

SUSTAINABLE NON-MOTORISED TRANSPORT COMPARING SOUTH AFRICA AND THE NETHERLANDS

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ABSTRACT

Governments are beginning to realize the importance of non-motorised transportation as part of the overall transport network. They have identified omissions in their respective transport systems and plan to rectify accordingly. SSI, together with their Dutch partner DHV, has developed a systematic, easy-to-implement approach to develop sustainable NMT networks. This paper describes the approach, based on successful Dutch and South African experiences.

The approach consists of the following steps:

1. Identify and profile target user group needs in terms of requirements and constraints.
2. Understand the area in terms of demographic, spatial and geographical layout, origins and destinations, weather conditions, etc.
3. Develop a desired NMT network linking the information identified above.
4. Develop a sustainable network by optimally fusing the desired and existing networks.

This paper discusses NMT networks and compares South African conditions with experience in The Netherlands where NMT is a successful means of safe transportation. The intention is to highlight the differences in conditions, success factors, as well as adaptability of this approach towards the creation of sustainable NMT systems in South Africa.

This paper concludes that South Africa has many opportunities to improve facilities for NMT. The following three are expected to be the most meaningful during the planning stages for the implementation of NMT:

- During new development planning.
- Incorporation in rehabilitation projects.
- In identifying NMT networks.

The challenges are there and the approach that has been developed can be used as a guideline.

INTRODUCTION

Non-motorised Transport (NMT) includes all forms of travel that do not rely on an engine or motor for movement. This includes walking, cycling, rickshaws, animal-drawn carts and rollerblading or skating. NMT is typically a part of all trips made (you get out of your car or off your bus at some point of a journey and walk) and everyone uses it. The importance of Non-Motorised Transport can be summarised as follows:

NMT is safe to other road users.
NMT is environmental friendly.
NMT is generally space efficient.
NMT is cheap.

In most South African Transport Plans, however, there is little or no consideration given to NMT. As an example, the Durban Integrated Transport Plan (Durban, 2005) commits 2 pages whereas 'Verkeersplan Breda' (a Dutch integrated transport plan) (Gemeente Breda, 2002) dedicates 20

pages to NMT. The allocation of funds to NMT shows a similar situation. In Breda approximately 10% of the traffic and transportation-budget is spent on NMT, in Durban there are no NMT projects in the project list. When comparing the objectives of the ITP's and the awareness of the benefits of NMT to economical as well as social development, South Africa and The Netherlands seem to agree. Both ITP's describe the fact that NMT is environmentally friendly, increases quality of life, improves health, is economically beneficial and improves the chances of a sustainable, operational transport system in the long run.

So where do the funding differences described above come from? Is it the climate? The perception of NMT? The culture? These questions lead to the fundamental issue: How can the successes of NMT policy on a municipal level of The Netherlands be applied to South Africa? SSI, together with their Dutch partner DHV, has developed a systematic, easy-to-implement approach for developing sustainable NMT networks. This approach consists of orderly planning for NMT network, the steps to be taken to develop a NMT plan are:

1. User groups needs in terms of requirements and constraints.
2. Areas in terms of demographic, spatial and geographical layout, origins and destinations, weather conditions, etc.
3. The desired NMT network linking the structures identified above.
4. Develop a sustainable network by optimally fusing the desired and existing networks.

This paper describes the steps in more detail as they are applied in the Msunduzi Municipality. Although the project is still work in progress, the first results are promising and worthwhile sharing. Even the best plan or policy by itself will not make people cycle or walk. Communication with and involvement of the community are equally important. These aspects are described in addition to the four step approach, in section 3 of this paper.

This paper finishes with a conclusion identifying in which way the strengths and successes from The Netherlands can be translated into opportunities for NMT in South Africa.

Table 1: NMT User groups

Type	Recreation / commuting	Sub types		Objective	Requirements / constraints
Pedestrians	Recreation	Children Disabled Elderly Adults		Play Enjoy Enjoy Enjoy	Short distance, no awareness of danger, need safe environment No steep hills, natural guiding, rest points Short distance, no steep hills, rest points Circular route
	Commuting	Children Adolescents Adults (incl. disabled)		School (junior) School (high) Work Shop	No awareness of danger Distances get bigger
Cyclist	Recreation	Children Elderly Adults		Learn, Play Enjoy Enjoy Social	No awareness of danger=> need safe environment
	Commuting	Children Adolescents Adults		School (junior) School (high) Work Shop	No awareness of danger Distances get bigger
Animal moved vehicles	Recreation	Horse-drawn		Enjoy	Nice surroundings
	Commuting	Horse-drawn		Work, social	Limited space
Man moved vehicles	Recreation	Rickshaws		Enjoy	Go to restaurant, hotel
	Commuting			Work, shop	
Skaters/ rollerblading / Scooters	Recreation			Enjoy	Flat surface, high speed by user compared to pedestrian.

THE PROCESS OF PLANNING

The process of planning involves four steps, identifying in turn; the user groups; the context or area in which the planning will take place, the desired NMT network and finally translating the desired NMT network to projects.

Step 1: User groups needs in terms of requirements and constraints.

NMT consists of all the modes of transport without an engine or motor, which can include a broad group of users. NMT includes walking, cycling, rickshaws, animal- and hand-drawn carts and rollerblading or roller-skating. Some of the activities are for recreation purposes and some are for commuting purposes.

Table 1 provides a breakdown of the user groups, their purpose and their requirements and constraints. Every NMT-plan requires a careful consideration of the groups important to the area. User groups can vary according to location. One way to specify NMT users is: captive or non-captive. Captives are the people that can only use NMT; they have no other available options. Non-captives are people that consciously choose to use NMT instead of using other modes of transport available to them. The requirements and constraints vary in each situation.

The mode of transport to school in The Netherlands is mainly bicycles whereas in KwaZulu-Natal it is walking. The different modes of transport used to travel from and to school are shown in table 2. It is very possible that the high percentage of walking in KZN is caused by the captives (people don't have a alternative mode of transport available)

Table 2: Travel mode to educational centres in KwaZulu-Natal and in The Netherlands

Modes	Train	Bus	Taxi	Car	Walk	Bicycle	other
KwaZulu-Natal	0,4	4,5	8,3	6,8	79,0		1,0
The Netherlands	6,9	6,9		17,4	17,2	48,3	3,4

A discussion with other planning professionals, politicians and the public will provide a complete (or as complete as possible) overview of the user groups for the study area and the related constraints and requirements.

Comparing to The Netherlands

User groups in South Africa are different from that in The Netherlands. In South Africa the man and animal powered vehicles are more prevalent. In The Netherlands skaters, rollerblades and scooters will also be used by commuters in addition to their recreational usage.

The biggest differences, however, are the number of cyclists on the road in The Netherlands and that everyone is willing to ride a bicycle. So there is no need to explain to other road users what a cyclist can or can't do. As a result there is no need to explain their importance to politicians, to the police, to planners, to traffic engineers and other road users.

Step 2: Understand the area

Understanding the area in terms of demographic, spatial and geographical layout, origins and destinations, weather conditions, etc. is of paramount importance.

The study area distinguishes the challenges and obstacles while developing a NMT network. By identifying these characteristics, optimizing the area for NMT purposes will be easier. Based on the users groups and maps of the area the following characteristics can be identified:

- Demographics (age groups, density, etc)
- Geographical layout (hills, flats, major rivers, oceans, etc)

- Spatial layout (main origins and destinations, residential areas, schools, hospitals, industrial areas etc)
- Weather conditions (temperature, humidity, rain, mist, etc)

All these characteristics need to be captured on maps or as a feature in a table. This will result in further identification of the most likely areas and links for NMT-use and also obstacles in the study area limiting NMT-use.

Comparing to The Netherlands

The demographics: the density of people is higher; the average for The Netherlands is 484 people per km² whereas KwaZulu-Natal has an average density of 102 people per km². In Rotterdam (a city compatible with Durban) there are 1 986 people per km², in Durban (eThekweni Municipality) the density is 1 400 per km².

The relatively short distances between residential and business areas, combined with the density in The Netherlands results in a majority of trips below 5 km (which translates to 25 min cycling). It's very rare that children in The Netherlands live more than 2 km from their primary school. Even in the case of high schools, most pupils live within a 5 km distance from the school.

The regional function of Pietermaritzburg in South Africa and Breda in The Netherlands, are comparable. Both have a university, hospitals and retail with a regional catchment area. The pictures show both cities on the same scale. For Pietermaritzburg it shows only the CBD and most of the city area (6 times bigger) is not shown, whereas for Breda about half of the city and the CBD is shown.



Photo 1 and 2: showing Pietermaritzburg (left) and Breda and indicating their CBD's to the same scale.

A big difference in KwaZulu Natal is the presence of fencing of residential areas and estates or other. This results in barriers for all traffic, but has the largest impact on NMT, because a direct short route is not always available.

The security aspects of NMT in The Netherlands is increased by people being able to see the street from their window; the layout of the houses and offices next to a major bike lane support that purpose.

Step 3: Develop the desired NMT Network linking the information from Steps 1 and 2.

Based on how the first two steps identify the user groups and the characteristics of the area, a desired network can be developed. People don't just walk around. The different groups use the roads and routes that lead them to their destination or satisfy their recreational needs.

Pedestrians

For pedestrians there is no real network compared to a network for cars and bicycles. Pedestrians will always walk the shortest safe route between two points. They move on certain links, but are more

likely to scatter around the destination. For example; people at a bus stop or in a railway station. So pedestrians need areas where they can move freely and need clear links between high volume destinations.

Main requirements of pedestrian areas are:

- **Attractiveness:** the infrastructure is designed and fits into the surroundings in such a way that walking is appealing.
- **Safety, traffic:** the pedestrian infrastructure guarantees the safety of the pedestrian and other users.
- **Security:** the pedestrian infrastructure is surrounded by an area guaranteeing the security of the users.
- **Comfort:** delays and nuisances caused by barriers and bottlenecks (e.g. a kiosk in the centre of a high volume pedestrian link) or additional physical effort caused by unnecessary grade differences are to be minimised.

The list of requirements also has to be completed with the requirements from the identified user groups. For example, children will play and have little attention for other road users; they need a safe space and something to stop them from unconsciously crossing the road. Elderly people need some more time to cross the street and a median will give them the opportunity to pause before crossing the next lane(s).

Cyclist

For a cyclist a network can be developed and designed. The main requirements for a network for cyclists are:

- **Directness:** the shortest or most straight routes
- **Cohesion:** the infrastructure forms an interconnected network
- **Attractiveness:** the infrastructure is designed and fits into the environment in such a way that cyclists perceive it as appealing
- **Safety, traffic:** the bicycle infrastructure guaranteeing the safety of the cyclists and other road users by avoiding conflicts at high speed at crossings and on the road itself
- **Security:** the cycle routes go through environs that guarantee the safety of the users (e.g. well lit, watched by residents, etc.)
- **Comfort:** delays and nuisances caused by bottlenecks or additional physical effort are to be prevented.

Developing a network for cyclist

Directness is the main driver for developing the routes. By linking up all facilities via a straight line, barriers will appear clearly. There are physical obstacles, but also safety problems with the most direct links. The next step is to change that line slightly to fit the six criteria listed above more appropriately.

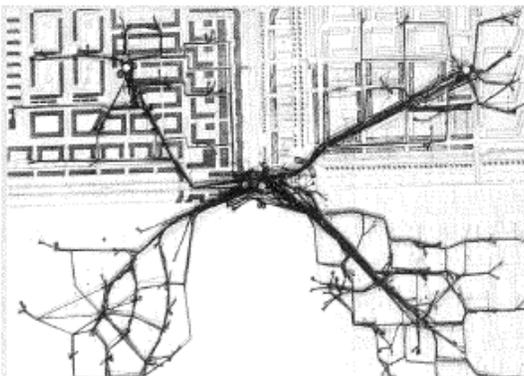


Figure 1: first network design

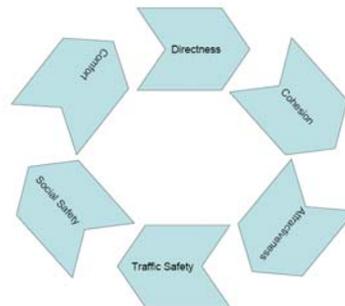


Figure 2: the iterative design process

Finding routes that comply with all six criteria is rare. But the NMT user wants a network consisting of routes complying with all these criteria. To ensure meeting as many of the criteria as possible an iterative design process needs to be applied (refer to figure 2, the iterative design process).

Comparing to The Netherlands

Traffic safety as well as security is an issue in The Netherlands as well as in South Africa. It is important to identify the elements of an unsafe route. For example: Is it just at night? Is it the amount of motorized vehicles, the type of vehicles (trucks, taxi's, private cars)? Usually pedestrians and cyclist perceive an area with more pedestrian activity safer and an area with more motorized vehicles is perceived as unsafe.

In The Netherlands a road is paved, sometimes with bricks sometimes with asphalt. Non paved roads are rare. In South Africa the urban areas are usually paved, but in the rural areas the minority of the roads are. This difference means that the guidelines in The Netherlands for comfort are different. People aren't used to riding their bikes on unpaved surfaces. This provides more opportunities in South Africa when developing a network within the criteria.

Step 4: Develop a sustainable network by fusing the desired and existing networks in to projects

An ideal NMT network would be expensive, and the budgets are generally not available. So the ideal network and its implementation have to be prioritized. With the goal of optimizing the results within the available funds the possibilities are on a range between the following extremes.

- Spread the projects in time or
- Minimize the projects to fit the budget.

The first is probably necessary to apply for funds if nothing is available at all, while the second extreme fits into a budget plan were funds are already allocated to NMT.

Liaising with all the stakeholders provides the input required while developing the NMT programme while keeping an eye on the priorities of the network itself.

The learning curve in The Netherlands was that the easiest way to construct good NMT facilities is by combining these with the construction of new developments or with the upgrades as the result of road and sewer rehabilitation or storm damage repairs. The NMT network provides requirements which can be added to the design brief and provides the funding. The subtle changes of the existing, and often very old, inner cities have been a much tougher nut to crack. In summary, the best examples of bicycle friendly cities in The Netherlands have: a large population which is captive (students in Delft and Groningen), are newly built in the 1980s and 1990s (Houten, Almere, Lelystad) or have government executives promoting NMT whenever they can.

Comparing to The Netherlands

In The Netherlands priorities are mainly set by existing or forecast volumes. 25% of all trips are made by bicycle which is a good base for estimating future use on existing or new links.

There are three major differences with South Africa in prioritizing based on volumes:

1. Census surveys are repeated yearly for traffic and transportation related issues. This provides up to date insights on the latest trends assisting with forecasting NMT use for new developments and collecting best practices while comparing towns.
2. There is a historical use of cycling.
3. The rehabilitation programs for roads are mandatory for all municipalities, which provide opportunities to construct bicycle and pedestrian facilities at relative low additional costs.

In South Africa, one of the reasons people aren't cycling is the lack of proper facilities. The existing routes lack traffic safety, security and are not comfortable. Encouraging people to use their bicycle at all is the first step. Encouraging people to choose voluntarily to cycle or to walk instead of using an alternative mode is the next step.

One of the success factors in the historic inner cities of The Netherlands was the lack of space for car parking. In most South African cities this is not a problem, yet. However, increasing congestion in some urban areas is a problem and creates opportunities for alternative solutions.

OTHER FACTORS, NOT TO BE OVERLOOKED

Even the best plan or policy by itself won't make people cycle or walk. Communication with and involvement of the community are equally important.

Security is a problem in some parts of The Netherlands and in some parts of South Africa. This is not a reason not to design routes for NMT in these 'problem areas'. By increasing the use of these areas by getting 'normal' people in and through the area, the security is likely to increase as well.

In new areas it is possible to make NMT routes **recognizable** for pedestrians and bicyclists as well as motorised traffic. So combine pedestrians and bicycles with other traffic or ensure that people can watch the route from their house or school. The most dangerous routes, both in The Netherlands and in South Africa, are the routes where the NMT user is not visible.

One of the most important differences between The Netherlands and South Africa is the **perception** of NMT. Walking and cycling in The Netherlands is seen as an environmentally friendly way of getting around. People doing it are not perceived as poor or as exercising, but are perceived as modern and making sustainable and conscious choices in life.



Photo 3 to 5: A different perception; from left to right: Dutch Prime Minister Kok (in 1995), Minister Donner (in 1998), Madonna (in 2001)

The change in The Netherlands started with the oil crises in the 1970s. The shortage of fuel and increasing prices made the government limit the use of the car during Sundays. This made all people much more aware of alternatives for the car and the costs of driving. The latest trend of environmental awareness has build further on the awareness from that period.

The learning curve from The Netherlands makes clear that good opportunities for realizing NMT links are found by **combining** several developments. A new soccer stadium for example generates new roads, public transport and upgrading of the existing infrastructure. By implementing NMT in these large scale developments awareness has to be created by all stakeholders:

- Current and future users, because they know where they want to go and can explain their current problems.
- Politicians, because they decide on the available funds.
- Professionals outside the engineering field, because they provide insight into other problems adding urgency (and funds).

In The Netherlands, design **guidelines** are provided. However, the engineers apply these sensibly and with an open mind playing within the given constraints. The best example is the depicted bicycle link in Delft. The busiest bicycle and pedestrian link of this historic town won't pass any guidelines book, but it's still the most used and there are hardly any accidents. Like Richard Kraiicek (Dutch tennis player, Wimbledon Champion in 1996) once said: if it doesn't go the way it's supposed to, then it'll have to go the way it does.



Photo 6: One of the most used links in the Delft network is not according to standard design practices

CONCLUSION

There are many differences between The Netherlands and South Africa. There are also a lot of similarities between both countries; the increasing environmental awareness, the clogging up of central business districts with cars, and the recent economic crises which are all not easy to solve.

These elements mean that now is the right time to implement NMT as an integral part of the transportation system. In South Africa there is more new development than in The Netherlands. New developments are huge opportunities for implementing NMT. There is opportunity to design and develop NMT facilities including the layout of the houses, combining motorized traffic, etc. Realizing a sustainable environment is, at this moment in time, a selling point providing even more opportunities.

South Africa is a rapidly changing country with a colourful population. South Africans are voicing openly the changes they want. Every South African uses NMT every day, some more than others. So, all South Africans want to be involved, and need to be engaged in upgrading the NMT facilities. Looking at the learning curve from The Netherlands, South Africa needs to focus for the next 5 years on building networks within new neighbourhoods and focus on links with existing road infrastructure improving NMT quality. The fencing in of neighbourhoods for security purposes means that for NMT it is necessary to look closely at the place where gates are put. It might mean that an extra gate, just for NMT is needed to get the residents to their destination quicker than by car! The systematic approach developed by SSI provides a helping hand to make this a success.

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