) is located at the Southern edge of the inner city, easily accessible both by car and public transport, and consists mainly of chain stores (such as V&D, Blokker, BCC,

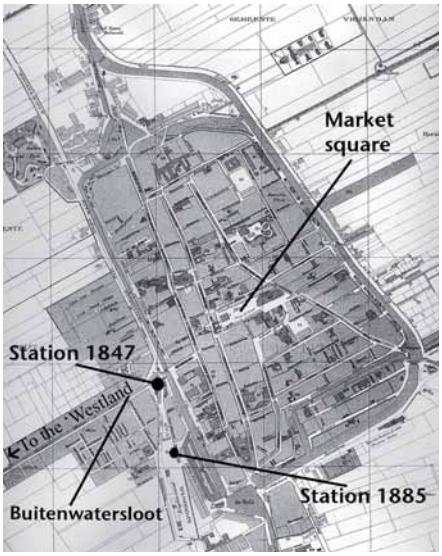


Figure 4.9 Map of Delft 1898, with indication the location of the station in 1847 and 1885 (Source: Kaartenkamer, Faculteit Bouwkunde, TU Delft).

Hema, etc.). The fourth one, *In de Hoven*, is an urban indoor shopping centre, located in a post-war urban area where buildings are mostly high-rise and densely populated. The newest shopping area (built 1995) is *Leeuwenstein*, a regional car-based shopping centre where one can get furniture, carpets, beds and kitchen appliances. It is easily accessible from Highway A13 and its parking place is directly connected to the entrance doors. Due to its outstanding accessibility via the highway, this shopping centre serves not only the city of Delft, but also the other smaller cities around it.

Table 4.2 The number of retail shops in Delft (Source: Gemeente Delft, 2003a)

Location	Absolute	Percentage
Historical inner city	202	33%
Leeuwenstein Meubelboulevard	122	20%
Ikea	110	18%
In de Hoven	86	14%
Other location	92	15%

4.3.3 'Consumption on the move' in Delft

The establishment of the railroad in Delft marked the beginning of its industrial period. In 1839, the "Hollandse Ijzeren Spoorwegmaatschappij" (Dutch Iron Railway Company) planned to extend its railroad line from Haarlem to Rotterdam, the future harbour city, passing through The Hague and Delft. This plan brought a radical change in Delft's

spatial lay out. Ir. F.W. Conrad, the railroad engineer, drew the first railway line about half kilometre away from the West city wall. It aimed to avoid the buildings outside the ramparts and to provide an extra space for a monumental district between the city and the station. However, the City Council of Delft argued that it was better to position the railroad next to the West city wall since there was no settlement outside the city wall at that moment. So, in 1847 the first railway station was built at a stone's throw distance from the most important city gateway, St. Joris, which was also the location of the barge harbour (barges were used as the regional passenger transportation mode in the Netherlands, before the railway system replaced it). This was next to the street named *Buitenwatersloot-Binnenwatersloot*, which leads towards the countryside to the west of Delft, the 'Westland' (Figure 4.9). Over the course of time the trains became longer, so if there was a train stopping at the station, the "*Buitenwatersloot-Binnenwatersloot*" was blocked. Meanwhile there was also a need for extra space for shunting wagons and for handling trading goods (mainly coal and vegetables), between trains and ships. Thus the station was moved a few hundred meters to the South in 1885, which offered

Figure 4.10. Delft, with its important functions.

more space for the transfer of goods and longer platforms for the trains passengers (Weve, 2004).

Although Delft's population is not expected to grow much by the year 2010, the number of commuters to Delft is expected to increase. At present, the railway station in Delft still plays an important role in the economical development of the city. Everyday the trains bring more than 20,000 passengers stopping at Delft Central Station, and this number is estimated to double in 2010. Most of these passengers are students and employees at educational institutions, e.g. Delft University of Technology (with its 13,000 students and 3,000 employees) and knowledge based companies (approximately 4,650 employees) such as the Netherlands Organisation for Applied Scientific Research (TNO) and Geodelft (Figure 4.10).

Currently, there are about 53,000 people commuting in and out Delft every day (Gemeente Delft, 2002b). With the expect amount of train passengers doubling in 2010 (about 40,000 passengers per day), we can expect that the number of daily commuters in Delft will increase as well. Thus we can conclude that there will be an increasing potential of shopping activities around Delft Central Station.

4.4 UNDERSTANDING THE COMMERCIAL-SPATIAL LOGIC OF DELFT

4.4.1 Spatial functional pattern of Delft

In spite of the fact that this study focused mainly on the spatial configuration around the railway station, it was necessary to include the whole urban grid in the analysis, to ensure that each line in the station area is embedded in the whole urban structure.

Figure 4.11a illustrated the city-scale movement structure and as such illustrates the most global structure of Delft. These are also the vehicular axes, except *Buitenwatersloot-Binnenwatersloot*. In spite of its narrowness and the un-attractiveness of its profile, this street is as present the busiest bicycle route in Delft with more than 10,000 cyclists passing it every day (Gemeente Delft, 2002a). The part of the *Binnenwatersloot*, Street that is inside of the historic inner city is densely packed with retail shops. This street is one of the oldest streets in Delft, and connecting Delft with its west countryside and with direct access to the Market Square.

Overall, the location of the knowledge-based institutes and companies are along these city-scale lines, partly because of their accessibility to the higher scale movement conveyor - highway A13. It implies that those functions not only serve the city of Delft, but also a larger region.

Compared to Surabaya, the movement layers in Delft are easier to distinguish In Delft, it is clear from the historical tracing that due to the organization of traffic (rerouting, altering, (dis-)connecting routes), much of the interconnectivity between the old city-scale (such as Oude Delft, Koornmarkt) and the local movement grid has diminished. Many of those old regional roads (city-scale) have been downgraded into a lower scale by cutting or changing the course of the routes, while the new city-scale networks were established (e.g. *Westlandseweg-Zuidwal, Westvest-Phoenixstraat, etc*). The result is that the city-scale network is neatly organized and equally dispersed. It is probably by means of this continual adjustment and readjustment that the scaled movement layers come into existence. We could say that the scaling of the movement pattern is something that evolves historically.

Just as the city-scale network has become more organised and systematized incrementally, so has the higher scaled regional movement network come into being and has begun to become more systematized in its own right. The building of the inter-city freeway network over half of the century is part of this process. This changes the distribution pattern of commercial activities in Delft. The urban function is segregated by scale, the mix function is diminishing and the tendency is more towards mono function.

Figure 4.11 a. City-scale movement network b. Grid orthogonality analysis of the local urban grid in Delft, using area integration measurement: the more simple and orthogonal is the grid, the higher is the integration value (the redder is the colour).

The regional economic function is located at the regional movement network while the city function is located at the city-scale network. In the same way, the local scale becomes unequivocally local, isolated from the other scales (such as the neighbourhood supermarket in the middle of the *Tanthof* area, which is known and used only by locals, and not by other city's inhabitants).

In most cases, retail is essentially linear in its spatial organisation. But in Delft retail distribution pattern forms a clustering shape of organisation as shown by Figure 4.12. There are two main explanations why most of the retail shops are clustered at this location. Firstly, not all city-scale lines inside the old city centre are diminished, but some of them still survive, like the *Binnenwatersloot – Nieuwe Langendijk*. This line is in fact still functioning as a city-scale line and connecting the old city-centre with the whole Westland area of Delft (the *Buiten-binnenwatersloo*t routes has the highest number of bicycles, it is the busiest bicycle route in Delft according to Gemeente Delft, 2002a). The second explanation can be seen in Figure 4.11b, which shows the grid orthogonality analysis (a measure designed to highlight areas in the city with a high general level of orthogonality), revealing the local potential of the fabric. As can be seen, the market

Figure 4.12 The movement layer networks (regional-, city – and local-scales) superimposed on retail location in Delft.

square area is highlighted (the redder patches in the area integration map) and here one finds a cluster of 192 retail shops out of a total of 612 shops in Delft (Gemeente Delft, 2002b). Thus precisely the overlapping of those two spatial characteristics has enabled the city centre to provide an intelligible, convenient and liveable place for walking, browsing and shopping.

Further Figure 4.8 reveals the relation between the grid orthogonality analysis, the city-scale network and the open market distribution pattern in Delft in the 18th century. It is interesting that the grid orthogonality analysis of Delft nowadays shows similar results as the one two centuries ago and the location of the shops at this moment is more or less the same as the location of the open markets a hundred years ago. Thus it can be argued that in spite of the transformation of the retail and business forms (from open market into shop and service firm), the intelligibility of the street networks, i.e. the interconnectivity between the city-scale networks with the orthogonality of the urban grid, has provided the city centre of Delft enough carrying capacity for these different forms of urban commercial activities for centuries to survive in this location.

4.4.2 Spatial functional pattern around Delft Central Station

The spatial analyses show that at the city-scale network the Delft Central Station is located in a rather well integrated position at the crossing between *Westlandseweg-Zuidwal* and *Westvest-Phoenixstraat*, which is one of the most central locations in Delft. However, as illustrated in Figure 4.11a, the city-scale networks of Delft are neatly organized and almost equally distributed. Thus, there is almost no concentration of city-scale lines in the whole settlement of Delft.

Let us focus now on the spatial configuration and the distribution of retail shops around Delft central station. Until how far from the station should we investigate? Since we deal mainly with streets configuration, a *walkable radius* is chosen as the research boundary. This means that the railway station area is identified as a circular area radiating from the station that is considered a 'walkable' distance. In this case we adopt a walkable radius of 1 km (more or less equal to ten minutes walking time).

Figure 4.13 selects a one-kilometre area around Delft Central Station and assigns numbers of retail shops on each line segment. It shows in more detail that retail shops are mostly located along the redder lines (most integrated spaces).

However, the station is not located in the most orthogonal space. As explained before (Section 4.3.3), the station was moved in 1885 to accommodate the necessity of a bigger space, but its connection and accessibility towards the city was not very well considered

(in terms of accessibility and centrality). In fact the choice of the station location is not usual for the Netherlands. Usually the station is located at the most important gate of the city, which provides good accessibility to the city, and is connected with a street called S*tationstraat* (station street), a street that integrates the regional scale of the station with the more local traditional urban grid[33] (Lugt and Spangenberg, 1980). Delft does not have a '*stationstraat*', which means the station misses its link with the city. The municipality of Delft was aware of this condition, especially when the university was moved to the South-East of Delft. Therefore in 1956 a new cut-through alley was established, the *Barbarasteeg* (Barbara alley), a 2 meter-wide alley for pedestrians and

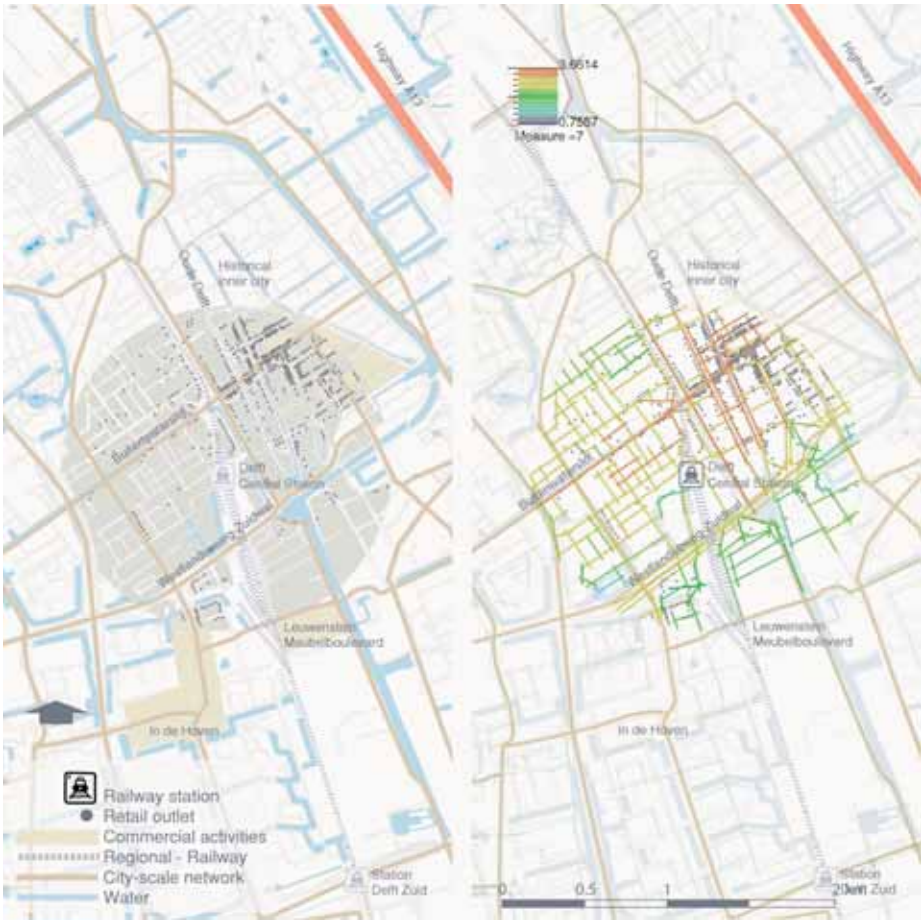


Figure 4.13 The distribution of retail activities within one kilometre radius of Delft Central Station, superimposed on the city-scale network (left) and orthogonality analysis (right).

33. Good examples of this type of development are the station street in Maastricht and 's Hertogenbosch

cyclists, which connects the station with the inner city and the university area. The opening of this alley slightly improved the integration of the station, making the station more intelligible for train passengers as well as local inhabitants. Several thousands of pedestrians use this alley every day to reach important places in Delft, such as Delft University of Technology, TNO and the inner city. It gives also an opportunity for retail shops to establish themselves along this route (*Barbarasteeg-Breestraat*). Nevertheless, the narrowness of the street and the existence of other public functions (such as museum, church and municipality office) do not provide an opportunity for the exploration of this routes economic potential.

Additionally, its integration with the local scale urban fabric is rather poor, as it appears from the grid orthogonality analysis (Figure 4.13b). The integration value of the grid in immediate surrounding of the station is less than the one in the historic centre. Only a small number of shops are located in the vicinity of the station. It shows that most of the retail shops are clustering in the most orthogonal- and smaller urban grid and are less attracted by the presence of the station. Additionally, the urban block configuration around the station is not transparent enough, which makes it difficult for pedestrians to orientate / move around.

4.5 CONCLUSION DELFT

This empirical analysis suggests that the effect of the spatial configuration, in this case the integration of city-scale networks with the orthogonal local grid, is much more determining than the presence of the station. The analyses show that at the city-scale network, the existing station is located in a rather well integrated position, by being centrally located in the city of Delft. But its integration with the local scale urban fabric is rather poor. Thus it seems to be the lack of spatial integration at the *local* scale that explains why there are no significant economic activities around the station.

Although it has been established for more than 100 years, Delft Central Station is not capable of attracting economic activities to establish around it. If regional accessibility (with almost 40,000 people passing by daily: 20,000 train passengers plus passengers using other modes of public transport) is the important factor which attracts retail activities then this place should have been full of shops by now. Thus, the lack of spatial integration explains why there are no significant economic activities around the station.

4.6 SETTING THE SCENE: RETAIL IN LEIDEN

The Rijnland, an urbanized region within the ambit of the Delta Metropolis, is located between the larger urban areas of Amsterdam in the North and The Hague-Rotterdam in the South. It consists of the Leiden urban area and a number of smaller villages woven through areas of intensive farming and recreational landscape from Katwijk on the coast to Alphen aan den Rijn 20 km to the East. Since the Second World War, the Netherlands has experienced a very rapid economic expansion, with short periods of recession between 1970 and 1990. Economic growth and a growing population have kept the country in a permanent state of reconstruction, which has changed the shape of Dutch cities significantly. The high demand for new residential areas and the car explosion, especially after 1960, defined a new phase in spatial planning in the Netherlands. Leiden is one of the Dutch cities that experienced fast growth during this period. At this moment, the Leiden agglomeration has reached the North Sea coast in the west and the The Hague agglomeration in the South.

Leiden itself, with a population of a little bit more than 118,000 inhabitants, is big enough to provide its inhabitants with a wide range of cultural and recreational options and exerts a powerful influence as a regional centre. Life science activities are the major driving force in Leiden's economy; combining extensive academic fundamental research at the Leiden University Medical Centre (LUMC), the University of Leiden and numerous centres of academic and research excellence, including the Bio Science Park which is one of Western Europe's largest life sciences parks. With almost 70 life science companies and an estimated number of 6,500 employees and 16,000 students, this region has the highest concentration of life sciences activity in the Netherlands (Stec Groep BV, 2003).

4.6.1 Retail transformation in Leiden

Leiden had long been an important market place due to its outstanding accessibility both by water and land (Van Oerle, 1974). Its first settlement emerged around the year 900 as a market place, at the crossing of important trading routes: the river Rhine (east-west route, connecting the mainland of Europe with the North Sea) and the *Mare-Vliet* canal (north-south route). This made it geographically a strategic location as the gateway for its reclaimed fertile hinterland and for its textile industry, which in turn contributed to the prosperity of this town as a trading place for several centuries. Through out the pre-modern period, water has long played a major role as an important movement infrastructure for the Dutch. Middle Age peddlers and merchants built their stalls along the river, growing slowly into a settlement. And since then Leiden's market place has been for centuries on the river Rhine.

4.6.2 Peddlers and hawkers in Leiden

The spatial transformation of the city is conditioned by the interaction between inherited spatial circumstance and contemporary usage and everyday culture. To have a better understanding of the emergence of retail locations in Leiden, historical studies and plans are used to trace the early consumption sites established in the spatial layout of the city before the 19th century (see Figure 4.14). Many of the locations of trading activities (old markets) can be traced from the street names, since often a name of a street is derived from its original activities.

The earliest trading activities in Leiden were located along the river Rhine as the main regional conveyor and location of earliest settlement and stretched from the *Vismarkt* (Fish market) till the *Steenschuur*. Fish is one of the earliest products traded on Leiden's market. It was a cheap food commodity and fast to prepare. Fish from Katwijk and Noordwijk was supplied two times per day to Leiden by boat or a two hours journey on foot. Since fish was in high demand, it was consumed much more than any other agricultural product at that time and because preservation technologies did not exist yet, it was necessary to establish a daily fish market. The fish market took place in the heart of the city, at the crossing of the main trading routes, precisely at the South side of the river Rhine, around the *Visbrug* (Fish Bridge). This bridge was the main crossing bridge, connecting the villages and towns from the North and South sides of the Rhine. To keep the fish fresh and alive, they were submerged in the river and sold at the *Visbrug.*

Different kinds of agricultural products were traded along the river, ranging from cheese at the *Kaasmarkt*, vegetables, fruits and flower at the *Nieuwe Rijn*, butter at the *Botermarkt*, grain at the *Koornbrug* and fish at the *Vismarkt, Aalmarkt* and *Boommarkt*.

While livestock, such as cattle, calves and sheep were also an important agricultural commodity, they were offered mostly along the *Haarlemmerstraat*. Since the Middle Ages, cows were offered in *Janvossensteeg* (Jan Fox Alley), *Zuid-Rundersteeg* (South Cow Alley) and *Noord-Rundersteeg* (North Cow Alley), the alleys behind the main street *Haarlemmerstraat*. However during the cattle's slaughter time, which was held four times a year, the *Haarlemmerstraat* would also be full of cattle, with calves and sheep standing at the *Hartebrug*. When the city expanded in 1616, it was possible to concentrate the cattle trading in one location at the *Beestenmarkt* (Cattle Market) and to have a weekly cattle market every Friday together with a cheese market at the *Kaasmarkt* (Cheese Market) square. Late in the 19th century or early in the 20th century, this market moved again to *the Nieuwe Beestenmarkt* (New Cattle Market).

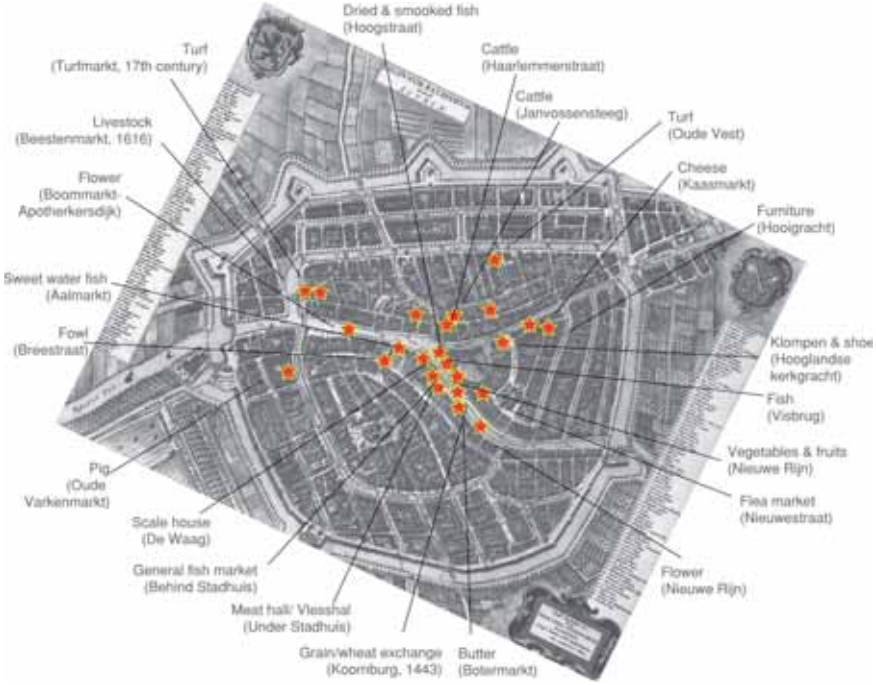


Figure 4.14 *The early location of peddlers and hawkers in Leiden was mainly concentrated along the River Rhine (east-west regional route).*

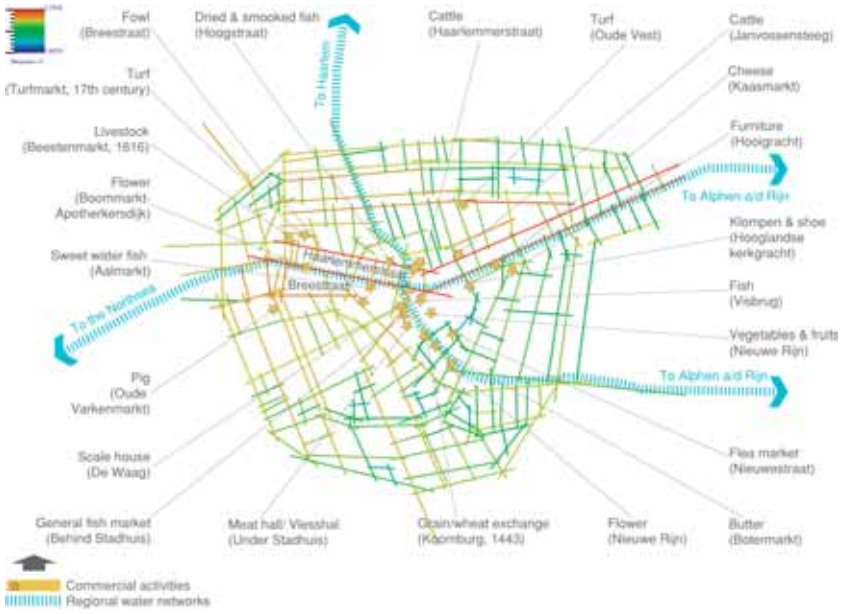


Figure 4.15 The movement layer networks (regional water networks, which functioned also as city-scale network, and orthogonal analysis of the local network) superimposed on the location of the open markets in the 18th century.

Pigs were traded separately at the *Oude Varkenmarkt* (Old Pig Market) Street. This market was moved in the 15th century to *Kort Rapenburg*, near the stalls of fruit and vegetables. While the butchers offered their meat in the *Vleeshal* (meat hall), which was located under the S*tadhuis* (Town Hall), wild fowl and game such as chicken, turkey or rabbit were available in the *Breestraat*. Other poultry, eggs and dairy products were available at the *Botermarkt* (Butter Market), but bigger amounts of butter had to be bought at the *Boterhuis* (Butter house), behind the *Waag* (Scale house).

With bread and wheat being the staple food for the people, the trading of grain (wheat, barley, oat, beans and peas) was regulated by the 'Wheat Exchange', which was established in 1443 at the old Sint-Cornelis bridge which is now referred to as the *Koornbrug* (Wheat Bridge). Since the 18th century, potatoes became an important staple food as well. It was transported via the water from the hinterland and traded along the canals in Leiden, precisely at *Oude Singel, Volmolengracht* and *Langegracht.*

Turf, previously one of the main energy resources, was also traded along the canals in *Oude Vest* (Old Ramparts) canal, between *Koddesteeg* and *Koestraat* (Cow Street). After the city extension in the 17th century, the *Turfmarkt* (Turf Market) moved to the west part of the city.

Figure 4.16 Painting of Hendrik van der Burgh (1627-na 1668) of the early location of peddlers and hawkers at the *Visbrug* facing *Stille Rijn* Leiden (Source: Weterings & Van der Vlist, 1996).

Vegetable peddlers sold their merchandize east of *Koornbrug* at the North side of the Rhine and the apple and peer hawkers sold their merchandize at the *Nieuwe Rijn*.

By the end of the 19th century, the street trading of agricultural commodities was slowly overtaken by auctions and larger enterprises. In spite of the existence of the market till today, its role and scale is much smaller than what it used to be. The rise of specialized wholesaling stimulated the rapid rise of retail shops and the growth of large retail enterprises. The more developed shopping-street began to emerge in Leiden such as in *Haarlemmerstraat, Doezastraat* and *Breestraat,* replacing the peddlers and street vendors.

Interestingly, the retail activities in the historical inner city of Leiden at this moment are located more or less at the same places as those street-traders centuries ago. It can be suggested that those locations incorporate certain aspects or characteristics that are capable of attracting retailers from different time periods and different forms of commercial activities.

4.6.3 Urban consumption site in Leiden

At this moment Leiden has more than 1,300 firms and almost 9,000 employees working in the retail sector – the second major employer of this city after the life science activities (see Table 4.3). The historical inner city of Leiden (*Leiden Centrum)* – particularly along the *Breestraat* and *Haarlemmerstraat* - is still the most important shopping area in the Rijnland region. It is also the third largest shopping centre in the province of South-Holland (three million inhabitants) after Rotterdam and The Hague (Goudappel Coffeng & Intomart GfK, 2005). The Rijnland region in total has more than 700,000 m^2 of retail space (Zwart, 2003). As shown in Figure 4.19 the shopping area in the Rijnland region can be divided generally into two types of orientation scale, the regional oriented shopping and the neighbourhood oriented shopping. *Leiden Centrum* is one of the shopping areas with a regional oriented function, along with the historical inner city of *Alphen aan den Rijn,* the historical inner city of *Lisse,* and *Meubelplein Leiderdorp* and *Rijneke Boulevard* in *Zoeterwoude* (Figure 4.17). The local oriented shopping areas such as *Luifelbaan, Kopermolen, Stevensbloem, Winkelhof, Diamantplein, Wagnerplein, Kooiplein* and some other smaller shopping stripes are serving the daily needs of the local neighbourhoods in Leiden. The local authority expect the growth of demand for retail space in this region to increase in the coming years, especially with the development of several housing areas, such as in *Voorhout Hoogh Teijlingen* (1,600 houses), *Oegsgeest Poolgeest* (1,000 houses), Leiden *Roomburg* (1,000 houses) and *Valkenburg Valkenburcht* (5,000 houses) (Droogh Trommelen Broekhuis, 2004).

Table 4.3 Number of employment and firms in Leiden in 2004 per sector (Source: Gemeente Leiden, 2005a)

Sector	No. of Employees	No. of Firms
Agriculture, hunting and forestry	46	18
Industry, public utilities and construction	7,702	615
Wholesale & retail distribution, hotels & restaurant	8,898	1,369
Transport, storage and communication	2,136	78
Financial services and business services	7,425	977
Public administration	3,682	28
Education*	8,247	217
Health and social work*	13,962	382
Other services	1,995	353
Total	**54,093**	**4,037**

***Life science** activities are distributed in health-social work and education sectors.

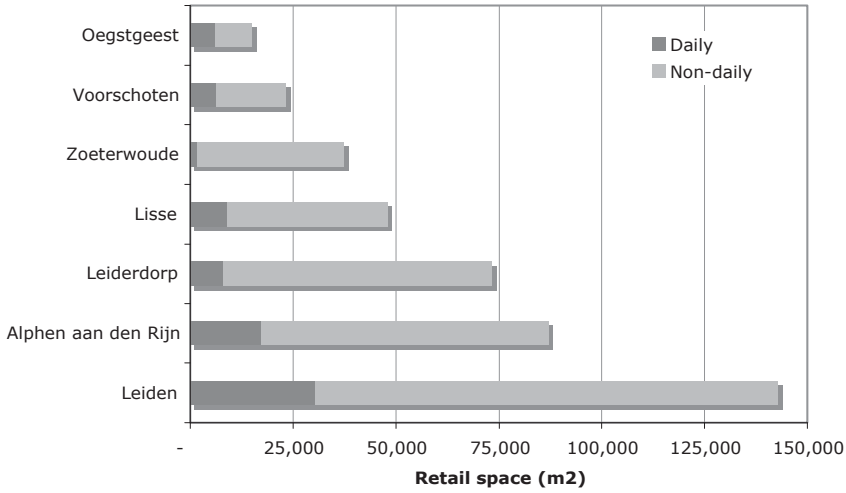


Figure 4.17 Retail space in Leiden agglomeration (Source: Locatus, 2005).

4.7 UNDERSTANDING THE COMMERCIAL-SPATIAL LOGIC OF LEIDEN

4.7.1 Development of movement networks in Leiden

The analysis starts by tracing the geometry of movement networks since Leiden's emergence in the 11th century. As shown in Figure 4.18, water was initially the main movement conveyor at different scale levels: local, city and regional. Since former times, the city and the regional networks could often not be distinguished from each other; they just overlapped into one network. The only differentiation which could be observed is

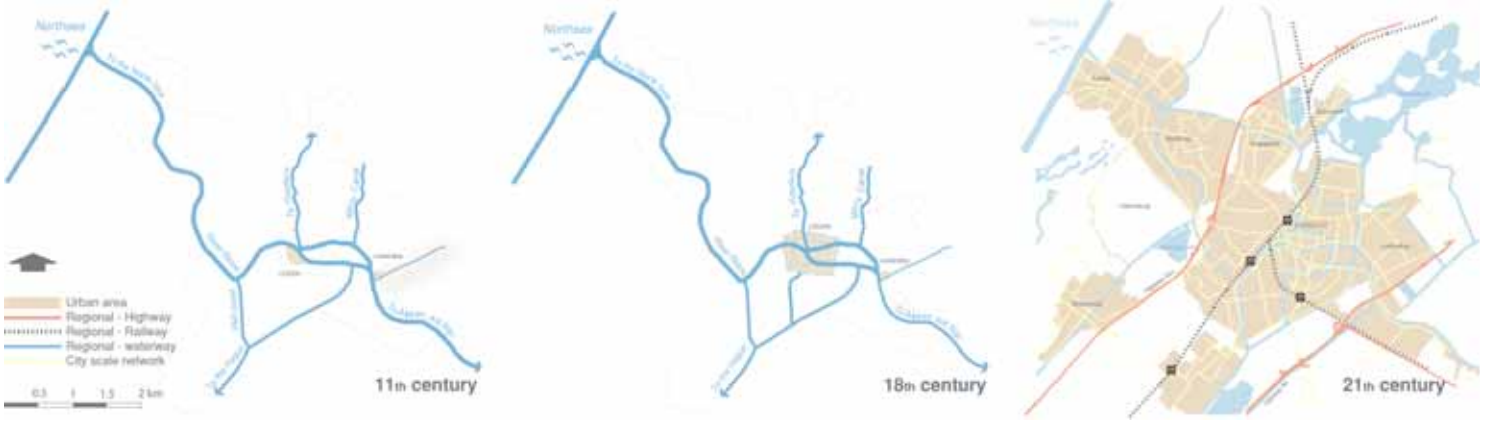


Figure 4.18 Development of movement networks in Leiden.

that where the networks experienced an intensifying or a thickening of urban intensity, then that part of the network would play a role more as a city-scale network. In fact street name referring to another town name, such as Haarlemmerstraat, refers to the regionality of the street, since it connects to that other town. A long distance traveller would pass through the centre of the town and stay at the inn of this high street. The regional and the town network overlapped each other on the high street.

The first settlement in Leiden was established at the South bank of the river Rhine, concentrated at the bridge that connected the North and South side of the river. Then the town began to expand to the North side of the river. Additionally, the roads along the river had the same role as the water. The roads were hardened and became also useful for passengers and goods transport (by horse cart).

The first railway infrastructure reached Leiden in the 19th century, connecting Leiden with Haarlem and Amsterdam. The growth of railway transport and the extensive networks soon largely replaced the role of barges as regional passenger transport mode in the Netherlands. Together with a better road infrastructure, land transport (rail and road, which were faster than water transport) started to expand and took over from water transport the primary role as movement conveyor in both passenger and goods transport. The role of river and canals as movement conveyors and access to the market place diminished. The fast population growth and the car explosion after 1960 also changed the scale and shape of the movement networks in Leiden. The automobile networks, then, superimposed onto the conventional water and railway networks, resulted in overcrowded street spaces. To solve this problem, the city planner and engineers strictly separated the city and the regional movement conveyors. The regional movement was put on highway and railway networks meanwhile the scale of many of the old regional networks was degraded to a city- or local-scale network (Figure 4.19). However, *Breestraat* and *Haarlemmerstraat* survived this traffic engineering. They preserved their street continuity, and as a result they did not lose their regional character. Those two streets are good examples for a street that plays a double role, as city-scale conveyor as well as a regional movement conveyor, since those streets are not only used for the local movement structure, but also still connect Leiden with its' neighbouring villages and towns. Their street spaces are stretching through the present urban agglomeration of Leiden. This spatial condition has sustained their liveability. They are until today still an important commercial space and main traffic route, not only for pedestrians and bicycles, but also for cars and other public transport such as buses and future light rail transport.

Figure 4.19 Regional-scale and city-scale networks vs. location of retail activities.

4.7.2 Spatial functional pattern of Leiden

In an effort to understand the spatial logic of retail activities in Leiden, the map of the distribution pattern of retail activities in the Rijnland region are projected onto the movement layers map (Figure 4.19 and 4.20). *Meubelplein Leiderdorp* and *Rijneke Boulevard – Zoeterwoude*, car-based shopping centres, are located in the vicinity of regional Highways A4 and A44, in order on the one hand to maximize their regional catchments areas, and on the other hand to obtain more and cheaper retail space since they trade larger size merchandize such as furniture, kitchen appliances, etc. Meanwhile in *Leiden Centrum,* the shopping area in the historical inner city is located in the vicinity of a railway station, which is a regional public transport node. This shopping area not only has a regional character, but also a local 'pedestrian' character since it is easily accessible by pedestrians and bicycle users.

Figure 4.20 shows the relationship between the grid-orthogonality analysis and the distribution pattern of retailing in the Rijnland region. It reveals that 60% of the retail

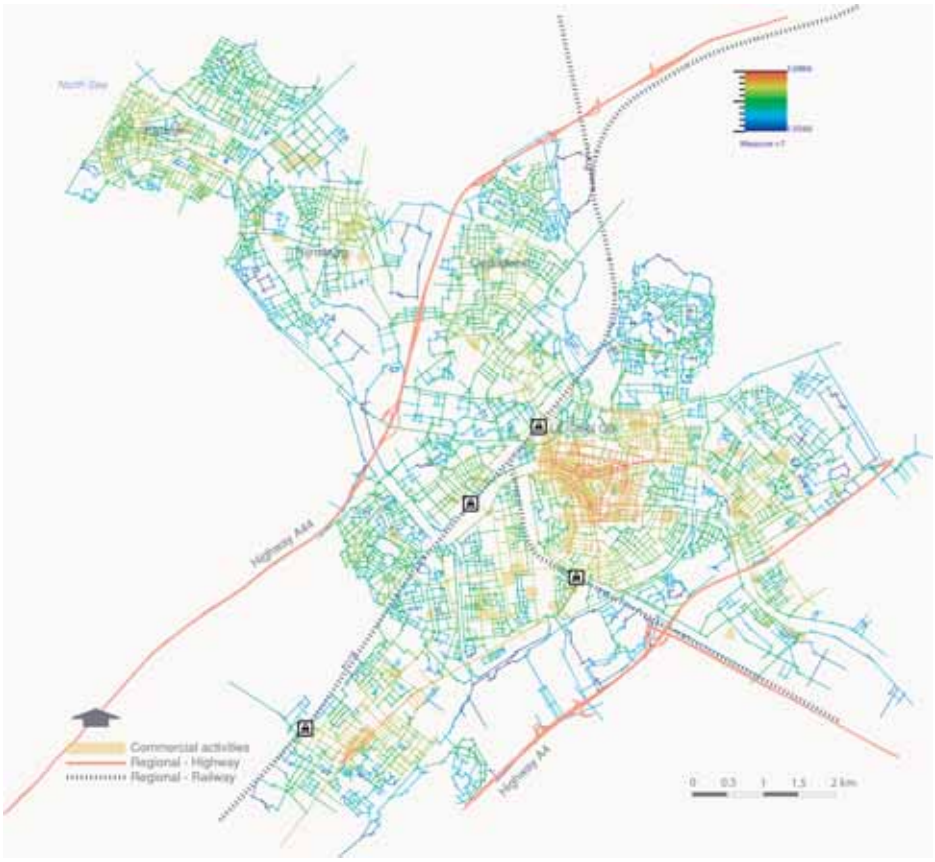


Figure 4.20 Distribution patterns of retail activities in Leiden projected on orthogonality analysis of local scale street pattern.

activities in the Rijnland region are located at the most integrated spaces inside the historical inner city of Leiden. The fact that the block size along these streets is rather small contributes to the production of finer-mesh circulation patterns and an intelligible neighbourhood for potential buyers (pedestrians).

As in Delft, the location of the most integrated spaces and commercial activities is at this moment almost similar to the locations of the open markets in the 18th century. However the retail activities are not spreading all over the historical inner city area. They are mainly concentrated along the *Haarlemmerstraat* and the *Breestraat*, the city-scale networks of Leiden. As has been discussed earlier in section 4.1.6, the *Haarlemmerstraat* and the *Breestraat* have been a market place since their establishment. This means that at the moment of their establishment, street-trade activities were not there because of 'historical' value or the 'nostalgic' atmosphere of the place, but more because those

spots were the most strategic locations for retailing. If the historical value of Leiden's inner city would be the main attractor of commercial activities, then one would expect the shops to be located 'everywhere' in the city centre, since all parts of the centre are historic. So, if the shops located in the historical city centre are not just there because of its oldness or historic value, then it can be suggested that the strategicness of the location, i.e. the integration of the city-scale networks with the orthogonality of the urban grid, is possibly the more important factor which has influenced the choice of retail location for both retailers in the 21st century and market vendors from the 18th century.

Further study of the spatial configuration shows that even though the two city-scale spaces - the *Haarlemmerstraat* and *Breestraat* - are close to each other, only few retail activities infiltrate into the interior of the grid between the two city-scales, in spite of the dense commercial activities along these city-scale spaces. Spatially, the neighbourhood area in between those city-scale spaces does not have a permeable, straightforward connection between them, except for the two bridges: *Visbrug and St.Jansbrug*. These bridges, segregated by the river Rhine, which is no longer a movement conveyor, are the only direct connection between these two shopping streets. The old bridges[34] have been there for centuries, serving as the connection between the North and South settlements of the river, and have always been a location for busy commercial activities (Figure 4.16). Furthermore, these bridges are the only city-scale in north-south direction in this area. Thus the absence of the retail effect in the local neighbourhood in between the two high streets (*Haarlemmerstraat* and *Breestraat*) in Leiden can be explained by the lack of permeability of the local grid in between those two high streets and the lack of city-scale lines in general, which makes the local neighbourhood not intelligible enough for the potential buyers to stroll around and to browse the merchandize.

4.7.3 Spatial functional pattern around Leiden Central Station

The city of Leiden has the third highest train passenger density in the Netherlands after Utrecht and Schiphol (see Table 4.4). Leiden Central Station, the main railway station in the Rijnland region, has a high accessibility by train and other public transport with more than 54,000 train passengers passing the station everyday. It is only 10 minutes by train from The Hague, 15 minutes from the International Schiphol Airport and 35 minutes from Amsterdam. The station is at the crossing of 3 major railway routes in the Delta Metropolis: the Amsterdam-Rotterdam route via Haarlem, the Amsterdam-Hague route via Schiphol and the Leiden-Utrecht route. It is also the main public transport

34. It used to be called *'Oude brugge'* (Old bridge) or *'Grote brugge'* (Big bridge) (Oerle, 1974).

node in the Rijnland region; very often one needs to transfer at this station to reach different destinations (towns and villages) in this area (see Figure 4.21).

However, with such a large number of users, the retail activities that we would expect to flock to its immediate surrounding are not there (or they were there but are closed by now). The concentration of street-edge retail activities can only be found on one street, the *Stationsweg*, the street that connects the station to the main shopping street *Haarlemmerstraat*. Why? Does the station, due to its high accessibility, not have enough capability of producing pedestrian movement and attracting retail activities? In the following an explanation is suggested to answer why the immediate area of the station, except for the *Stationsweg*, is not attractive for shops and other street level activities.

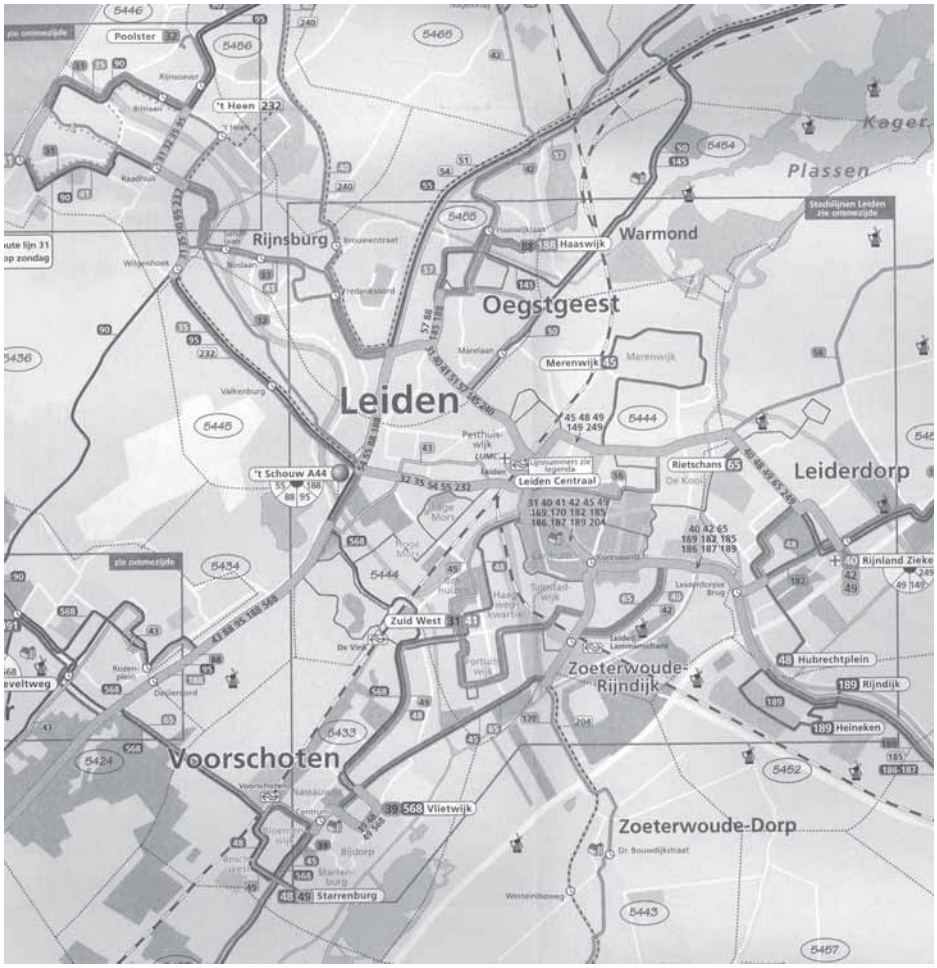


Figure 4.21 The regional position of Leiden CS – public transport map of Leiden agglomeration (Source: Connexxion, 2002).

Table 4.4. Train passenger density in the Dutch cities, in the year 2004 (Source: Gemeente Leiden, 2005b)

City names	Population	Number of passengers	Number of passenger per 100 inhabitants
	1st April 2004	2004	2004
Emmen	108.354	3.352	3,1
Apeldoorn	156.000	14.555	9,3
Enschede	152.989	16.519	10,8
Breda	166.035	22.846	13,8
Tilburg	198.767	28.935	14,6
Ede	105.495	16.569	15,7
Maastricht	122.183	19.433	15,9
Groningen	179.185	29.617	16,5
Dordrecht	119.649	21.132	17,7
Zoetermeer	114.216	22.303	19,5
Zaanstad	139.774	29.108	20,8
Almere	170.704	36.696	21,5
Rotterdam	598.923	130.936	21,9
Eindhoven	207.870	45.531	21,9
Haarlem	147.343	33.859	23,0
Nijmegen	157.466	37.236	23,6
Amersfoort	132.851	34.165	25,7
's-Gravenhage	469.059	121.589	25,9
Zwolle	110.880	29.173	26,3
Arnhem	141.601	42.276	29,9
's-Hertogenbosch	133.511	42.733	32,0
Amsterdam	739.104	241.621	32,7
Leiden	**118.702**	**58.413**	**49,2**
Haarlemmermeer (Schiphol)	127.750	65.906	51,6
Utrecht	270.244	144.665	53,5

Figure 4.22 selects a one-kilometre radius around Leiden Central Station and assigns a number of retail shops on each line segment. It shows that the station area has two contrasting street patterns at its two sides (the sea side and the city side). At the sea side the spatial pattern is dominated by huge blocks, while the city side has smaller block size.

Walking on the two different sides of the station presents two contrasting experiences. Street level commercial activities are scare on the sea side of the station. There is only a

small food stall (Vietnamese snack bar) and a café (Café Lebkov). The main occupation of the public space by people is limited to certain hours (weekdays, office hours).

There are two possible explanations why this side of the Leiden station experiences a lack of commercial activities despite being a busy pedestrian route to the LUMC (Leiden University Medical Centre) and the Bioscience Park (business cluster in life science), experiences a lack of commercial activities. First, this area was especially designed to accommodate the university, the hospital and the life science laboratory function, which required huge block sizes. As consequence, the distances between the one and the other function are rather large, which makes it neither comfortable for pedestrians to stroll around nor suitable for retail activities, which require smaller block sizes for more potential store frontages and for smooth pedestrian movement of their potential buyers (see Chapter 2). Second, the street pattern is rather un-intelligible. When one comes out of the station and walks towards the sea side area of the station, a route is not easily discernable. Somehow the built environment (the hugeness of the distances and a big open field without any orientation point) is rather difficult to figure out and one can easily get lost. A new visitor (stranger) would always need to read the map, which is provided just outside of the station (see Figure 4.23 and 4.24)

Figure 4.23 Map information board outside Leiden Central Station.

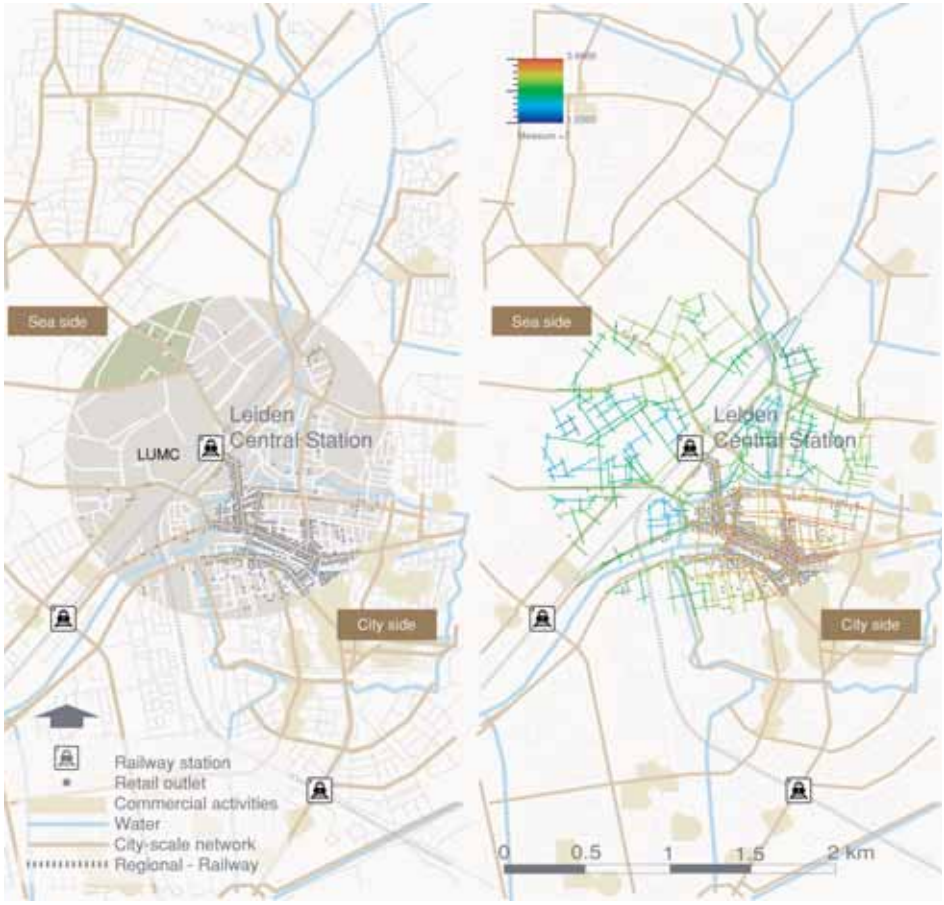


Figure 4.22 Distribution of retail activities within one kilometre radius of Leiden Central Station, superimposed on the city-scale network (left) and orthogonality analysis (right).

Meanwhile, on the other side of the station (the city side), the block sizes are smaller than on the sea side. However, the street-edge retail shops are mostly (only) located along the *Stationsweg*. In spite of the high demand for retail space in the inner city of Leiden, the efforts of the local authority to extend the retail activities into the urban area around the station has not been fruitful (W. van der Poel, Economische Zaken Gemeente Leiden, personal interview, October 20, 2004). There were some initial commercial activities trying to do business along *Stationsplein* (the street adjacent to the station), but after a few years those shops closed down. The map at Figure 4.22 clearly shows that the direct influence of the station is only limited to the *Stationsweg*, a street which connects the station with the heart of the commercial structure of the city. The *Stationsweg* serves as a tapping conveyor or a short-cut route that brings people from

Figure 4.24 The seaside of Leiden Central Station.

the station (the regional potential buyers) to Leiden's main shopping streets and vice versa. This implies that the station is just an additional supporter of the existing retail structure of the city: in fact it only enlarges the catchments area of the local retail structure (in this case the retail structure of the city centre) by bringing the regional potential buyers to it.

From the above, it is evident that the station by itself cannot attract enough retail establishments to its vicinity. The station is dependent on the local retail activities of the city. If the station would have a very strong attracting power, then the retail would eventually move as close as possible to the station, but what has happened is that the retail has stayed in the place were it used to be. This contradicts the conventional thinking of city planners, namely that the draw of the station is enough to attract commercial activities to its surroundings and that the station will be capable of supporting these retail activities by itself.

4.8 CONCLUSION LEIDEN

Often, urban transformation around a rail station is either considered only from a regional scale, which assumes a station just as a 'point' in regional networks, or from a very local scale, just taking into account the architectural design of the station building and its immediate public space (station square, parking space, bus terminal, etc.). Meanwhile, the importance of the 'in-between' scale is often neglected. The 'in-between' scale is the scale that integrates the railway station into its urban spatial and functional context.

In the Leiden case, the distribution pattern of commercial activities is influenced by the synergy of the city movement network with the local urban fabric to a certain extent. The spatial analysis clearly demonstrated that on the one hand each city-scale section which is well-embedded in the local urban fabric of Leiden is characterized by street-edge shopping activities. On the other hand, it confirms the earlier finding in Delft that

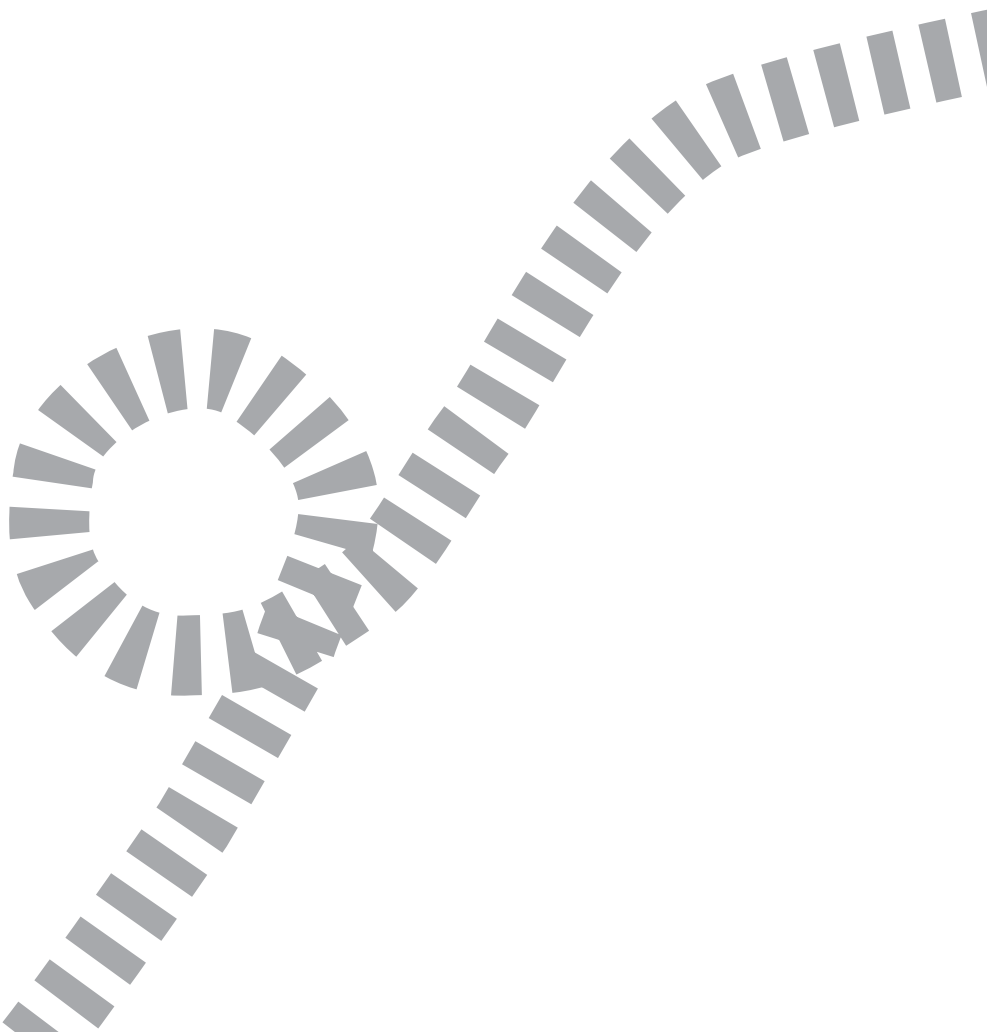
the detailed shape of shopping patterns are very stable over time. This is demonstrated most consistently by a very local space syntax measure, namely area integration.

In spite of being a highly accessible station (at regional scale) and having powerful attractor functions, it is confirmed that Leiden Central Station would not be able to create an urban place for commercial activities without being plugged-in (via *Stationsweg*) into the existing main shopping street (*Haarlemmerstraat*). The absence of retail activities at the sea side of the station implies that a high accessibility only at the regional level has little influence on the retailer's choice of the retail location. On the other hand, the intelligibility of the street configuration and integration of the station into the existing city's commercial structure at the city side has attracted the retail activities to locate/concentrate in this location.

It is argued further that the intelligibility of the street configuration and the integration of the station into the existing city's commercial structure, which is influenced by the integration into the urban spatial configuration, are important in creating a well functioning vibrant central area around the station. Because Leiden Central Station is highly accessible and the trend of commuter shopping is increasing (Goudappel Coffeng & Intomart GfK, 2005), the station area has the potential to be explored for further commercial functions. However, it is necessary to redesign its urban street pattern (to integrate this regional node into the local networks), in order to attract and sustain retail activities, so that the urban area around the rail station may benefit from the flow of its regional shoppers to create a well functioning vibrant central area around the station.

Chapter five

Cross-Case Conclusion: Retailing in a Railway Station Urban Area



CROSS-CASE CONCLUSION: RETAILING IN A RAILWAY STATION URBAN AREA

This chapter will provide the cross-case conclusion of the Dutch and Indonesian case studies. I will return now to the central issue and hypotheses of this research. The central issue involved the question of how to design a good spatial configuration around the railway station that supports high-street economy activities. This issue was broken down into three hypotheses:

1. **The distribution pattern of commercial activities is influenced to a certain extent by spatial configuration of the movement networks.**

As the analysis progresses, it became clear that, in spite of differences in cultural and socio-economic structure, all the cases studied confirm that indeed the spatial configuration of the street network influences the distribution pattern of commercial activities.

The analysis began by tracing the geometry of the origin of movement networks since their establishment, in Surabaya, Delft and Leiden in order to examine how the cities studied have changed their movement connections over time (Figures 3.15, 4.6, 4.18). It is clear that in all three cities the trade is an important part of their history both in the Netherlands and Indonesia. While the location chosen for the establishment of Leiden and Delft was on a riverbank at the crossing of two or more regional trading routes, Surabaya is located at the estuary (see Figure 5.1) of the *Mas* River where the river meets the Java Sea.

Since the location of commercial activities is sensitive to both flows and concentrations of traffic, these regional trading movement routes helped influence the location of the early establishment of markets. For this reason, some of the early markets in Surabaya were established on the spot where the *Mas* River crosses regional land roads (connections to other towns and villages) or the open sea (connection to other islands or continents). As illustrated in Figure 5.2 the original location of *Pasar Turi* (at the bank of River *Mas*) was at the crossing of the river and *Dupak* Street (the regional road); similarly, the *Keputran* market is located at the intersection of the river and the East-West road, *Sulawesi* Street (which used to be connected via pontoon). *Pabean* market is located at the estuary of the *Mas* River, the meeting point of the river and the sea trading routes. Since those intersections are the places where most people pass by, it is no surprise that these places experienced a thickening of urban intensity by the establishment of living and civil functions.

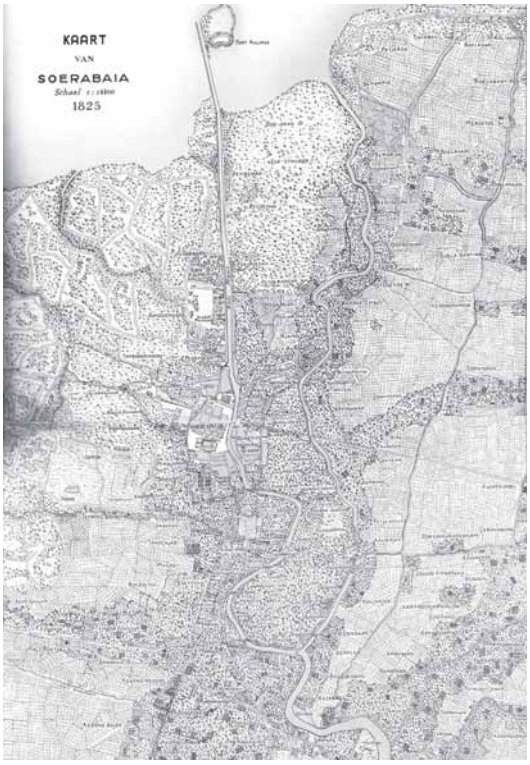


Figure 5.1 Map of Surabaya in 1825 (Von Faber,1906).

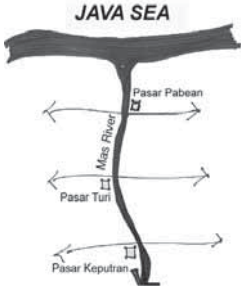


Figure 5.2 Sketch of the original position of the market in relation to the Mas River.

In ancient Holland, the waterways (canals or rivers) were important movement conveyors within the swampy landscape, both for trade and fisheries. For Dutch towns the canals served multiple purposes and can therefore be considered the 'veins of life' for the city. In fact Delft and Leiden emerged at the crossing of these regional trading waterways routes with both towns serving as a market place for their surrounding villages and hinterland. It is explained in Chapter 4, that when the settlement and its direct

surroundings are concerned, these trading lines also often mark the direction of settlement development. The regional canals running through the city centre were connected to the next town. Thus the regional and the city-scale movement often overlapped each other on the high street and can not be differentiated from each other. Since the main orientation of the trading routes in Delft was in the North-South direction (connection between Delftshaven (in Rotterdam) and The Hague), most of the early street vendors were located in this orientation as well, especially along the Oude Delft (Figure 4.8). In the same way, the early street vendors in Leiden established themselves along the Rijn River which was the important water trading route to the North Sea (Figure 4.15).

Thus it can be suggested by the cases studied that the locations of the early market activities were influenced to a certain extent by the flows of movement routes especially the regional ones.

In spite of the fact that nowadays the three cities studied have grown over time and the pattern of movement has become more complex, the same distribution logic of commercial activities can still be found in these cities.

Stimulated by demographic growth, the commercial activities in Surabaya have expanded considerably in the last decade. However, it is evident from the analysis that the spatial configuration of movement networks still influences most of the commercial locations (Section 3.3). In spite of the fact that the *Mas* River has lost its role as a movement conveyor, many of the old land regional movement routes are still functioning and working at the same scale as hundreds of years ago. Furthermore, as the city grew, those movement conveyors (the city-scale networks) became more centrally located and immersed in a dense functionally mixed urban fabric (Figure 5.4). Due to the lack of highways (engineered regional road), many regional movements in Surabaya are still using those streets. As revealed in Figure 3.16, most of the commercial activities in Surabaya are located in the concentrated area of city-scale networks In fact those city-scale structures serve multiple scale movements which results in hybrid-functions (multi scale commercial functions), urban buzz and at the same time often chaos and congestion.

Unlike in Surabaya, the Dutch planners and engineers, in their effort to reduce congestion and to facilitate faster regional movement in the cases of Delft and Leiden, have separated the regional network from the other scales, resulting in segregation of the urban function. They established well engineered highways intended only for regional movement and left the existing routes for city-scale movement or in some cases eventually disconnecting them to degrade their function into the local scale. The

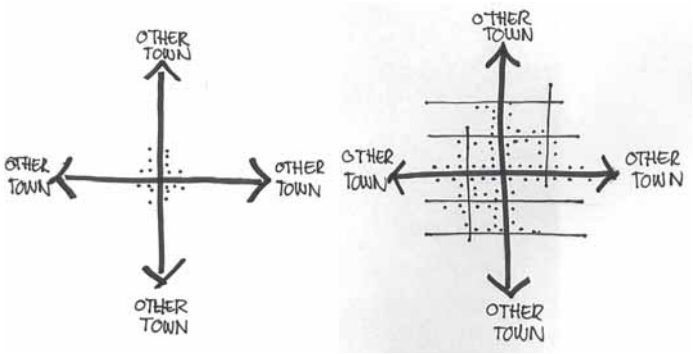


Figure 5.3 The emerging of the settlement and street vendor activities on the crossing of two or more regional trading routes.

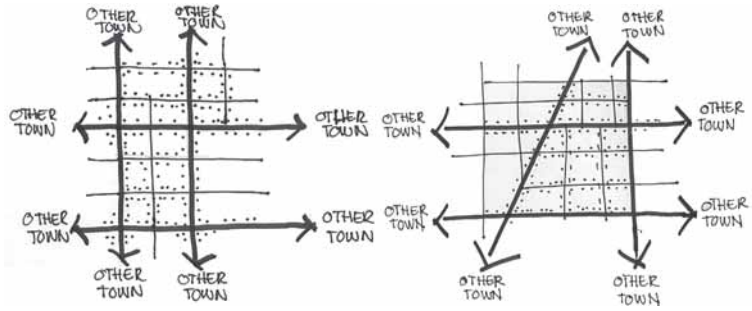


Figure 5.4 Sketch of possible integrated (intact) movement structure of Surabaya.

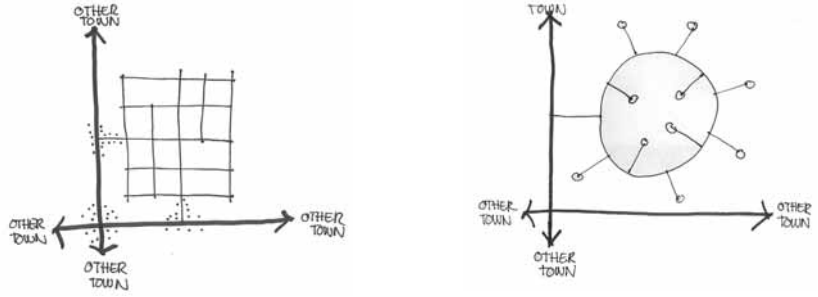


Figure 5.5 Sketch of the disengagement model of movement structure in Dutch towns.

interconnectivity between the regional and the city- and local-movement grids has diminished (Figure 5.5). Consequently the regional and the local commercial functions also begin to disengage from each other.

At first glance, it may seem that the commercial activities in the Netherlands and Indonesia are organized in a different way, but in fact the same urban spatial conditions have attracted, established and sustained urban commercial activities for centuries at certain

locations. They are following the same spatial logic, namely that the interconnectivity between the movement layers does influence the distribution pattern of the commercial activities. The overlap of different scales of movement networks and their intensity provide a spatial condition which can support mixed urban functions. However, when the interconnectivity between these networks begins to unravel and the local-scaled grid starts to be unequivocally local, while regional conveyors become more and more specialised for movement at the regional-scale, the locations lose that hybridity and different factors will creatively change these places. The regional activities become located outside the city, at the crossing of the highways or other regional transport nodes, while the street edge retail takes place inside the city.

2. The clustering of the high-street economic liveability is often found in a location where city-scale networks are concentrated and well connected into the transparent, orthogonal, small-sized local grid

In many cases, retail activities are linear in its spatial organization, yet in some places retail starts to cluster. The analysis suggests that this clustering of retail activities is influenced by the synergy of the city-scale structure (or supergrid) and the orthogonality and size of the local urban grid.

In Surabaya, Delft and Leiden, most of the commercial activities are distributed linearly along the city-scale structure. But at some locations, where the city-scale structure is more dense and integrated in the permeable local grid, the clustering of the retail activities can be found. Furthermore, these locations are also characterized by small block size, facilitating better commercial activities, since this provides smoother pedestrian flows and more potential shop facades for customers due to its scale size.

It is interesting that in the Dutch cities, the old core of the city is often the only urban area with orthogonal urban structures, meanwhile the rest of the city, especially those planned in the 20th century, have much more complicated structures (cul-de-sac, cauliflower, etc.). This design consequently supports the historical inner city as the most intelligible place in the city for pedestrian flows as well as for retail activities.

As illustrated in Figure 4.19 and 4.20, most of the retail clusters in Leiden agglomeration are found in the old core of the city (such as the city centre of Leiden, Voorschoten, Rijnsburg, etc.). When we have a closer look, we can see that these historic city centres create certain spatial conditions that help induce retail activities. Firstly, those locations are located at the spots where many supergrid lines (old regional conveyors) cross each other. Secondly, they have permeable and orthogonal structures. Thirdly, their urban

areas contain the smallest urban blocks compared to the rest of the city. In Delft, it is clear that this hybrid spatial condition has provided the city centre enough carrying capacity for retail activities to survive in this location. Even though many of the old supergrid lines in Delft have been cut or altered, causing no extensive concentration of the supergrid lines at any place, the stacking of the old regional road (*Binnenwatersloot - Oude and Nieuwe Langendijk*) on the most orthogonal configuration has provided a vibrant urban place at the city centre of Delft (Figure 4.12).

The analysis of these cases has clearly demonstrated that the clustering effect of retail activities in urban areas in general corresponds with the direct physical connection between the neighbourhood and the city. The higher the permeability of the city-scale structure (towards the local grid) and the more direct the sightlines in the local urban grid, the more retail activities can permeate into the local grid which in turn triggers the clustering effect. The orthogonality of the local street networks generates clustering of retail activities, because it will diffuse the pedestrian movement flows to the whole trading area (or all possible streets) and minimize the 'dead spots', the 'edge' streets or 'cul-de-sac'. The orthogonal pattern will increase the visibility of the customers while searching for purchases, so people will have possibilities to observe all corners of their environment inside the local grid, which increases the 'spill-over' of the main city movement routes to permeate inside the grid. Additionally, the structure is more porous which means that people can move into this area at a number of points that increases the accessibility of the neighbourhood for strangers, who can then move contiguously without experiencing a dead spot.

All the cases demonstrate that commercial patterns are remarkably stable and are effectively indicated by a very local space syntax measure. It is at least a possibility that the stability of these patterns is not so much a result of convention or habit or even 'feedback', but of the local conditions established by grid orthogonality and block size.

3. **The regional centrality of the station alone is not enough to generate the liveability around the railway station area. The railway station needs to be physically integrated into its local urban surrounding. Precisely, to be integrated into its local urban street pattern, both at the city and local scale. The station needs to be supported by a well structured (city and local scale) street network.**

It is evident in the cases of Delft Central Station and Leiden Central Station, that in spite of being highly accessible stations and attracting thousands of passengers everyday,

there are only a few retail activities established around those stations. The regional accessibility quality of the stations does not have enough power to attract the retail establishments in the vicinity of the stations.

In the case of Delft Central Station (Section 4.4), where the integration of the station with its local urban structure is rather poor, there are only a small number of retail shops located around the station area. Even though the station has been established there for more than 100 years, it does not manage to attract the presence of retail activities in its vicinity. If the regional accessibility (with almost 40,000 people passing by: daily: 20,000 train passengers, plus passengers using other modes of public transport) is the factor which attracts retail activities, then this place should have been full of retail shops by now. Instead, most of the retail and service firms in Delft are located in the highly integrated street network in the historical inner city.

In the case of Leiden Central Station (Section 4.7), it is confirmed further that the station (with an even higher accessibility than Delft CS) would not be capable of attracting the street-edge economic activities without being plugged-in (via *Stationsweg*) into the highly integrated main shopping street of Leiden (*Haarlemmerstraat*). It suggests that the station needs the support of the local urban commercial structure in attracting those commercial activities.

Recent research on shopping behaviour in the Randstad (Delta Metropolis) in the Netherlands shows that there is some potential for the urban area around a commuter node, such as railway station, to be explored for retail functions (Goudappel Coffeng & Intomart GfK, 2005). In spite of the increased interest in internet shopping, the report has shown that retail shopping is still the favourite way of shopping among the respondents. Interestingly, the report also indicated that there is an increasing trend called 'commuter buying power' in the Randstad: 64% of the 32,000 household respondents indicated that they do shopping during their commuting activities. However, it is evident from the analysis that the potential of this commuter buying power is not well explored in either Delft's or Leiden's cases. In spite of the high number of commuters in both stations, the two stations by themselves are not capable of attracting retail establishments in their vicinity. The disengagement of the stations (regional network) from other movement layers (city and local networks), has disengaged the local commercial activities from the station's activities. The urban areas around the stations do not have the right spatial condition to explore this retail potential.

While the railway stations in Delft and Leiden offer good examples of highly accessible stations, they lack overall integration with the city and the local scale. This is not the

case with Surabaya's *Kota* and *Turi* Railway Stations which presents a contrasting picture (Section 3.4). The empirical research in the two stations in Surabaya has shown that if the station is physically well integrated in its local urban configuration, the lively condition will emerge by itself and guarantees its sustainability without being dependent only on the power of accessibility to the station. Although the accessibility of both stations is declining, the stations are located in well integrated movement layers (three different scale of networks merged). This contributes to the urban buzz, people moving, buying and selling goods and services and interacting with each other: 'constructing', in Zukin's terms[35], 'an urban culture within urban space'. It is a regional node location that is intelligible enough by having a dense city-scale network, supported by a transparent (orthogonal) grid, which enables the location to be economically vital and attractive for both retailers and pedestrians. The location of both stations in Surabaya obtain this spatial condition, which made it possible for the retail activities to survive in the area around the railway station, regardless of the quality of regional accessibility of the station. Thus whether the railway station is operating or not does not matter much for the retail activities. A good spatial condition is the more determining factor for the retailers to choose that location.

This implies that at the regional nodes (such as railway stations and highway exits), the other movement scales (city and local) not only supplement the regional scale in terms of adding more dimensions to local urban possibility, they also add a deeper 'carrying capacity' to the nodal location set up on the regional network, allowing a wider urban context at the scale levels below the regional to participate in the benefits of the regional node. Thus it can be suggested that in order to produce *real* urban liveability around the railway station, i.e. a liveability that consists of different kinds of socio-economic activities, we need to integrate the station (as a regional node) into the urban system (through a well distributed network) to the city-scales network as well as to the local one (i.e. neighbourhood scale). This implies that to be able to create a vibrant place for retail activities, the station needs to be integrated into the local retail structure of the city, which is influenced by the synergy of city-local movement network to a certain extent.

Integrated into the city-scale network means being part of the long and continuous main streets of the city. This will guarantee the omnipresence of strangers, which is commonly found in great cities. As Jane Jacobs (1961, p.30).claimed:

35. Zukin, 1995, p.11

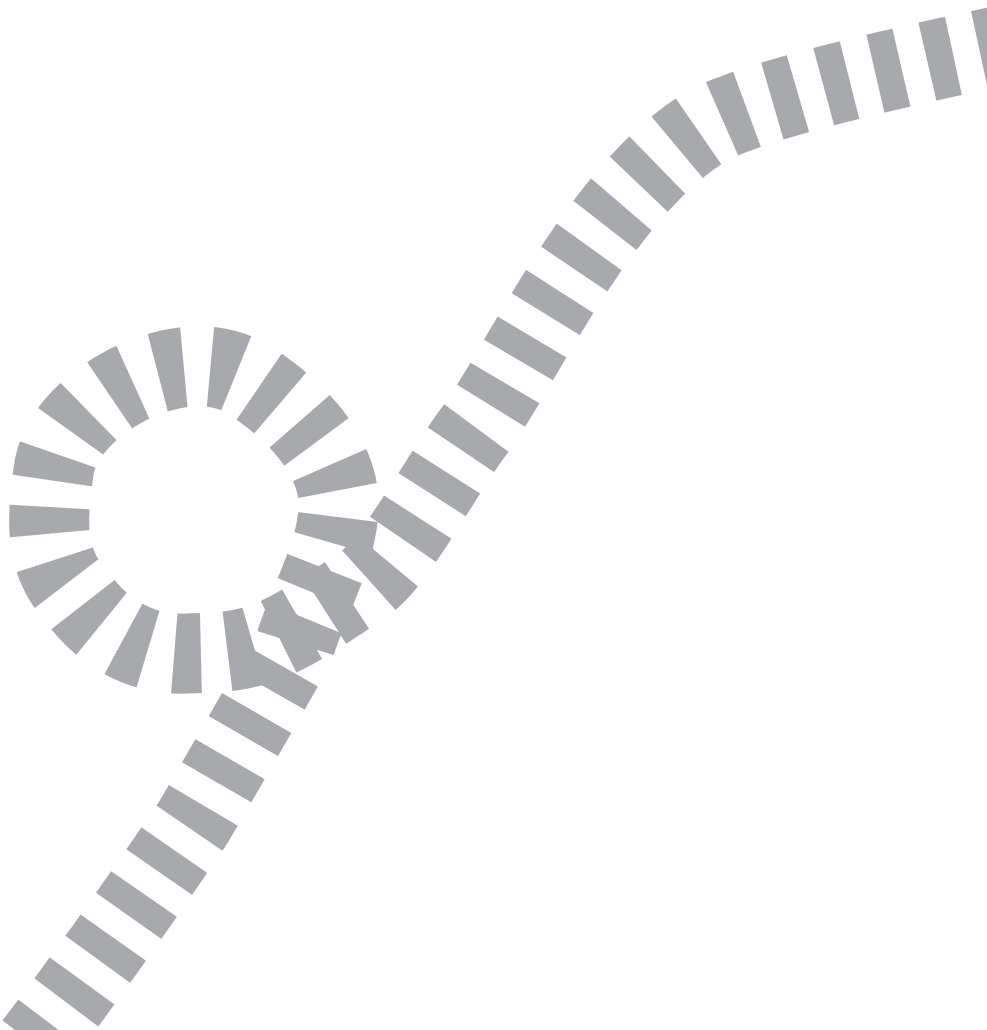
> *Great cities … differ from towns and suburbs in basic ways, and one of these is that cities are, by definition, full of strangers. To any person, strangers are far more common in big cities than acquaintances. More common not just in places of public assembly, but more common at a man's own doorstep.*

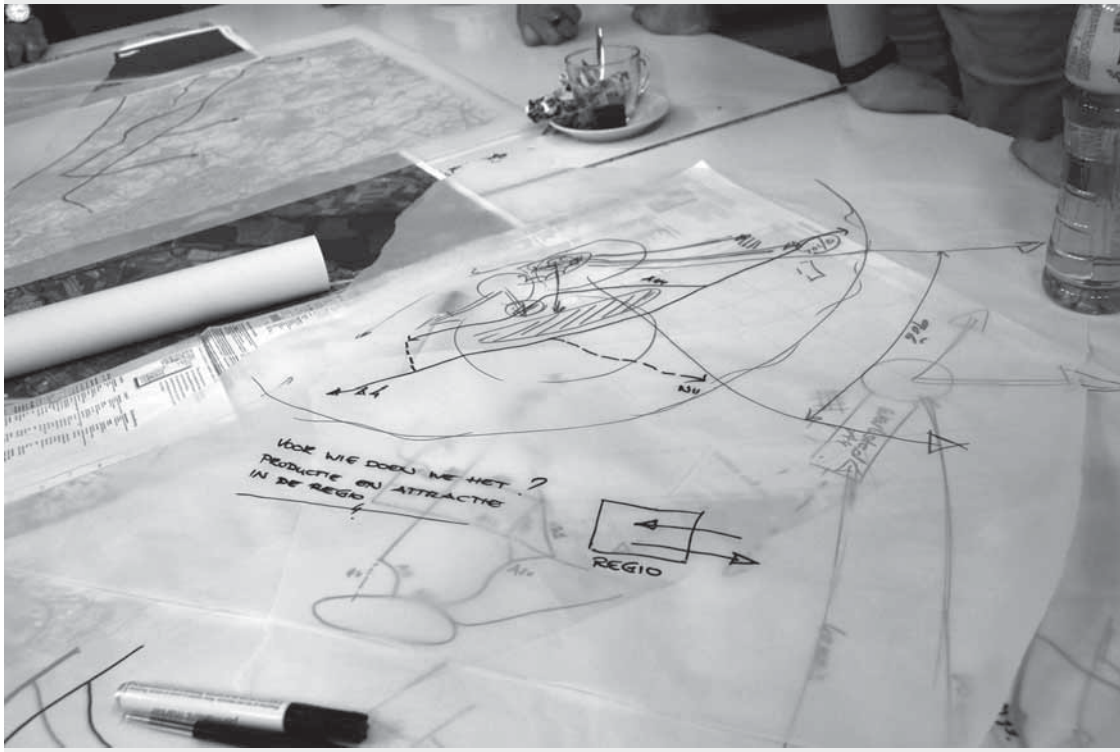
Integrated into the local scale networks means having an immediate urban area with high orthogonality and small block size, which not only ensures a smooth pedestrian movement and clustering of commercial activities, but also provides 'flexibility' in terms of the ability of urban forms to accommodate different uses and to adapt to social changes over time.

Therefore, if we understand the logic of the distribution pattern of commercial locations, then we can utilize this logic to design and to plan the potential future locations of commercial activities in urban areas around the station. We can expect that this spatial condition will perform similarly in other cases in the future.

Chapter Six

Design Application: Movement, Movement, Movement




VOOR WIE DOEN WE HET ?
REGIO

DESIGN APPLICATION: MOVEMENT, MOVEMENT, MOVEMENT

This chapter will demonstrate the application of the spatial design principle discussed in this thesis. This spatial guiding principle can then be applied in evaluating and predicting the possible future potential effect of different urban design proposals on the pattern of the concentration of commercial activities in an urban area.

6.1 THREE EXAMPLES

The exploration of different case studies highlighted the importance of understanding spatial configuration in designing a potential space for retail activities. An application example of this spatial framework is presented as an assessment tool for:

1. Planning of the urban area around Delft Central Station.

Two possible master plans for the railway station area surrounding Delft Central Station were analyzed. With the establishment of the *Stedenbaan*, a rapid transit system in *Randstad Holland*, the Dutch railway company expects the amount of the trains and passengers to Delft Central Station to double by the year 2010. As a result, the municipality of Delft proposed a new master plan to upgrade the quality of the infrastructure. This proposal eliminates the existing barrier effect of the railway by building underground railway tracks, which gives a new opportunity for the redevelopment of the urban area around the existing station. The spatial framework is used to assess the likely impact of different urban design plans of railway tunnel alternatives on urban movement patterns and retail activities; and subsequently to give a spatial insight to the decision maker to be able to choose the most suitable urban design plan for the new station.

2. Planning of a new regional connection in the Leiden region.

It will examine three planning alternatives for the improvement of the regional scale connection, between Highway A4 and A44, near the immediate vicinity of the central fabric in the agglomeration of Leiden. The current planning alternatives for Highway A11 for the improvement of the regional scale mobility networks are tested in the movement layers map of the Leiden agglomeration in order to uncover the fabric effects of the alternatives. It is shown that the solution to a regional infrastructure problem can have consequences which go beyond the simple facilitation of accessibility. The fabric itself can react in complex ways to changes. It can cause unexpected problems, but it can also deliver unexpected opportunities for the reconfiguration of the pattern of functional centres within the fabric.

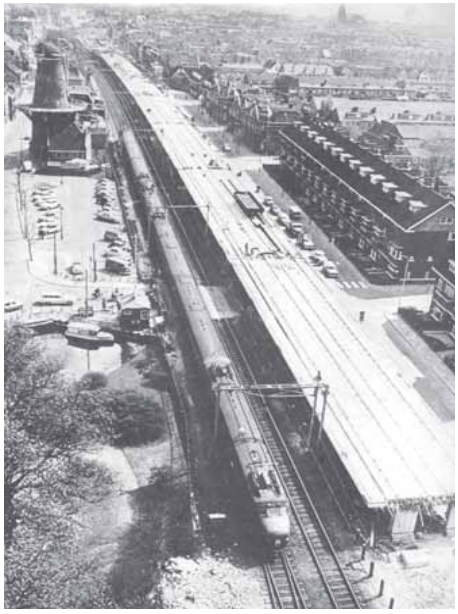


Figure 6.1 Picture of viaduct (Source: Geurtsen, 1988).

Figure 6.2 Green arrows is the city-scale movement transparency, orange arrow is the local-scale movement transparency).

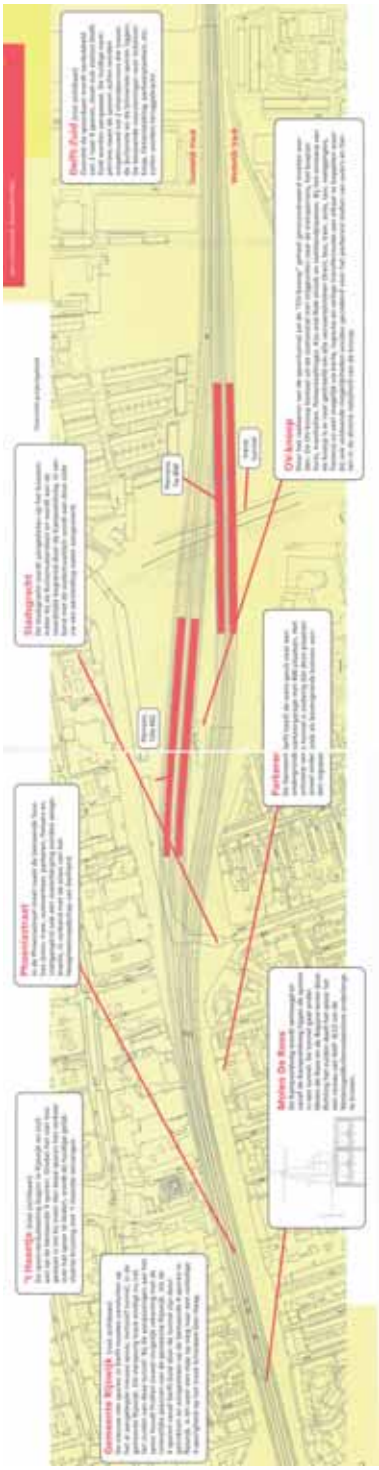


Figure 6.3 The tunnel alternatives (Source: Den Heijer, 2003).

3. In search of a new location for Surabaya's wholesale vegetable market.

Daily congestion in the heart of the city centre of Surabaya and the fast growth of the number of vendors in *Pasar Keputran* are the reasons why the municipality is searching for a new location for the wholesale vegetables market. The spatial framework is used to analyze two possible locations, to examine the impact of these alternatives on movement flows of different users groups, highlighting the importance of understanding the urban movement in assessing the wholesale market location.

6.2 DESIGN EVALUATION: LIVING, WORKING AND SHOPPING IN DELFT CENTRAL STATION

In the beginning the 20th century, population growth forced the city of Delft to expand itself to the west side of the railway line. Since the frequency of the trains also increased, the railway infrastructure and the *Spoorsingel* canal formed a barrier to the integration of the city. Thus in 1965, the railway was raised to the top of a viaduct (Figure 6.1).

However, the viaduct still has the effect of acting as a physical and psychological barrier for the city inhabitants at the east and west side of the railway tracks. Physically, the viaduct divides the city into two parts; it limits the flow of both people movement, as well as vehicle traffic between the two sides (especially trucks and buses due to the viaduct's height). Psychologically, it provides an unattractive and socially unsafe crossing. Figure 6.2 shows how the infrastructure blocks the line continuity between the local street spaces (orange lines). The local urban grid is broken up, suffering from a lack of permeability.

At this moment, the railway line between Rijswijk and Schiedam is carrying 345 trains per day (of which 28 of them are Thalys trains). With the arrival of the *Stedenbaan* and the new High Speed Train, it is expected that by 2010-2015, the number of trains will be increased significantly (466 passenger trains, 11 cargo trains and 68 Thalys trains). Therefore Railned concluded that there is a necessity to double the capacity of the railway line between Rijswijk and Schiedam from 2 to 4 tracks (Den Heijer, 2003).

However, the high density of buildings along the railway, the barrier effect and noise pollution make it difficult to expand the existing line by adding tracks. Therefore, the municipality of Delft proposed to move the railway underground, with the following aims:

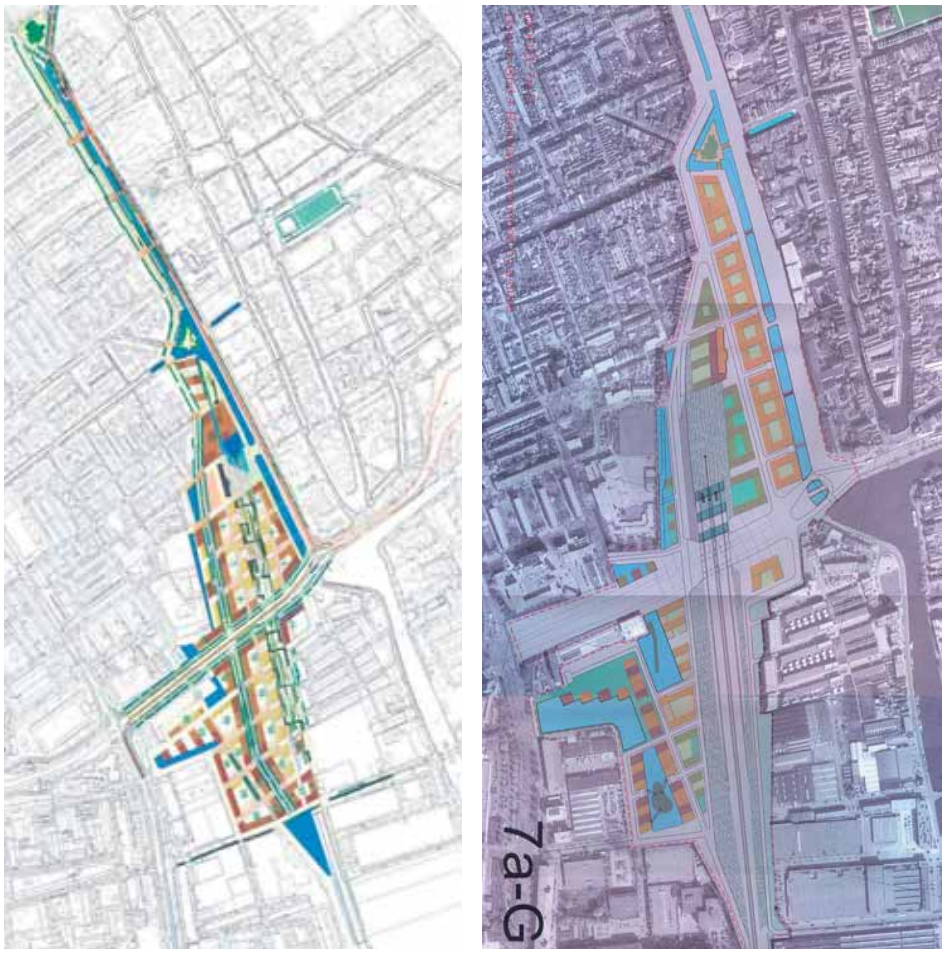


Figure 6.4 a. Masterplan of the long tunnel; b. short tunnel (Source: Busquets,2003).

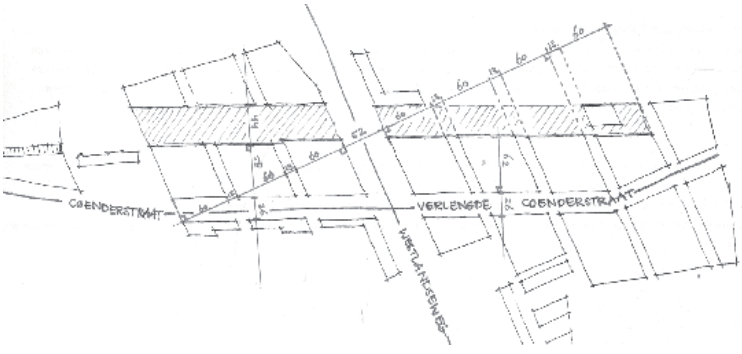


Figure 6.7 Block composition of the long tunnel scenario (Source: Busquets, 2003)

- to solve the problem of the barrier effect of the railway infrastructure by creating good city integration and a good relation between the two sides (west and east) of the railway;
- to reduce noise pollution;
- to increase and intensify the use around the station by creating more space with liveable city centre functions, such as shopping activities that can strengthen the image of the city.

At the beginning of the proposal, 14 different alternatives for the location of the underground tunnel trace and railway station were mentioned. After close study and thorough discussion among the different parties, finally two alternatives remained (see Figures 6.3 and 6.4). These are:

A. The short tunnel - 1,900m tunnel under the existing trace, with 'on the ground South station's location'.

B. The long tunnel - 2,300m tunnel on east trace, with 'underground North station's location'.

The next section investigates the future spatial impact of these 2 tunnel alternatives, not only regarding their capability in integrating the city's spatial structure, but also regarding their potential in providing a liveable place for economic activities.

A. The short tunnel scenario

In this scenario, the tunnel length is 1,900m. The tunnel trace is the same as the present railway lines. The railway tunnel starts at the DSM-Gist factory (north border of Delft's municipality), passing *Buitenwatersloot* (a canal), and then proceeds up reaching ground zero level just before the Irene tunnel. The present Irene tunnel will be widened, to provide enough space for the railway lines and the station. The station's hall will be located under the viaduct, to the north of the Irene tunnel. The bus station will be located on the east side of the railway track oriented toward the *Westlandseweg*. The tram track will be moved to the new bus station area. In order to reduce noise pollution, a transparent noise shield will be built along the rail lines. Furthermore, the *Spoorsingel* canal will be revitalized. Nine new bridges will be established along the canal to ensure a good connection in the East-West direction,

Figure 6.5a represents the city-scale structure of Delft after the tunnel is built. The upgrading of *Coenderstraat* to a city-scale movement conveyer increases the density of the city-scale network in this area and enhances the integration of the city in the North-South direction.

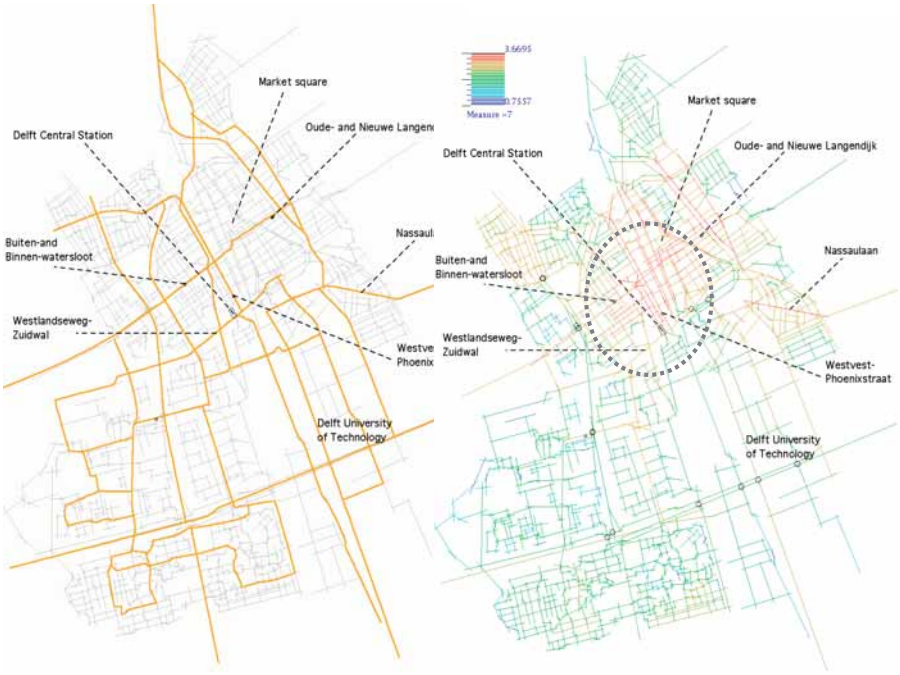


Figure 6.5 a. City-scale networks (yellow colour lines); b. orthogonality analysis (area integration) of short tunnel.

Figure 6.6 a. City-scale networks (yellow colour lines); b. orthogonality analysis (area integration) of long tunnel.

Figure 6.5b shows the orthogonality analysis of the short tunnel scenario. The tunnelling will provide an opportunity to redevelop the station area. It will provide 50,474m^2 overall footprint space for urban development and about 175,317m^2 built-up space (Busquets, 2003). The new urban design plan (Figure 6.4b) restructures this area and adds more urban blocks (17 blocks) which increases the orthogonality of the structure.

B. The long tunnel scenario

The long tunnel scenario is approximately 2300m in length and is located about 50m to the east of the present railway trace. The start of the tunnel will be at the DSM-Gist factory (the same as the short tunnel alternative) and continues until it passes *Abtswoudseweg*. Since the Irene tunnel in *Westlandseweg* will be eliminated, the road and the tram line of the *Westlandseweg* will be at the ground level. The bicycle tunnel at *Abtswoudseweg* will also be eliminated as well. The station will be located underground, to the north of the existing station. The accessibility will be from the new municipality office and the bus terminal (still in discussion). The bus terminal and the tram stops will remain at the same location. This scenario opens up an opportunity to urbanize the *Spoorzone* area from the '*Bolwerk*' until *Abtswoudseweg*, which will provide about 60,851m^2 of overall footprint space and 26,000m^2 built-up space for urban redevelopment (Gemeente Delft, 2003b).

Figure 6.6a shows the city-scale network in Delft after the long tunnel is built. The city-scale network is basically the same as to the short tunnel alternative. Most important is that there will be the addition of the city-scale network on the *Coenderstraat*, which will improve the density of the city-scale network in Delft.

The results of the orthogonality analysis are presented in Figure 6.6b. As can be seen, the long tunnel scenario provides not only the opportunity to utilize more space for urban redevelopment, but also more possibilities to increase the number of small urban blocks (approximately 3,900m^2/block). In total, 38 blocks will be added. The long tunnel scenario will also allow a more transparent orthogonal grid in the area. These factors increase the orthogonality of the area (more highly integrated lines (redder colour) in area integration measurement). Those areas of high area integration, where they coincide with a city-scale space (supergrid) will usually be those which exhibit, on the city-scale space at that point, a high level of street-edge activity and a vital 'high street' character with shops and other facilities serving the local neighbourhood (see for example Read, 2002; Kusumo & Read, 2003; Budiarto & Read, 2003). The long tunnel scenario would therefore be more suitable for the general functioning of the city centre, by triggering intense pedestrian activity and in particular retail activity.

Since the railway infrastructure will be mainly underground, it would be possible to design the urban fabric in this area as a continuation of the street pattern of the two parts of the city (Centrum area and Hof van Delft area) with the block size of 60-65m (see Figure 6.7). Therefore, it would have continuity not only in the city-scale but also in the local-scale network. This makes the urban fabric more transparent. In this scenario there will be 9 new spatial crossings created along the railway area, which will integrate the eastern and the western parts of the city with each other and makes the area more permeable. Thus, there will be direct transparent connections between the two city-scale structures, *Coenderstraat* and *Westvest*. The railway infrastructure will no longer be a barrier for movement.

6.2.1 Design thinking and discussion

It is evident, as it exists now that the railway infrastructure forms a barrier for city integration. The infrastructure divides the city and makes the area around the station unintelligible and not potentially favourable for street edge economic activities. Two scenarios are proposed to solve this problem. By putting the railway infrastructure underground, the short and the long tunnel scenario opens the opportunity to spatially integrate the city area and exploits the urban area around the station. Underground railway tracks allow for the development of a transparent and simple orthogonal urban grid increasing significantly the spatial potential for urban activity in the area around the new station without decreasing the spatial quality of the historic city centre.

In both scenarios, the upgrading of *Coenderstraat* into the city-scale structure will increase the centrality of the station area, since it will increase the density the city-scale network in this area and improve the city's spatial integration in the North-South direction. Both scenarios also intend to improve the spatial integration in the East-West direction. The short tunnel scenario provides 50,474m^2 overall footprint space for urban redevelopment and it will add 17 smaller urban blocks (to the existing area). However, the short tunnel scenario will not contribute much to the integration of the city in East-West direction, since it allows only the addition of two spatial crossings. The rail infrastructure will still remain a physical barrier for area integration.

Meanwhile, the long tunnel does not only provide more space for urban redevelopment (about 60,851m^2 overall footprint space), but it also solves the barrier problem and creates a better city integration by having more crossings in the East-West direction and finer-mesh block structure (60-65m). The railway station (a node of regional network) is well integrated into the city- and local-scale network, which means it will provide a favourable place for the emergence of urban centre activities, such as retail. Theoretically there exists a strong relationship between the integration of the street networks

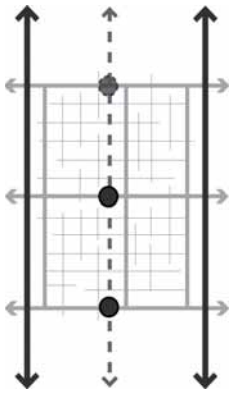


Figure 6.8 Sketch of possible integration of different movement layers in Delft

Figure 6.9 Four design alternatives of A11 S1: Highway fly over, S2: Highway with exit to Voorschoterweg, S3: Churshillaan-Lelylaan, S4: As Leiden Katwijk scenario.

in different scales and the small block size on the one hand and the centrality of the space on the other hand. Thus, the more integrated is the space, the more pedestrian movement potential we can find. The more pedestrian movement, the more potential the space has for economic activities, which is one of the pre-conditions for mixed-use and a liveable environment.

Furthermore, this scenario offers the possibility of the re-integration of regional and local urban functions. While the outstanding regional centrality of Delft Central Station provides easy access to the metropolitan scale of Randstad, the good local spatial condition creates a supportive environment for the emergence of local urban liveability. The functions that used to be segregated by different scales of movement layers, now have an opportunity to be combined in this location. It would be interesting to explore this area further for possible use by business or industry with a regional function which has need of local character. These could include service oriented functions or incubators for creative industry, the spin-offs from the university (generator of the knowledge-based economy) that require both connectivity to the regional scale and at the same time need to be grounded in the local urban setting that has a sense of place and encourages mixed use and creativity.

Finally, these findings imply the importance of a thorough understanding of the city's spatial structure in planning future strategic interventions. Once the *Stedenbaan* is established, there will be other possibilities for strategic intervention on the *Delft-Zuid* station and the new *Delft-Noord* station, as top locations for living, working and leisure. This will cause another shift in centrality in Delft that may lead to new questions, such as: how would these stations contribute to the exploration of the economic potential of the city? Would the stations have potential for mix or mono function? Would the stations become an integrating or segregating element of the city? Would the stations be intelligible enough for the city inhabitants? Therefore we suggest that further research in spatial configuration would be useful to seek a proper understanding on the impact of these strategic interventions on the future of Delft, and for generating alternatives which may not otherwise be given serious consideration.

6.3 PLANNING THE LEIDEN REGION AS A LAYERED MOVEMENT FABRIC

In terms of regional planning, Leiden's position between the urban regions to the north and to the south is crucial for understanding the logics behind its functioning. However, the discussion in this section concerns functional patterns at a lower scale - that of the

region itself - in relation to the spatial structure of economic activities and to changes in the infrastructure at the larger metropolitan scale.

In the last few years there has been an intensive planning discussion about possible road connections between Highways A4 and A44 within the Leiden agglomeration (see for example PZH, 2002; Holland Rijnland, n.d.). This discussion is motivated by the interest to expand the economic potential of the western side of A44 (Flora Holland, Estec, Keukenhof, Bio Science, etc.) and the urbanisation of the former airport location at Valkenburg by improving the accessibility of people and the movement of goods. Often the secondary consequences of such intervention on the urban fabric and their social and economic potentials at the local, city and regional scales, are not well investigated. This investigation shows how the relatively simple solution of the regional problem can have a significant effect on the local urban fabric of Leiden. Furthermore, this demonstration is used to begin the discussion, which is then directed towards creating new more intelligible structures within the central fabric of Leiden as a by-product of connections at the regional scale.

Four scenarios of intervention for the possible road infrastructure between the Highway A4 and A44 have been made: Highway A11 flyover, Highway A11 with exit to *Voorschoterweg*, up-grading the *Churchilllaan -Lelylaan* and the 'As Leiden Katwijk' scenario (see Figure 6.9).

In the first scenario, Highway A11 flyover (Figure 6.10a), the new highway route connecting A4 and A44 is proposed, it is a flyover highway, meaning it will not have any exit to the urban fabric.

This type of intervention will definitely have a direct impact on automobile movement at the regional levels by improving the traffic flow and travel time at this scale, but its impact on the scales of the urban fabric are likely to be negligible. Since it does not have any off-ramp to connect the urban fabric of Leiden with the highway infrastructure, the intervention will not change the local urban potential of the urban fabric.

In the second intervention, the proposed Highway A11 will have an exit at the *Voorschoterweg* (Figure 6.10b). The *Voorschoterweg* is the old road connection between Leiden and Voorschoten. This connection to the city-scale system will improve the traffic flow inside the urban system, because it will feed the 'through movement' from the urban areas of Voorschoten and Leiden directly to the regional scale. The effect is also quite limited for the local urban networks, since the intervention only adds one connection to

Figure 6.10 Regional-city scale networks and orthogonality analysis of two design alternatives of A11 - a. S1: Highway fly over, and b. S2: Highway with exit to Voorschoterweg.

the urban area and does not directly influence the orthogonality structure of the whole local urban system.

It is also quite clear intuitively that in the first and second scenarios, the interventions will have consequences on the regional scale network and that the local urban scale will be only marginally affected because of the lack of a close connection between the two levels.

But in the third scenario, the proposed intervention does contact the city-scale, with the new connection in the regional infrastructure being embedded in the urban fabric (Figure 6.11a). The *Churchilllaan*, in the southeast is stretched to join the Highway A4, while the *Lelylaan* is stretched to the Highway A44 to the northwest. The intervention

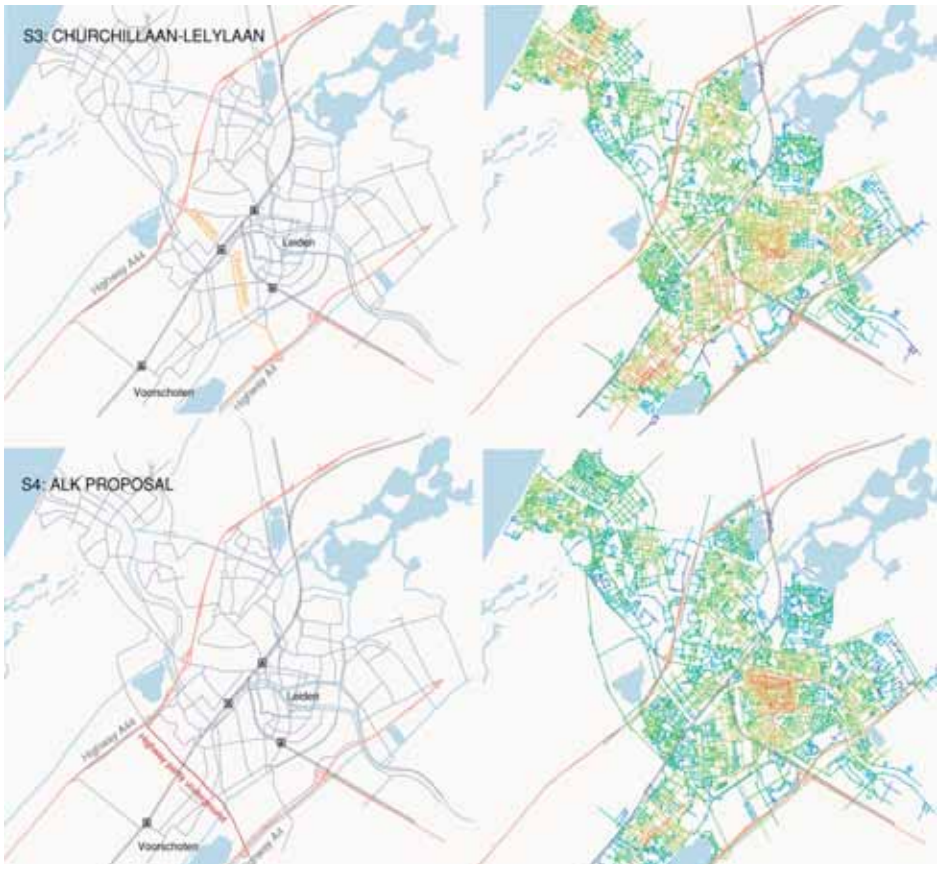


Figure 6.11 Regional-city scale networks and orthogonality analysis of two design alternatives of A11 - a. S3: Churshillaan-Lelylaan, and b. S4: As Leiden Katwijk scenario.

creates a direct connection along the *Churchilllaan-Lelylaan* between the A4 and the A44 through the urban fabric.

The effect of the intervention in orthogonality analysis is quite interesting. The stretching of the *Churchilllaan-Lelylaan* through the urban fabric significantly increases the area integration value of neighbourhoods alongside and of the old city centres of Voorschoten and Katwijk. It is clear that the ultimate effect in terms of movement will be much more complex than in terms of simply a regional link. This suggests an increase in the spatial potential for the intensity of activity along the *Churchilllaan-Lelylaan* at the same time, as this axis is connected and accessible at city and regional scales. The *Churchilllaan-Lelylaan* will become part of a long and continuous regional space, the longest street axis in the Leiden agglomeration, and potentially strong as a centre combining all three scales.

The combination of strong city-scale and local centrality potentials with high regional connectivity is one that offers an interesting challenge at the design level. This relatively simple intervention constructs an interface between three layers of high integration: those of the local scale of the neighbourhood area around the *Churchilllaan-Lelylaan*, the city-scale network of the city fabric, and the regional scale. The merging of these scales contributes to the potential of this space as a rather different type of functional centre. It draws the metropolitan scale, by way of the highway network, directly into the functional field of the central fabric, offering the possibility of a hybrid centrality which combines aspects of centre and periphery through being simultaneously part of the two larger scaled networks while being embedded in the local through the fine-grained grid. It creates opportunities for the reconfiguration of a pattern of functional centres within the fabric of Leiden and has implications for planning places of distinctiveness and particular functional specialisation within the centre seen as a whole. Nevertheless, due to the limitation of the space capacity, this 'thickening' of movement flows not only increases the congestion potential in this street space but also in the other streets connected to it (including the Highways A4 and A44). This means that the main aim of this intervention will not be achieved, namely improving the regional movement connection and speed.

In this large-scale urban intervention, the spatial issue is not the only factor to be considered. Financial, environmental and social factors also influence the design choice for the infrastructure project of a new highway. The first two scenarios improve significantly the travel time at a regional scale, but from the environmental point of view, their air and noise pollution level is rather high. The third scenario, since it is located in the middle of a local housing neighbourhood does not resolve the traffic jam problem. This scenario is likely to have a severe environmental impact as well.

The planning process for this project involves a large number of social actors with different interests. As these parties have different perceptions of the problem, interest conflicts are always present. Thus, in an effort to accommodate and resolve the conflict of interests of different parties, the Province of Zuid Holland and the Holland Rijnland Region organized a design workshop in the period May-October 2006 (Mulders-Kusumo & Van den Berg, 2006). This interactive design process, called 'As Leiden Katwijk' workshop, involved all parties (public, private and local citizens), where everyone could participate at the same place and time to design together the future of the Leiden agglomeration.

The 'As Leiden Katwijk' design workshop's scenario (Figure 6.11b) offers a solution that reconciles, in certain ways, the interest of the different parties. Thus while the connection still has a highway character, the spatial and environmental quality of the intervention area will be improved due to the fact that part of the new highway will be constructed underground. At the same time this proposal also improves the city-scale traffic flow inside the Leiden urban agglomeration, by adding two city-scale streets parallel to the highways, which not only function as feeders to the regional scale, but also as supplemented structures that complete the ring road of Leiden agglomeration.

Spatially, this solution can be explained in three ways. First, it fulfils the aim of the intervention in improving the regional connectivity of the Leiden agglomeration. The highway character of the intervention guarantees that the travel time and the traffic flow for the regional scale movement will be improved. Second, it does not add any extra traffic load to the urban system. On the contrary, the city's 'through movement' will be able to move even faster around the city due to the extra connections to the city ring road. Third, since the solution creates only two direct connections with the local urban fabric, it does not have much influence on the movement inside the local urban fabric. As a result this scenario offers a compromise solution: the regional movement can be speeded up while still being beneficial for the local movement by providing better connectivity for the city-scale movement to flow quickly to the regional movement network.

This spatial analysis highlights the variation in potential for activity levels over the urban field, making the exact targeting of interventions less a matter of guess-work. Perhaps even more important, this research suggests a mechanism for the interaction of the local and city scales network, which offers a way of thinking about the ways social and economic activity potentials are structured into the physical space by movement dynamics through the scaled networks of the city. This is knowledge which can guide decision-making during planning discussions at the design level.

This spatial framework opens up new levels of discussion in deliberations about complex urban regions, and can reveal potentials that may lie latent in a complex overlay of scaled networks and movement patterns. An over-simple model of the regional movement network connected to attractive place-nodes is replaced by a much more realistic model consisting of layers of differently scaled networks which produce emergent social and economic formations through their interaction, in the surface of a complex urban fabric. The regional movement network is supplemented by two further network layers at the city and local scales, which serve to ground and structure spatial flows and processes, producing coherent social and economic patterning in the urban surface.

6.4 IN SEARCH OF A NEW LOCATION FOR *KEPUTRAN* (WHOLESALE VEGETABLE MARKET)

The main vegetable market in Surabaya, *Pasar* Keputran, represents a powerful element in the everyday urban life of Surabaya. It significantly affects the nature and costs of the food production and distribution system in the city. Therefore, its form and location need to be carefully examined from a synoptic urban structural perspective, it cannot be considered in isolation from the broader issues of structure and form.

As explained before in Section 3.3, the present location of *Pasar Keputran* is outstanding. It is intelligible for producers, consumers and other smaller market vendors. The concentration at this location of multi- movement networks has ensured an easy access both for the bulky trucks of the agricultural suppliers and for local urban consumers. The flows of supply from the hinterland or sea (the suppliers, the farmers, the fishermen) can easily reach this market. Another interesting advantage of the location is that it is geographically centrally located where the distance to all corners of the city is a minimum. For consumers, the groceries from this market can be efficiently distributed to most other domestic markets or local neighbourhoods in the city in at most three turns. This intelligibility gives advantages to smaller market vendors. As they do not have unlimited capital to do their business, the cheapest way to transport their goods is by *'cargo' becak*.*36* The distance to all other places is minimal since the location is relatively central. Transportation costs are also limited since the distribution flows can move efficiently through the city. Another reason why the speed of the supply chain to the consumer is important is the scarcity of refrigerated transport.

Moreover, the *Pasar Keputran* also triggers a huge variety of spin-offs.[37] The market spin-offs may appear small in terms of aggregate employment, but they significantly contribute to the creation of new jobs for the local economy. These spin-offs are not only in terms of trading, but also transport and other supporting activities. For example, food vendors (*warung38, depot*), peddlers, retail markets, garbage services, cigarette vendors, newspaper kiosks, housing rental services for market vendors, suppliers of agricultural equipment and all kinds of transport supportive services such as *becak, angguna*, pick-up, etc., all seek this location to be easily accessible to their potential customers.

---

36. A 'cargo' becak is a specially designed trishaw to carry the goods from Keputran to other small markets.

37. That is the *Pasar Keputran* attracts a wide variety of other activities.

38. A *warung* is a street food stall

At the same time it is necessary to recognize that a pervading characteristic of wholesale markets is that they generate considerable amounts of traffic (they need it). As is the case of *Pasar Keputran*, the retailing activities are flooding the street together with traffic generated by them, intersecting with the main traffic conveyors of the city. Severe congestion is unavoidable and inefficiency is the result. Officially the municipality has erected a building for this market. However, the growth of the market (in correspondence to the growth of the population), together with unclear regulations and bad circulation inside the market building have led many of the market vendors to choose to do their trading on the street. This street trading and its spin-offs have caused not only traffic congestion, but also a chaotic, dirty and unhygienic environment in the heart of the city. Therefore, the municipality of Surabaya sees a need to move this market to a new location.

Nevertheless, it is not easy to find a place for a huge wholesale market in a highly densely populated city of more than three million inhabitants. The attempts to move this market to a new location have often faced the resistance from both the traders and the local inhabitants of the newly designated place (Warga Segel Pintu Masuk, 2004; Pasar Induk, 2004; Urban Poor Linkage, 2005; Keputran Riwayatmu Kini, 2006). Since the establishment of most of markets in Surabaya have emerged naturally (as described in Chapter 3), the local government has no clear criteria of how to select a new location for market activities (Pemerintah Kotamadya Surabaya, 1999). In most cases the new location has been chosen just because the price of the land of the new location is cheap and because it is hidden from the 'front' side of the city (not a strategic location) and separated from the main movement networks. Since many parties consider markets to be dirty and since they do not bring much profit for government or real estate investors, the importance of the accessibility for the suppliers and buyers was not well considered, nor was a thorough location analysis done for the proposed area.

However, the location of a market is a critical factor to its success. An inappropriate location has led to the total failure of markets. In many cases, expensive rent for market shelter and infrastructure has simply been abandoned while vendors took matters into their own hands to find more suitable locations. Using the users groups as starting points, the location of the wholesale markets should be considered by its relationship to:

1. Agricultural producers, who mostly originate from the hinterland of the city, to ensure that all suppliers (especially the small local ones) have easy access to the market.
2. Other forms of wholesale- and domestic-markets, to ensure easy access to a full range of products and smooth distribution flows to all corners of the city. Appro-

priately, wholesale markets should be seen as feeders supporting a system of local markets and other forms of retail distribution in the city.

3. Potential customers from the local urban population which the markets seek to serve. This means that the access to the regional and city wide (public) transportation system is important, to ensure that access is not restricted by transport cost and to enable easy access for consumers and small-scale vendors and groceries peddlers.

In Figure 6.12 to 6.15 two different (possible) new locations for the *pasar induk sayur* (main vegetable market) *Keputran* are examined. The various movement generative capacities of different locations of the city form a hierarchy of a range of potential locations with commercial possibilities. This hierarchical range offers a guide to potentially good locations for markets at different network scales.

The first alternative in *Kebraon* neighbourhood is the latest option proposed by the municipality (Pemerintah Kotamadya Surabaya, 2005). *Kebraon* neighbourhood is a housing area located at the south side of the city. It is not clear why this location was chosen. However, based on the spatial configuration analysis, the location is not well connected to the regional and city-scale networks.

Firstly, from the point of view of agricultural producers, this location is not well connected to the regional network that links Surabaya and its hinterland. The suppliers need at least, mostly more than three turns before they reach the location. For example if the trucks come from the South (e.g. from Malang), they need four turns before they reach the market (Figure 6.12).

Secondly, from the point of view of other types of markets in the city, this location is also difficult to reach (Figure 6.13). One would need about 5 to 8 turns before reaching the market. This is because it will be located behind a housing area (bad visibility) so that people will always need to pass the *Kebraon* housing area. This has caused several demonstrations from the inhabitants who reject this market being located in their neighbourhood. The residents argue that the market will disturb 'the quietness' or residential atmosphere of their neighbourhood.

Thirdly, potential customers will have difficulty reaching this location since there are not many public transportation systems serving this area. Furthermore, the 'backyard' location makes it even more complicated since its visibility to city-wide inhabitants is also limited.

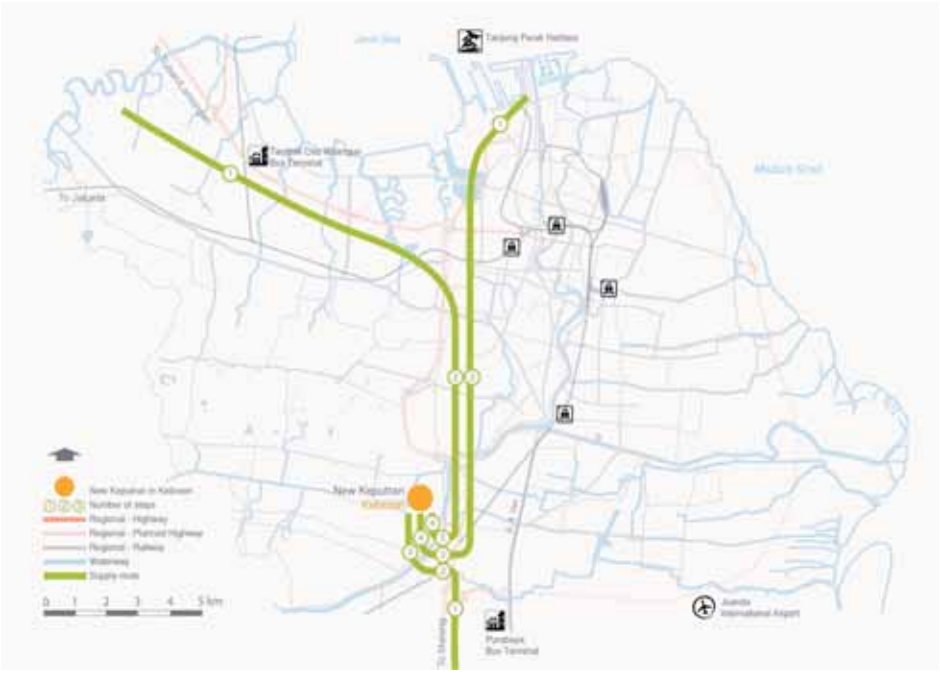


Figure 6.12 The 'Kebraon' alternative, the supply flows of agricultural producers.

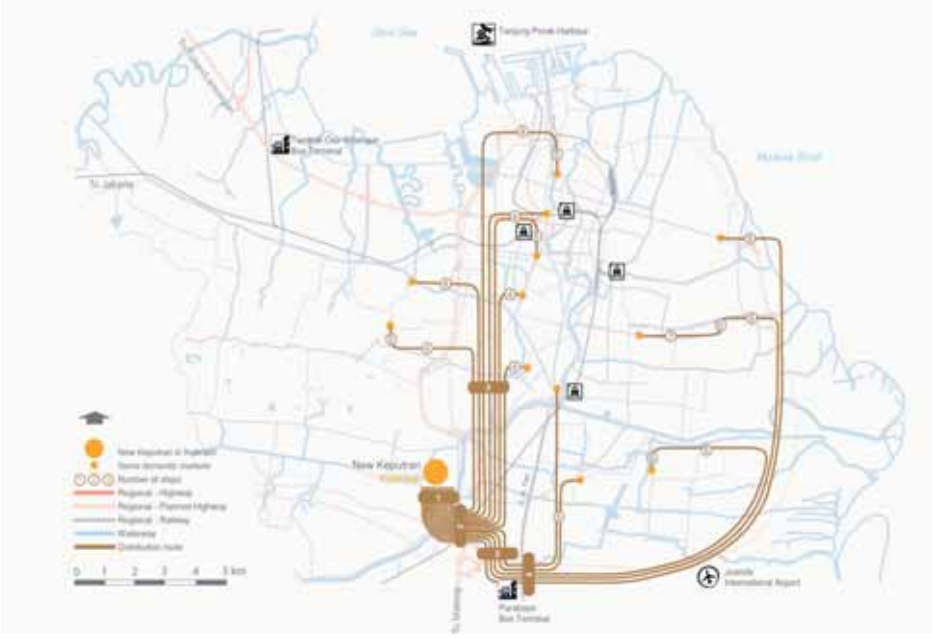


Figure 6.13 The 'Kebraon' alternative, the distribution flows to other markets in Surabaya (not all domestic markets are drawn here).

Figure 6.14 The 'Waru' alternative, the supply flows of agricultural producers.

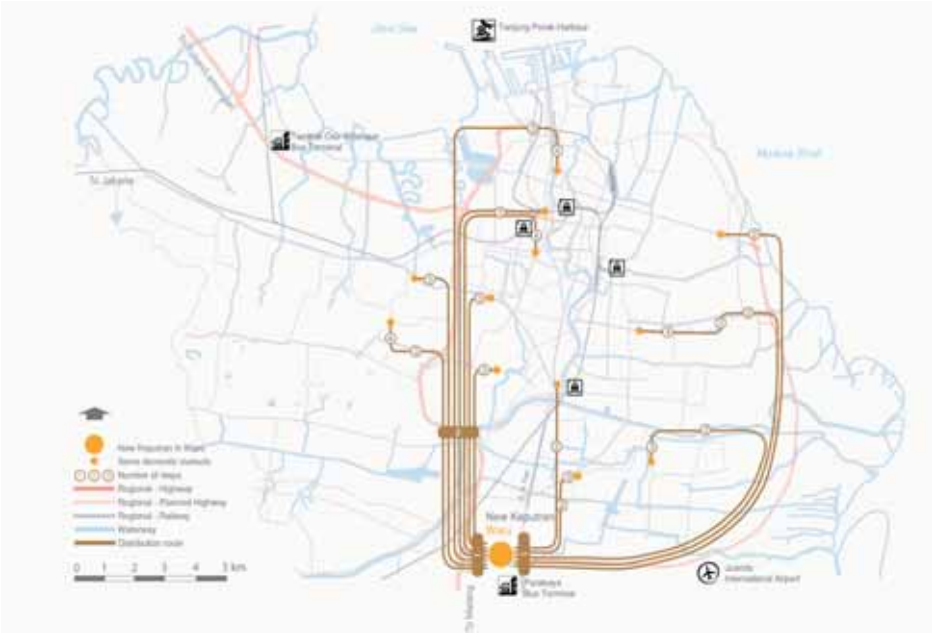


Figure 6.15 The 'Waru' alternative, the distribution flows to other markets in Surabaya (not all domestic markets are drawn here).

This analysis implies that the new location is not suitable because:

1. The traders face the risk of losing their potential buyers (city inhabitants and other smaller vendors) and transportation is expensive (the neighbourhood is not easily accessible and transport to the location will take longer and be more expensive).
2. The quietness of the local neighbourhood will be disturbed. A housing area is not suitable for this type of market activity which needs a high frequency of movement flows.

Both the traders and the future neighbour of the market have expressed their opinions regarding 'the unsuitability of the site for market activity'.

Therefore, based on the spatial configuration analysis, I propose another location for the *Keputran* vegetable market at *Waru* Highway exit at the Southgate of the city which is directly adjacent to the Purabaya bus terminus (the main bus terminal in Surabaya).

For agricultural producers, this location is connected to the major regional movement networks. *Waru* highway exit can be reached from all the regional networks (from any direction) in maximal three turns, making its regional intelligibility very good (Figure 6.14). Secondly, other wholesale- and local markets in the city can reach this new *Pasar Induk Sayur* location via the western highway and (planned) eastern ring road in maximal four turns, as for example shown in Figure 6.15 where as the *Pasar* Turi and *Pasar* Pabean market can be reached in 3 steps via the highway. The same is the case for smaller local markets and other the food distribution system inside the city, utilizing the major thoroughfares in the city: they also can reach the new wholesale market in maximal four turns. Thirdly, the close proximity of the market to the larger generators of population movement such as the *Purabaya* bus terminus (which is the main public transport carrier of Surabaya) will be really useful for the success of the wholesale market. In this way the market will be easily accessible for the local urban population. Additionally this location is located on major thoroughfares of Surabaya (A. Yani Street) that ensures the intelligibility of this location for a wide range of city users.

This analysis has shown how the choice of location will influence the pattern of movement for suppliers, distributors, vendors and buyers. A market is extremely sensitive to flows and concentrations of traffic and pedestrians at different scales of movement. It is shown that the '*Waru*' location is integrated in the different levels of movement networks, not only regionally (highway, bus terminal), but also at the city-scale (city-scale conveyor, city-bus network). However, the distance for smaller vendors to this wholesale market is increased. To solve this problem, a spatial solution only is not enough; other aspects such as financial, social, environmental aspects need to be considered as well, requiring interdisciplinary studies to be done. In this way, the relocation of the market will not sacrifice the liveability of the small traders which is often the case.

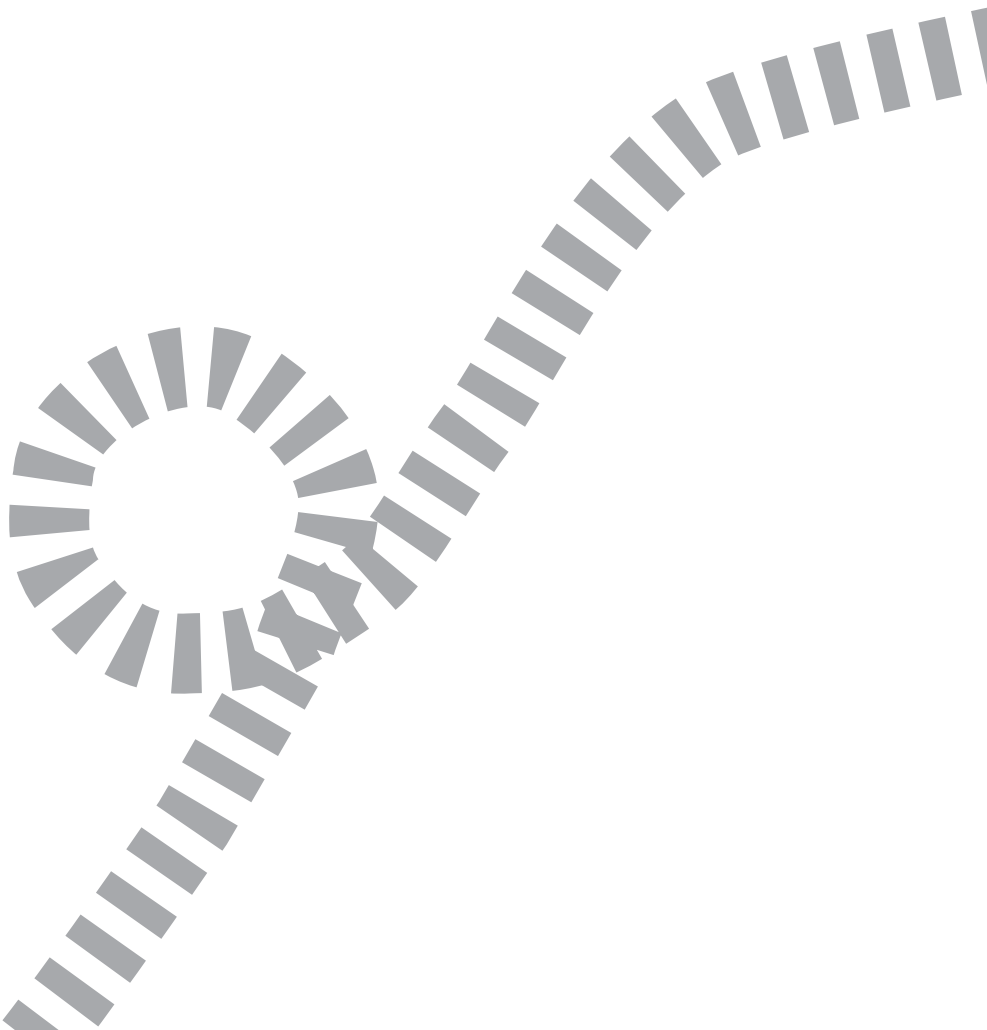
6.5 CONCLUSION

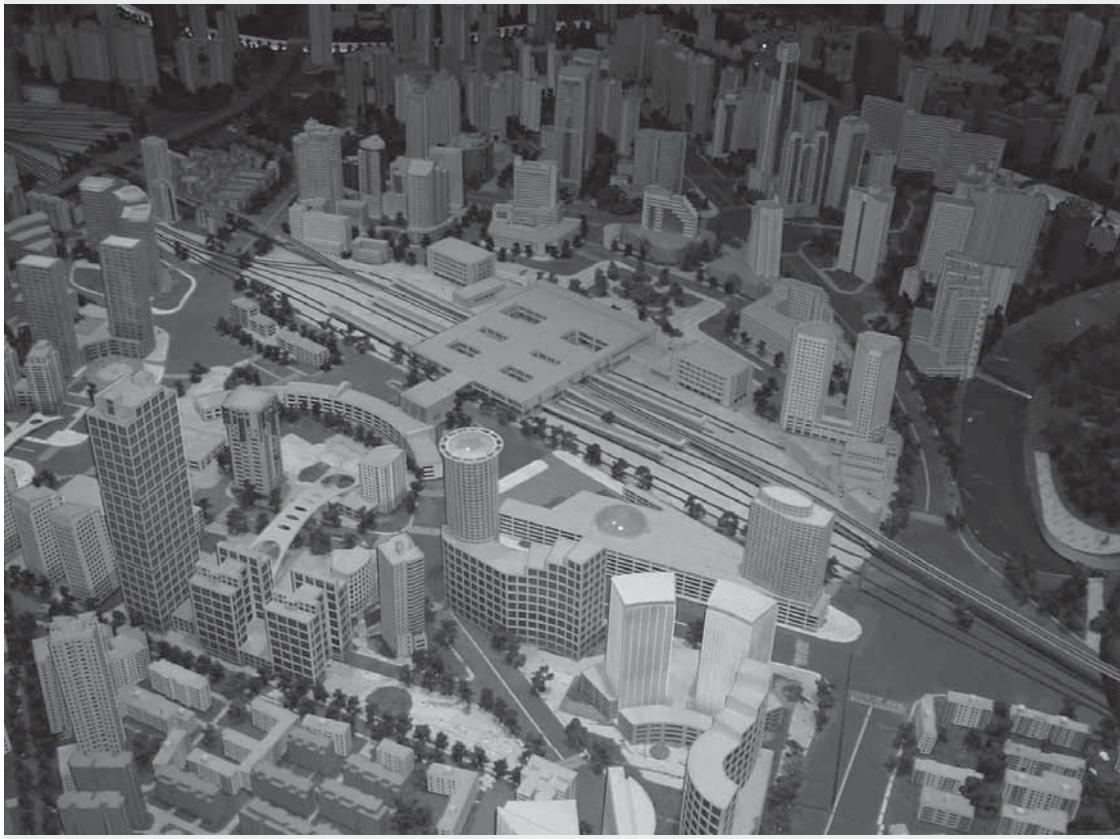
In designing urban intervention, the large number of social actors, the competitive economic scenario and connectivity and sustainability are among the significant aspects to take into account when formulating plans for a region. But often the real spatial effects of these kinds of large interventions on the urban liveability are unknown. This design application and evaluation shows that considering spatial analysis can open up new insights to the consequences of such urban interventions, which might otherwise not have been well considered in the process of decision making.

A planning practice which incorporates practical and robust procedures for dealing with networks layered by scale may go beyond the rather simple issues of accessibility and attraction to issues of the generation of social-spatial and economic-spatial forms in the city resulting from the interface between mobile populations at regional, city and local scales. The analysis of locations in these terms suggests not only ways of understanding the functional unevenness of the more traditional kinds of urban fabric, but also begins to suggest the principles by which new scales may be integrated with existing functional structures. It suggests also a different view of the problem of designing new centres - one which may recognise 'the local' as a condition rather than as a location and which may direct us to ways of making socially and economically dense and supportive environments.

In general, these design applications highlight the usefulness of the spatial framework in bringing possible future effects to light to help facilitate planning, thinking and discussion, and for generating future design alternatives.

Chapter seven
The Way Ahead





THE WAY AHEAD

7.1 CONCLUSION AND DISCUSSION

By obtaining a greater understanding of the internal dynamics and the contextual urban retail activities in the city, this empirical research has been able to advance our understanding of the spatial-commercial logic in the cities of Surabaya, Leiden and Delft. In the process, a spatial framework has been formulated, one which allows for heightened awareness of the influence of movement patterns, for a better understanding of the commercial distribution pattern in an urban space specifically around the railway station, and for a detailed knowledge of the location choice of retailers and firms in a range of scales.

While there exists extensive literature on location choice of economic activities, traditional theoretical approaches critically examined in this dissertation have been found deficient, in ways that analyzed merely from a planning point of view, especially from regional accessibility attractiveness. The role of a real urban space, where we experience our everyday life and which is inherited in the street pattern and in the location choice of retailers, is often neglected. In seeking to overcome this deficiency, I have turned to spatial approaches, which are recognized to give more attention to the capability of urban spatial patterns in producing the urban life, the urban movement and the socio-economic activities than previous approaches.

A number of important factors have been highlighted by this spatial approach. The first is the historical tracing of the movement layers. It became clear that in early settlements, the movement layers were overlapped each other and cannot easily be distinguished or separated, by scale, from each other – main spaces always belong to two or more movement layers. Often, early market towns emerged from the crossing of two or more regional routes. When the crossroads were heavily travelled, traders and peddlers started to aggregate on the same spaces and eventually built up or extended a new settlement. Those regional roads then started to grow and immerse to the other street networks of the settlement, in which three movement layers integrated and mingled with each other, creating a public space full of the bustle of people moving, buying and selling goods and services and interacting with each other. It is the relation between the regional and the local that generates urbanity. Over time, such a place became full of all kinds of urban socio-economic activities: from peddlers, artisans, hawkers to shops and other modern forms of consumption such as supermarkets and department stores. In the course of time, the local authorities and planners saw this 'buzz' often as

a problem (associating the urban buzz with chaos and congestion). Thus the planning authorities and traffic engineers decided, in an effort to organize the city, to rationalize the space of the city by separating and confining function and movement on different traffic conduits (Sennett, 1990; Marshall, 2005). They did this by putting the regional movement on highways, ring-roads and railways, and by putting the city-scale movement on special arteries separated from the local ones.

The problem with these modernist strategies has been the way they circumscribe both everyday actions as well as urban futures. This separation and isolation does not only result in the segregation of the movement types, but also in the segregation of the economic functions. The different economic functions, regardless of the scale and catchments areas, used to be found in one place, but are now often being separated. The regional economic functions moved out of town, as soon as the regional routes were moved out of the city. Meanwhile, the activities inside the city are only left with a local catchments area or at most a city-scale catchments area. Unfortunately, the planners went further, they applied a strict traffic hierarchy in town planning (see for example Ministry of Transport, 1963), which means total separation of all types of movement layers, which not only results in the separation of functions, but also gives rise to the mono-function and non-lively urban area (Read, Van Nes, 2003; Marshall, 2005).

In Surabaya this space rationalization has not taken place. On the one hand, the underdeveloped planning tradition, the regional political and economic situation limit the applicability of modern western planning and city engineering, in terms of building highways and ring roads to separate the movement and function. Thus, in spite of the fact that the city has grown to almost four million inhabitants, the old regional routes are still functioning at multi-scale levels, carrying regional movement and at the same time functioning as the city and local conveyors, creating a condition what we call a true urbanity, with lively, even 24-hour activities. On the other hand, they are causing chaos and congestion in many parts of the city.

7.2 COMMERCIAL ACTIVITIES IN A COMPLEX URBAN AREA

In order to understand the economic activities around a railway station area, it is first necessary to understand the commercial spatial logic of the city. The correlation of economic activity patterns with the urban movement was explored further in the case cities studied. In spite of different socio-economic and political settings (and consumption types), the retail and service firm distribution patterns follow the spatial logic of urban movement patterns. It is further confirmed that the urban buzz (i.e. commercial activities)

are significantly found on locations where two or more layers are well integrated. As is the case in Surabaya, most of the markets, which are among the most important economic institutions for the city, are located at the crossings of the old regional roads, which, nowadays, are also functioning as the city-scale movement conveyors. Therefore, those markets are not only serving the local inhabitants, but also reach out to other cities and villages. Meanwhile, in the cases of Leiden and Delft, the regional networks have been separated from the city and local networks. Thus, while the regional shopping areas are located outside the city in the vicinity of the regional network, the street-edge retail activities take place along the well embedded supergrid, where the city-scale networks meet and are well integrated with the local networks.

The clustering effects of retail activities are also highlighted in this study. As is the case in Delft and Surabaya, the clustering effects of commercial activities are often found in a location where there is a concentration of city-scale network, overlapped with an orthogonal and permeable local grid. It is a location where two or more city-scale spaces are connected with each other via a straightforward local grid (a ladder structure), providing intricate cross-use among the inhabitants of city neighbourhoods. Furthermore, as Jacobs (1961) and Siksna (1997) have suggested earlier the local grid should have a block size which is rather small or have frequent street connections to provide more potential façades for retailers to attract customers and to ensure a smooth and easy pedestrian movement to browse the merchandize, and to permit cross-use of the city neighbourhood between local inhabitants and strangers. Another advantage of the small urban block size is their large flexibility for different kinds of functions and increased resistance to economic crises (in fact almost similar to the market principle). Different owners and investors allow that the area is easily changed and modified for different kinds of functions. It offers more flexibility when dealing with space vacancies. As a whole, an urban area with small urban blocks provides greater resilience, because any number of separate retail units can fail without affecting the total urban system since their finances are entirely independent of each other. These then are several ways in which a multiple-unit retail system serves the needs of the economy more efficiently than a large-scale (shopping mall) block.

The results of this dissertation also rejected the myth that the oldness of the city is a measure for the liveability of the area. There is a high demand for retail space in the historical city centre in Leiden and Delft, however activities do not spread everywhere in the historical urban area. The retail activities are in fact only concentrated to areas where different layers of movement are merged and integrated (in Delft near the Market square, in Leiden along the river Rhine). The findings of this empirical analysis, the very surprising stability of commercial patterns over time and the non-intuitive link that

seems to exist between these patterns and local grid conditions, have confirmed that the spatial configuration is the main factor that influences the distribution pattern of retail, not the age of a certain urban area.

This research also suggested further that urban form is not a passive backdrop of retailing. Annually, many square meters are built and rebuilt for new shopping centre in the Netherlands, with the aim to attract more potential buyers. However, the number of visitors seems to have no correlation with the facilities provided by the new structures. In some places, a decrease in the number of visitors is experienced even after the (re-) building of a new shopping centre. Only during the first few years (5-10 years), a newly built shopping area has a high shop occupancy, but after that it will have more empty retail space than the existing shopping area in the city (Van der Hurk, 2005). Likewise it has been suggested in this thesis that the strategic location for retail and service firms in the city is influenced by the spatial configuration. Thus, it can be concluded that beautification intervention in itself will not attract the potential buyers to come. Rather the crucial factor is understanding the spatial commercial logic of the urban area which can assist both retailers with where to establish their retail outlets and urban designers with how to (re-)design the movement routes of potential buyers.

Hence it can be concluded that the understanding of the spatial logic opens up a new level of discussion in deliberations about complex urban regions. By providing a potentially strategically located place for commercial activities, it makes the performance of space and the urbanity a more predictable phenomenon that is related to urban movements and the geometry of the urban grid.

7.3 THE RAILWAY STATION IN A COMPLEX URBAN AREA

Railway station areas in a complex urban area are one of the places with a high potential for the integration of different scales of movement layers, since they represent the gate of the regional networks and have at the same time an opportunity to connect and integrate themselves into the city-scale network and local urban fabric. Nevertheless, if this potential is not well explored, by means of integrating the railway station more into the lower scale movement networks than the regional ones, the retail activities that we would expect to flock into this area would not be there. It is clear from the cases studied that the location of the station needs, in other words, to be systematically connected (through a well distributed network) to the city-scale network as well as to the local one (i.e. neighbourhood scale). So if the regional node is located in a well configured local

structure, then the local urban space has more possibilities to participate in the benefits of the high accessibility of the regional nodes.

Therefore I conclude that in designing an urban area around the railway station only the regional network is not enough to generate a vibrant urban place full of different kinds of commercial activities. Its attracting power is too limited and creates only one type of activity, the one that is oriented to regional scale only. This exploration by means of different case studies highlights the importance of *integrating a railway station into* different layers of movement (at least into the city- and the local scale networks) with small block sizes for a retail clustering effect, especially for urban-oriented stations.

7.4 CODA

In spite of the trends of out-of-town retailing and the increasing scale of the retail space (Tromp & Ploegmakers, 2005; Evers, Van Horn, & Van Oort, 2005; Brayé, 2005), I do believe that a spatially well integrated location in an urban area, not only around the station, can be a future central place. This is because a spatially integrated place will gentrify a liveable location in one or the other way, not only merely for retail activities, but also for different kinds of economic activities. It might be that in the near future the basic consumption would move to the periphery location or cyber space. However the convenient, enabling and lively place – the spaces in which we experience public life in cities - will always be wanted.

As is evident from Delft and Leiden, their central places have not changed since their establishment in the 12th century, even though the type of retailing (from street hawkers to internet shopping), the consumption, the society and the technology have undergone massive changes. Here, the central place in the urban area stays central, not because of its age (often it is assumed that a historical centre is alive because it is old), but because its spatial structure represents the spatial logic of a central place, a place that is produced by the many social encounters that make up daily life in the streets. Time moves on, the function and consumption can change, but the urban form is little affected by major changes in consumption (Glennie, 1998). The spatial structure has more or less stayed the same for centuries. The City of London is another good example. In spite of the fact that the shops have deserted this location since the last century, this area still represents a liveable central place. New post-modern functions such as banking, financial and legal institutions have squeezed long-established shops from many early modern shopping districts (Hanson, 1993; Glennie, 1998), and now together with its growing number of service employees, who live there and enjoy its

amenities such as cafés, restaurants, hotels, internet cafés, art galleries etc. So, even though the main function has changed from retail-oriented into more service-oriented, the City remained one of London's major commercial centres.

In an article for CNNmoney.com (2003), Sarah Max observed that the American regional shopping malls were in decline, while the nearby downtown shopping district was thriving. Americans are looking now for a sense of place, back to downtown, spending more of their free time in newly revived downtowns. Only when they want to do serious shopping, they head to upscale mega-malls and big-box stores such as Costco, Home Depot, even if it means driving a little farther. In a 2000 study, Price Water House Coopers found that 140 existing regional malls in America were already dying malls, while another 250 were heading in that direction (Price Waterhouse Coopers, 2001). In their effort to save their malls, many of these shopping mall owners are learning from successful high streets, trying to turn the malls inside out, break them up, and link them with city streets to the existing downtown (Max, 2003; Southworth, 2005). So if we design our city well, it is not necessary to be worried about the coming of the shopping mall. Our city can still provide a sense of place for 'a new middle class' to drink their Starbucks coffee, an urban setting where social interaction between the streetscapes and consumer cultures takes place (Smith, 1996), and for a creative economy, where quality, interaction and atmosphere become important conditions (Landry, 2000).

However, models are not a panacea. They cannot substitute for intelligent decision-making, nor can they incorporate the full complexity of real world problems. This model just gives us a better understanding in designing a liveable environment that is potentially attractive for commercial activities. It gives an indication of how you should create and recreate your city for commercial activities. The solutions will be diverse and the solutions are open-ended.

I hope this dissertation has provided a starting point to help drive our design imagination even further to create a design which is sustainable for the long term and to provide a flexible future in a changing globalization era.

BIBLIOGRAPHY

Alexander, C. (1966). A city is not a tree. *Design Magazine, 206*, 46-55.

Alonso, W. (1964). *Location and land use.* Harvard: Harvard University Press.

Alonso, W. (1975). Location theory. In J. Friedmann, & W. Alonso, (Eds.). *Regional Policy: Readings in theory and applications.* Cambridge, Mass: MIT Press.

Bach, B. (2006). *Urban design and traffic: A selection from Bach's toolbox* Ede: CROW.

Bakker, H.J.M. (1994). *Station locaties: Geschikt voor winkels?* [Station locations: Suitable for shops?]. Amsterdam: PR & Communicatie MBO.

Banister, D. (1995). *Transport and urban development.* London: E&FN Spon

Bertolini, L., & Spit, T. (1998). *Cities on rails: The redevelopment of railway station areas.* London: E&FN Spon.

Bertolini, L. (1999). Spatial development patterns and public transport: The application of an analytical model in the Netherlands. *Planning Practice and Research, 14* (2),199-210.

Bertolini, L., & Dijst, M. (2003). Mobility environments and networks cities. *Journal Urban Design, 8* (1), 27-43.

Bernick, M., & Cervero, R. (1997). *Transit Villages in the 21st century.* New York: Mc Graw-Hill.

Berry, B. J. L. (1967). G*eography of market centers and retail distribution.* Englewood Cliffs, NJ: Prentice-Hall, Inc.

Biro Pusat Statistik Kotamadya Surabaya. (2004). *Kotamadya Surabaya Dalam Angka 2003* [Surabaya in Figures 2003]. Surabaya: Author.

Blomley, N. (1996). 'I'd like to dress her all over', masculinity, power and retail space. In: N. Wrigley & M. Lowe (Eds.), *Retailing, consumption and capital, towards the new retail geography* (pp. 239-256). Essex, Harlow: Longman Group Limited.

Brayé, B. (2005). *Rijden met de handrem aan* [Driving with the brake]. Retrieved April 12, 2006, from http://www.locatus.nl

Budiarto, L., & Read, S.A. (2003). Human scales: Understanding places of centering and de-centering. In J. Hanson (Ed.), *Proceedings 4th International Space Syntax Symposium.* London: Pims UK Limited.

Busquets, J. (2003). *Presentation of Urban Design Plan 'Spoorzone Delft'.* Delft: Author.

Calthorpe, P. (1993) *The next American metropolis: Ecology, community, and the American dream.* New York: Princeton Architectural Press.

Carmona, M., Heath, T., Oc, T., & Tiesdell, S. (2003). *Public places, urban spaces: The dimension of urban design.* Oxford: Architectural Press.

Centraal Bureau voor de Statistiek. (2005). Statistic Netherlands. www.cbs.nl

Cervero, R., Ferrel, C., & Murphy, S. (2002). *Transit oriented development and joint development in the United States: A literature review.* TCRP Research Results Digest 52. Retrieved July 16, 2007, from http://www.trb.org/news/blurb_detail.asp?id=973

Christopherson, S. (2004). [Reviews of the book Reading retail: A geographical perspective on retailing and consumption spaces]. *Environment and Plannning A, 36*, 375-376.

Connexxion. (2002). *Regiokaart lijnen openbaar vervoer: Rijn- & Bollenstreek/Leiden.* [Regional map public transportkation: Rijn- & Bollenstreek/Leiden]. Amsterdam: Carto Studio.

Dasselaar, A. (2004). *Winkel in de etalage: Een analyse van langdurige leegstand in de Nederlandse hoofdwinkelgebieden* [Shop on show case: an analysis of long term vacant space in the Dutch main shopping areas]. Master's thesis, Rijksuniversiteit Groningen, Faculteit der Ruimtelijke Wetenschappen, Groningen, the Netherlands.

De Boer, N. (1996). *De Randstad bestaat niet* [Randstad does not exist]. Rotterdam: NAi Uitgevers.

De Bont, C. (2000). *Delfts water: Tweeduizend jaar bewoning door waterbaheer in het Delftse* [Delft's water : Two thousand years of habitation and water management in and around Delft]. Delft: IHE/Walburg Press.

De Vries, J. (1981). *Barges and capitalism: Passenger transportation in the Dutch economy, 1632-1839*. Utrecht: H&S Publisher.

Den Heijer, I. (2003). *Spoorzone Delft* [Brochure Prorail]. Waddinxveen: Connect Communications BV.

Departemen Perhubungan Republik Indonesia. (2005). *Statistik Perhubungan* [Transportation Statistic]. Retrieved May 27, 2005, from http://www.dephub.go.id/

Dewar, D., & Watson, V. (1990). *Urban markets: Developing informal retailing*. London: Routledge.

Dewey, A. G. (1962). *Peasant marketing in Java*. New York: The Free Press of Glencoe.

DHV Consultants BV & PT. Tritunggal Konsultan. (1999). *Final report: Surabaya Urban Development Policy 2018*. Surabaya: Pemerintah Kotamadya daerah tingkat II Surabaya.

Dick, H.W. (2002). *Surabaya city of work: A socioeconomic history, 1900-2000*. Ohio: Ohio University Press.

Dickinson, R.E. (1947). *City region and regionalism: A geographical contribution to human ecology.* London: Kegan Paul, Trench, Trubner.

Dittmar, H., & Ohland, G. (Eds.). (2004). *The new transit town: Best practices in Transit-oriented Development*. Washington DC: Island Press.

Droogh Trommelen Broekhuis bv. (2004). *Leiden: Detailhandelsstructuurvisie* [Leiden: Vision on retail structure]. Nijmegen: Author.

Evers, D., Van Hoorn, A., & Van Oort, F. (2005). *Winkelen in Megaland* [Shopping in Megaland]. Rotterdam/Den Haag: NAi Uitgevers/RPB.

Fasseur, C. (1975). *Kultuurstelsel en koloniale baten; de Nederlandse exploitatie van Java 1840-1860* [Cultivation system and colonial avail: The Dutch exploitation of Java 1840-1860]. Leiden: Universitaire Pers Leiden.

Foster, N. (2001). *Foster Catalogue 2001*. Munich: Prestel Verlag.

Frieling, D.H. (2003). From Randstad to Delta Metropolis. In Eldijk, J., Read, S., & Rosemann, J., (Eds.), *Future City*. London: Routledge.

Fujita, M., Krugman, P.R., & Venables, A.J. (Eds.). *The spatial economy: Cities, region and international trade*. Cambridge, MA.: MIT Press.

Geertz, C. (1963). *Peddlers and princess: Social change and economic modernization in two Indonesian towns*. Chicago: The University of Chicago Press.

Gemeenterarchief Delft & Gemeentemusea. (1996). *Ach lieve tijd Delft, 750 jaar Delftnaren en hun rijke verleden* [O dear old Delft, 750 years of the people of Delft and their rich past]. Zwolle: Waanders uitgevers.

Gemeente Delft. (2002a). [Number of bicycles in Delft, November 2002]. Unpublished raw data.

Gemeente Delft. (2002b). *Statistisch Jaarboek Delft 2002* [Statistical year book of Delft 2002]. Delft: Author.

Gemeente Delft. (2003a). *Delftse economie in beeld 2003* [Delft's economics in 2003]. Retrieved April 21, 2004, from http://www.gemeentedelft.info/

Gemeente Delft. (2003b). *Masterplan spoorzone* [Masterplan railway zone]. Delft: Author.

Gemeente Delft. (2005). *Kerncijfers* [Key Figures]. Retrieved January 23, 2006, from http://www.gemeentedelft.info/

Gemeente Leiden. (2005a). *Statistisch Jaarboek Leiden 2005* [Statistical year book of Leiden 2005]. Leiden: Author.

Gemeente Leiden. (2005b). *Leiden langs de meetlat: Trein reizigers*. [Leiden along the measuring rod: Train passengers]. Retrieved January 28, 2006, from http://www.leiden.nl

Ghosh, A., & Mc Lafferty, S.L. (1987). *Location strategies for retail and service firms*. Massachusetts: D.C. Heath and Company.

Glennie, P.D. & Thrift, N.J. (1996). Consumers, identities, and consumption spaces in early-modern England. *Environment and Planning A,* 28, 25-45.

Glennie, P. D. (1998). Consumption, consumerism and urban form: historical perspectives. *Urban studies*, *35* (5-6), 927-951.

Goudappel Coffeng & Intomart GfK (2005). *Koopstromenonderzoek Randstad 2004*. [Research on sale streams in the Randstad 2004]. Retrieved February 25, 2005, from http://www.kso2004.nl.

Groenemeijer, L. (2001). *Naar ontwerp voor de deltametropool* [To the design of Deltametropolis]. Delft: ABF-Strategie.

Groenemeijer, L.M.G., & Van Bakel, M. (2001). *Naar een ontwerp voor de Deltametropool: Een betere programmatische benutting van infrastructurele investeringen* [Towards a design of Deltametropolis: A better programmed exploitation of infrastructural investments]. Delft: ABF-Strategie.

Hanson, J. & Hillier, B. (1993). City of London: Shape and role. *Urban design group quarterly,48,* 8-13.

Hanson, J. (2003). *Proceedings 4th International Space Syntax Symposium*. London: Pims UK Limited.

Hanson, S.E. (1997). *Ten Geographic Ideas that changed the world.* New Brunswick: Rutgers University Press.

Hess, P.M., Moudon, A.V., Snyder, M.C., & Stanilov, K. (1999). *Site Design and Pedestrian travel*. (Transportation Research Record 1674). Retrieved January 2, 2003, from http://www.enhancements.org.

Hillier, B., & Hanson, J. (1984). *The social logic of space*. Cambridge: Cambridge University Press.

Hillier, B., Burdett, R., Peponis, J., & Penn, A. (1987). Creating Life: Or does architecture determine anything. *Architecture and Compartement/Architecture and Behaviour*, *3* (3), 233-250.

Hillier, B. (1988). Against Enclosure. In N. Teymur, T. Markus & T. Wooley (Eds.). *Rehumanizing Housing* (pp. 63-88). London: Butterworths.

Hillier, B. (1996). Cities as movement economies. *Urban Design International*, *1* (1), 41-60.

Hillier, B. & Penn, A. (2004). Rejoinder to Carlo Ratti. *Environment and Planning B, 31,* 501-511.

Hillier, B., Penn, A., Hanson, J., Grajewski, T., & Xu, J. (1993). Natural movement, or: Configuration and attraction in urban pedestrian movement. *Environment and Planning B, 20* (1), 29-66.

Hotelling, H. (1929). Stability in competion. *Economic Journal, 39*, 41-57

Informasi Pemerintah Kota Surabaya. (n.d.). *Surabaya - Land use map*. Retrieved December 1, 2004, from http://www.surabaya.go.id.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House.

Jacobs, M. (2000). *Multinodal Urban Structures: A comparative analysis and strategies for design*. Delft: Delft University Press.

Kaartenkamer Bouwkunde …….Delft 1898

Keputran Riwayatmu Kini [The fate of Keputran]. (2006, February 26). *Kompas*. Retrieved December 20, 2006, from http://www.kompas.com.

Koolhaas, R. (1993). TGV-station, Lile. In S. Gall, R. Bijhouwer, J. D. Hoekstra, & J. Geuskens [Eds.], *Stedebouw in beweging* [Urbanism on the move]. Rotterdam: Uitgeverij 010.

Koper, A. (2003, June 23). Hoog Catherijne: zowel success als ramp [Hoog Catherijne: both success and disaster]. *Volkskrant*. Retrieved May 22, 2006, from http://www.volkskrant.nl.

Kusumo, C., & Read, S.A. (2003). Building on geometries of intelligibility: Planning the Leiden region as a layered movement fabric. In J. Hanson (Ed.), *Proceedings 4th International Space Syntax Symposium*. London: Pims UK Limited.

Krings, U. (1985). Bahnhofarchitecktur: Deutsche Grossstadtbahnhöfe des historismus. [Architecture of stations: German metropolitan stations of the historicism]. Munich: Prestel.

Landry, C. (2000). *The creative city: A toolkit for urban innovators*. London: Earthscan Publications Ltd.

Lilananda, R. P. (1997). *Transformasi Pasar Tradisional di Perkotaan di Surabaya* [Transformation of traditional markets in Surabaya]. Surabaya: Universitas Kristen Petra.

Locatus. (2005). *Retail handboek 2005: Kerngetallen voor de detailhandel* [Retail handbook 2005: Key figures for retailing]. Den Haag: SDU Uitgevers.

Lugt, R. van der., & Spangeberg, F. (1980). *De wereld van het station* [The world of the station]. Delft: Stichting wonen.

Lynch, K. (1960). *The image of the city*. Cambridge, Mass.: MIT Press.

Mai,U. (1984). Small-town markets and the urban economy in kabupaten Minahasa. *Indonesia Journal, 37*, 49-58

Marshall, S. (2005). *Streets and patterns*. London: Spon Press.

Max, S. (2003, July 24). *Malls: death of American icons*. Retrieved February, 2006 from www.CNNmoney.com.

Microsoft Encarta Online Encyclopaedia 1997-2006. Central Place Theory. Retrieved September 22, 2006, from http://uk.encarta.msn.com/media_121644615_781533898_-1_1/Central_Place_Theory.html.

Ministry of Housing, Physical Planning and Environment. (1991). *Fourth Report (EXTRA) on physical planning in the Netherlands*. Den Haag: Ministry VROM.

Ministry of Housing, Physical Planning and Environment. (2001). *Fifth report on physical planning in the Netherlands*. Den Haag: Ministry VROM.

Ministry of Transport, Steering Group and Working Group. (1963). *Traffic in Towns: A study of the long term problems of traffic in urban areas*. London: HMSO .

Moudon, A.V. (1986). *Built for change: neighbourhood architecture in San Francisco*. Cambridge Mass: MIT Press.

Mulders-Kusumo, C. & Van den Berg, K. (2006). *Het atelier kijkt terug: procesbeschrijving ontwerpatelier As Leiden Katwijk*. Delft/Leiden: Author.

Museum voor Communicatie. (2006). *Trekschuit, aquatint C.C. Fuchs, ca. 1810* [Barges: aquatint C.C. Fuchs, around 1810]. Retrieved August 4, 2006, from http://www.muscom.nl/collecties/inhoud/artikel/141.htm.

Nederlandse Spoorwegen. (2006). *Welkom in de trein: Alles over treinreizen.* [Welcome to the train: Everything about train journeys]. Retrieved September 29, 2006, from http://www.ns.nl.

Nederlands Spoorwegmuseum. (2003). *Scriptiepakket.* [Thesis package]. Retrieved July 28, 2003, from www.spoorwegmuseum.nl.

Paksukcharern, K. (2003) Node and place: The spatial embedding strategy in railway terminus area redevelopment. In J. Hanson (Ed.), *Proceedings 4th International Space Syntax Symposium*. London: Pims UK Limited.

Pasar Induk yang mengundang kontroversi [The controversions around the main market]. (2004, October 27). *Koran Tempo*. Retrieved March 26, 2007, from http://www.korantempo.com/news/2004/10/27/Nusa/35.html

Pasar-pasar tradisional yang mampu bertahan [The traditional markets that survive]. (2004, June 28). *Kompas edisi Jawa Timur*, p. P.

Pemerintah Kotamadya Daerah Tingkat II Surabaya (1994). *Rencana Tata Ruang Wilayah Kotamadya Daerah Tingkat II Surabaya 2005.* [City Planning of Surabaya 2005]. Surabaya: Author.

Pemerintah Kotamadya Surabaya (2005). *Pasar Induk Keputran Baru.Operasi tahun 2006* [The new Keputran main market will be operated in 2006]. Retrieved March 26, 2007, from http://www.surabaya.go.id

Peponis, J., Hadjinikolaou, E., Lieratos, C., & Fatouros, D.A. (1989). The Spatial core of urban culture. *Ekistics 56* (334-335), 43-55.

Pinilla, C., & Read, S.A. (2006). *Visualizing the invisible: Towards an urban space.* Amsterdam: TechnePress.

Port Administrator of Tanjung Perak. (n.d.). *Passengers traffic 2000-2004.* Retrieved November 21, 2005, from http://tgperak.pp3.co.id.

Price Water House Coopers. (2001). *Greyfield Regional Mall Study.* Retrieved October 10, 2006, from http://www.cnu.org/sites/files/Greyfield_Feb_01.pdf

Provincie Zuid Holland (2002). *Tussen groen hart en Noordzee: Strategische inrichtingsvisie Leiden – Katwijk – Noordwijk*. [Between green heart and North Sea: Strategic design vision on Leiden – Katwijk – Noordwijk]. (Planning document).

Provincie Zuid Holland, Directie Ruimte en Mobiliteit. (2004). *Provinciale ruimtelijke structuurvisie Zuid-Holland 2020.* [Provincial vision on spatial structure South Holland 2020]. Den Haag: Provincie Zuid-Holland.

Ratti, C. (2004). Space Syntax: Some inconsistencies. *Environment and Planning B, 31*, 487-499.

Raue, J.J. (1982). *De stad Delft: Vorming en ruimtelijke ontwikkeling in de late Middeleeuwen. Interpretatie van 25 jaar binnenstadonderzoek.* [The city of Delft: Formation and spatial development in the late Middle Ages. Interpretation of 25 years of investigation of the inner city]. Delft: DUP

Read, S.A. (1996). *Function of Urban Pattern, Pattern of Urban Function*. Delft: Publicatieburo Bouwkunde, Delft University of Technology.

Read, S.A. (1999). Space Syntax and the Dutch city. *Environment and Planning B: Planning and Design*, 26, 251-264.

Read, S. A. (2000a). *The patchwork landscape and the engendineered web: space and scale in the Dutch city*. Retrieved February 1, 2004, from http://www.spacelab.tudelft.nl/publications/publications.html.

Read, S.A. (2000b) Space movement and scale in the Dutch city. In A. Nieuwenhuis & M. Van Ouwerkerk (Eds.), *Proceedings of Research by Design conference in Delft University of Technology*. Delft: DUP Satellite.

Read, S. A. (2001). Thick Urban Space: shape, scale and the articulation of 'the urban' in an inner-city neighbourhood of Amsterdam. In J. Peponis, J. Wineman & S. Bafna (Eds.), *Procedings of International Space Syntax 3rd Symposium in Georgia Institute of Technology, Atlanta*.

Read, S.A. (2002). Learning from Amsterdam, axes and centers in the dynamic city. In M.I. Carmona & M. Schoonraad (Eds.), *Globalization urban form & governance 6* (pp. 227-256). Delft: DUP Science.

Romkema, S.A., Uitzetter, D.J.M., & Verkennis, A. W. (1994). *Werken aan het spoor: De ruimtelijk-economische ontwikkeling van stationslocaties in zes middelgrote steden: Eindrapport* [Working on the railway: The spatial-economical development of station locations in six medium-sized cities: Final report]. Rotterdam: Nederlands Economisch Instituut.

Sassen, S. (2001). *The Global City: New York, London, Tokyo*. Princeton: Princeton University Press.

Schmal, H. (2003). Cities and railways in the Netherlands between 1839 and 1860. In R. Roth & M.N. Polino (Eds.), *The city and the railway in Europe*. Abingdon: Ashgate.

Schofield, J. W. (2000). *Increasing the generalizability of qualitative research in case study method*. In R. Gomm, M. Hammersley, & P. Foster (Eds.). *Case Study Method*. London: Sage.

Sennet, R. (1990). *The conscience of the eye: The design and social life of cities*. New York: Norton.

Siksna, S. (1998). City centre blocks and their evolution: a comparative study of eight American and Australian CBDs. *Journal of Urban Design, 3* (3), 253-283.

Smith, M. D. (1996). *The empire filter back: Consumption, production and the politics of Starbucks coffee*. *Urban Geography, 17* (6), 502-524.

Smulders, M. (2002). *Project Deltametropol*. Master's thesis, Delft University of Techonology, Delft, the Netherlands.

Southworth, M. (2005). Reinventing main street: From mall to townscape mall. In *Journal of Urban Design, 10* (2), 151-170.

Spek, S.C. (2002). *Connectors: the way beyond transferring*. Delft: DUP Science.

Stec Groep BV. (2003). *Bussiness-operations of foreign companies in West-Holland.* Retrieved May 31, 2005, from http://www.wfia.nl.

Takes, Ch.A.P. (1948). *Bevolkingscentra in het oude en het nieuwe land: Een onderzoek naar verspreiding en functie van een aantal nederzettingen in enkele Nederlandse gebieden, ten einde inzicht te verkrijgen in de behoefte aan bevolkingscentra in de toekomstige zuidelijke Ijsselmeerpolders* [Population centres in the old and the new land: An investigation into distribution and function of a number of settlements in several Dutch areas, in order to obtain insight in the need for population centres in the future southern Ijsselmeer polders]. Alphen aan den Rijn: N.Samsom N.V.

Topographische Dienst. (1925). *Soerabaja en omstreken.* [Surabaya and surroundings]. Retrieved on September 15, 2006, from http://maps.kit.nl.

Tromp, J., & Ploegmakers, I. (2005). *De opmars van grootschalige detailhandel.* [The coming on of large-scale retailing]. Retrieved December 20, 2005, from http://www.jll.nl.

University of Texas Library (n.d.). *Map of Surabaya*. Retrieved June 8, 2004, from http://www.lib.utexas.edu/maps/world_cities/surabaya.jpg.

Urban Poor Linkage Indonesia. (2005, August 29). *Pedagang kecil jadi korban pembangunan pasar* [Petty traders, the victims of the market development]. Retrieved August 31, 2006, from http://www.uplink.co.id.

Vákár, L.I., & Snijder, H.H. (2001). Railway station structures designed for densely populated urban areas. *Structural Engineering International, 11* (2), 128-138.

Van Brussel, J., Daalhuizen, F., Eck, J.R. van, Van Oort, F., & Raspe, O. (2006). *Vele steden maken nog geen Randstad* [Many cities do not necessarily make a Randstad]. Rotterdam/Den Haag: Nai Uitgevers/RPB.

Van der Hurk, M. (2005). *Nieuwbouwontwikkeling in bestaande winkelgebieden en de invloed daarvan op bezoekers en passantenstromen* [Development of new housing estate in existing shopping areas and its influence on visitors and passers-by streams]. Woerden: Locatus BV.

Van Nes, A. (2002). *Road building and uban change:The effect of ring roads on the dispersal of shop and retail in Western European towns and cities.* Doctoral thesis, Agricultural University of Norway, Department of Land Use and Landscape Planning, Oslo, Norway.

Van Oerle, H.A. (1974). *Leiden: Een multidiciplinaire benadering van het process der stadwording en de ontwikkeling van het oudste stadsgebied in de Middeleeuwen* [Leiden: A multidisciplinary approach of the process of becoming a city and the development of the oldest city quarter in the Middle Ages]. Leiden: E.J. Brill.

Von Faber, G.H. (1906*). Oud Soerabaia : de geschiedenis van Indië's eerste koopstad van de oudste tijden tot de instelling van den Gemeenteraad* [Old Surabaya: The history of Indonesia's premier commercial city from the oldest times to the inauguration of the Municipal Council]. Surabaya: Kolff & Co.

Von Gerkan, M. (1996). *Renaissance der Bahnhöfe: Die Stadt im 21. Jahrhundert* [Renaissance of the train stations: the city in the 21st century]. Braunschweig: Vieweg.

Warga Segel Pintu Masuk Proyek Pasar Induk Keputran [Residents blocked the entrance of Keputran market]**.** (2004, November 29). *Koran Tempo*. Retrieved March 26, 2007, from http://www.korantempo.com/news/2004/11/29/Nusa/30.html.

Weterings, E.J., & Vlist, E.v.d. (1996). *Negen eeuwen markt in Leiden.* Leiden: Drukkerij Groen, B.V.

Wiyana, D., & Kartini, S. (2005, February 16). Jumlah penumpang kereta api tinggal 50 persen [The number of train passengers decreases to 50%]. *Tempo Interaktif.* Retrieved February 16, 2005, from http://www.tempointeraktif.com.

Yossihara, A., Suharsiningsih, A., & Ambrosius, H.M. (2004, June 28). Peta jalanan kereta api dalam kota Surabaya [Railway networks in Surabaya in 1958].*Kompas,* p. O.

Zuidvleugelbureau. (2003). *De Stedenbaan.* Den Haag: Provincie Zuid-Holland.

Zwart, A.H. (2003). *Regionale structuurvisie detailhandel REO Rijn-en Bollenstreek: Beleid 2003-2010* [Regional vision on retail structure REO Rijn- and Bollenstreek: Policy 2003-2010]. Bussum: Marktplan Adviesgroep.

Zukin, S. (1995). *The Cultures of Cities*. Cambridge: Blackwell.

ACKNOWLEDGEMENTS

I am enormously indebt to God for His mercy and grace that have led me to start and to finalize this thesis. He was, is and will always be the faithful One. Thank you!

I would like to thank my promotors Prof. Dirk Frieling, Prof. Joost Schrijnen and my supervisor dr. Stephen Read, for the opportunity to carry out this research, for the freedom to work on a subject of my interest and for the fruitful discussions and debates all these years. Thank you for your guidance and generous support. Special thanks go also to the members of PhD commissions Prof. Mike Batty, Prof. Joan Busquets, Prof. Jurgen Rosemann and dr. Luca Bertolini.

This dissertation has taken shape in the Department of Urbanism, Faculty of Architecture, Delft University of Technology. My gratitude there goes to my researcher colleagues and students for their valuable ideas, support and friendship. Particular thanks to those whom I directly worked with: Camila, Camilo, Sari, Roberto, Anna Maria and many others. Thanks for your contributions guys, our exchange of ideas and nice lunches together!

Special thanks also to the people with whom I had formal and informal conversations in Delft: Edith Bijleveld, Wim Weve, Wilke Ruiter; Leiden: Dirk Halfwerk, Willem van der Poel, Hans Reijnen; and Surabaya: p. Han, p. Benny, p. Timoticin, b. Joyce; and many others who were kind enough to spare the time to talk and to help me gathering my data, and who provided me with many valuable information and (unpublished) reports. I can't mention your names one by one, but many, many thanks to you all!

I would like to thank my pastors and the congregation of Full Gospel Mission Church, for your prayers and unfailing encouragement, which have supported me a lot in the last few years in finishing up my thesis.

I would express my sincere gratitude to my family: my mother, my sisters and brother, for their unconditional support and encouragement on my decision and giving me the opportunity to study abroad and develop myself. Last but not least, I would specially thank my husband Frans, for his love, understanding, encouragement, support, patience and his constant companionship in every circumstance I faced, especially during the last stages of this work. Thanks' a lot you are great!

Camelia Kusumo
September 26, 2007

BIOGRAPHY

Camelia Kusumo was born on the 8th of September 1973 in Surabaya, Indonesia. She attended the high school Sekolah Menengah Atas Negeri 5 Surabaya. After her graduation from high school in 1992, she studied architecture at Petra Christian University in Surabaya and obtained her Bachelor of Science degree in 1996. After gaining experience in architecture and engineering offices for a year, she worked as a lecturer at the Department of Architecture of Petra Christian University.

The interest to study further and the grace of God have brought her to the Netherlands in the summer of 1999, where she joined the Master of Science International Course at the Faculty of Architecture, Delft University of Technology. In 2001 she obtained her Master of Science degree from the Department of Urbanism of the faculty on the topic of Renewal and Redesign of City Areas.

In March 2002 she joined the Department of Urbanism of Delft University of Technology as a PhD student, to start the research that culminates in this thesis.

Currently she is employed at Advin BV in the Netherlands as an advisor in project management.