xculty of Economics, Business Administration and Econometrics

SERIE RESEARCH MEMORANDA

Internationalization and Localization:
A Double-Edged Sword?

Peter Nijkamp
Sytze A. Rienstra

Research Memorandum 1998-27

Universiteit amsterdam

INTERNATIONALIZATION AND LOCALIZATION :

A DOUBLE-EDGED SWORD?

Peter Nijkamp   **Sytze A. Rienstra**

Abstract

This paper analyses the locational choices and perceptions of international firms in a local economy. It addresses in particular the behaviour of Japanese firms in the Dutch city of Amstelveen near Amsterdam Airport Schiphol. Beside a qualitative analysis, a recently developed meta-analytic technique, viz. rough set analysis, is applied to identify various critical success factors.

pn71 lsr

1. The Global Company and the Local Community

The action radius of modern firms is gradually expanding. It is often argued that our world is moving towards a global economy (Daniels and Radebaugh 1994; Daniels and Lever 1996). Globalisation does not only mean a rise in physical movements towards a world-wide scale, but also an integration of business life in a transnational setting, often in the form of complex physical and non-material networks (Ball 1975). Such changes in traditional industrial patterns and linkages mirror clearly the transition from an industrial to a post-industrial society, in which producer and financial services take the lead (Dunning and Norman 1987).

Such drastic change processes have a clear impact of the functioning of modern cities, which are gradually opening up towards 'global cities' (Sassen 1991) which act as geographical polarisations. Such cities seem to become bi-modal socio-economic nodes with an over-representation of both high-income and low-income jobs. This post-industrial, neo-fordist economy provokes questions on the locational behaviour of the modern global firm. Is this firm entirely footloose, or are there other forces than economic motives which keep global firms aligned to specific locations?

In a network economy the traditional 'hard' locational motives of firms (such as cost-minimising behaviour) are also co-determined by complementary 'soft' or qualitative objectives, such as local recognition, socio-political support etc. In this context, Terpstra and David (1985) have made a useful distinction of three classes of environmental conditions for the firm:
* economic: employment, income, foreign exchange risks, investment policy etc.
* physical : natural resources, climate, ecology, nature, demography.
* cultural : language, religion, values and attitudes, education, social organisation.

While traditional location theory has mainly focused on the first category and partly on the second category, there is an increasing recognition that the cultural factor has been dramatically underrepresented in locational analysis (Funck 1996). Culture may manifest itself in various appearances in the locational decisions of firms. Culture may be a source of new opportunities for a firm (e.g. by allowing for the creation of new market niches), but it may also act as a barrier impeding multinational business activities (Kaminarides and Orpharides 1997). Especially for a multinational firm the potential significant impact of culture is a major issue in locational decisions (Hall and Hall 1990). Furthermore, the presence of a foreign firm in a given city may also have an impact on its local culture, its 'couleur local'. It is clear that such cultural factors are difficult to measure and to operationalise. But their importance warrants due attention for cultural values in the global city.

This paper aims to place the cultural environment of the city in relation tot international business life at the forefront. After an introduction to the importance of cultural factors, the paper addresses the locational aspects of foreign firms in a particular place in the Netherlands, viz. the city

1

of Amstelveen (a neighbouring city of Amsterdam) which has an abundance of foreign-based (mainly American and Japanese) firms.

The factors influencing the locational choice of international companies have been well researched within the scientific literature. However, the impact and integration of foreign based companies and their employees on the host society has far less been systematically researched. Questions about the 'local milieu', which represents the local synergy based on social, cultural or entrepreneurial networks, require further investigation.

Seen from the viewpoint of internationally operating companies, it is important to make a distinction between foreign and Dutch based companies. Both types are attracted by the above mentioned location factors and will have a clear impact on the Amstelveen society. In this study we will however especially focus on the impacts of foreign based companies for two reasons; first, this group can be defined fairly easily and second, these foreign cultures in Amstelveen provide interesting integration questions. Therefore, the impacts of non-Dutch residents in Amstelveen -the Japanese population in particular is a large one - will be investigated.

The locational motives and consequences of foreign-board firms are investigated in this paper, while also their local impacts on the cultural environment of Amstelveen are traced. Next, the various 'soft' cultural factors are analysed more rigorously by using a recently developed tool in operations research and decision theory, viz. rough set analysis, to identify various critical success factors for firm location. The paper is concluded with come policy recommendations.

2.   Assimilation of Foreign Based Companies: Analysis Framework

2.1   Locational factors

There are several types of impacts of foreign based companies on the host community which can be distinguished: economic impacts, social impacts and cultural impacts. Economic impacts have to some degree been investigated on the macro level; these relate especially to employment impacts and investigations about the international character of economies. However, the actual impacts on the host society have received much less attention in empirical research, even though these impacts may be very significant. In order to analyse these impacts, we will first present the literature on this subject and give a short introduction concerning the factors influencing the locational choice. Two types of factors can be identified in the locational choice of companies.

The hard location factors are easily quantifiable and are relatively well researched. Amstelveen generally scores high on the 'hard location factors': the city is well connected by highways; Schiphol Airport is a major location factor; Amsterdam with its many facilities (R & D, universities, etc.) is nearby and develops primarily southwards; the living conditions are highly valued, etc.

Hard (measurable) locational factors
* geographical location
* access to infrastructure (R & D, educational, health, etc.)
* position in transportation and communication networks
* utility supply and waste disposal systems
4 structure of the labour market
* structure of existing economic activities

Soft (qualitative) locational factors
* intensity, diversity and level of quality of cultural activities and recreational offers
* quality of natural and man-made environment
* the creative climate
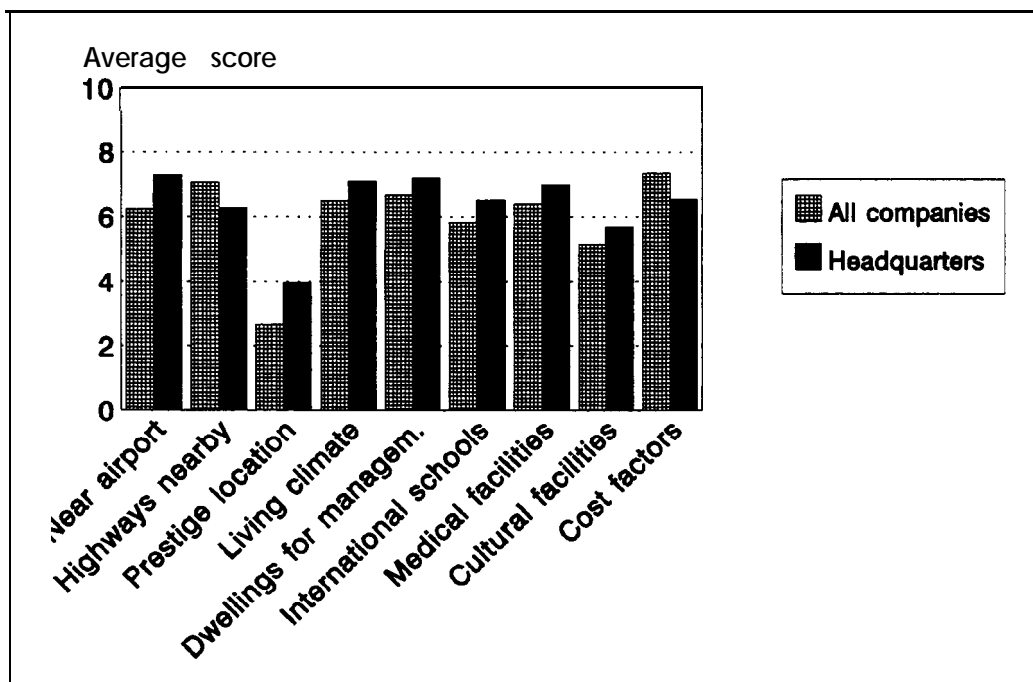* identification with the location (historical, cultural, future aspirations etc.)

Figure 7 *Average scores for location factors*
Source: Poppelaars (1993); based on Price Waterhouse (1991).
Note: The scores given ranged from '0' (no importance) to 10 (extremely important)

In Figure 1 scores given by foreign based companies throughout the world are presented on several of the above mentioned location factors, and are particularly interesting for Amstelveen. Since the subgroup 'headquarters' is very important for Amstelveen - these are located here to a large extent - the scores given by this group are presented separately.

The hard factors 'costs' and 'highways' are regarded as the most important reasons to choose a location. Curiously however, 'softer' features

3

such as living climate, dwellings for management and medical facilities receive fairly high scores. Cultural facilities are not considered to have significant importance, and the prestige of the location receives the lowest average score. When headquarters are considered separately, 'softer' location factors - including the presence of an international school and cultural facilities - are thought to be more important; the same holds true for the availability of an airport.

For our study, 'soft' locational factors are most important' in distinguishing various impacts. Therefore, we will now discuss potential economic, social and cultural impacts.

2.2 Economic impacts

The location of foreign based companies will result in several impacts on the local economy. The most important impact is an increase in employment in the host community; meanwhile in other places, employment will also increase because of commuting. The employees might be residents of the host country, but they may also be (temporary) migrated foreign employees. This employment growth is entirely 'generative' in nature, so this is no growth at the expense of employment in other regions. At the same time, several multiplier impacts will occur which will increase employment growth:

Temporary Multiplier Impacts
*   employment increases in the construction sector and in several supplying sectors
*   second order impacts, because of expenditures of extra employees in the construction sector and its suppliers

Long Lasting Multiplier Impacts
*   employment in supplying sectors of the new company (cleaning, office supplies, catering, etc.)
*   employment because of expenditures of the newly employed people (both former unemployed and newly immigrated)

The location of foreign based companies will therefore result in increasing employment levels and local/regional economic growth. It should be acknowledged however, that not all of these impacts will occur in the host community, because employees and suppliers may also live or be located in other regions. In addition, when there is lack of office space other activities may shift away; the same holds true when there are few housing possibilities for the new employees. Nevertheless, it is likely that the host community will largely benefit from the extra demand, particularly shops, restaurants, cleaning services, etc.

4

2.3 Social impacts

Social impacts due to the location of foreign based companies are also important. The literature mainly focuses on the absorption, labour market problems and integration of low-educated and income immigrants. Theories mostly focus on the immigrants' choice of the host country, but that issue is not important here.

The immigrants regarded in this study are of another type: in general, they are well-educated, have high incomes, have a guaranteed job and the company takes care of housing etc. In addition, it can be expected that questions of where to locate as well as the significant bureaucratic barriers are solved by the company. However, the adaptation process - in effect, the adjustment and settlement process in the host community - is indeed relevant to our project. Therefore, some of these theories and frameworks may be relevant for the Japanese, American and other immigrants in Amstelveen.

The choice of where to locate largely depends on the social network within the host community. When a rather large community from a country already exists, new immigrants from these countries tend to move there too. In Amstelveen, the Japanese community is a good example of this: Japanese tend to live in Amstelveen, even if they work elsewhere. In this way, the trend of an increase in the number of companies and immigrants from a particular country reinforces itself.

In this respect the impact on the host community is also important. New people, with different languages and habits and a potential array of problems, are becoming part of the society. On the other hand, this influx of new arrivals can enrich the existing community, because they experience new things, sports, food, etc.

Social Impacts

* changes in behaviour and habits of foreign residents.
* Changes in behaviour and habits of the current population.
* The availability of new activities (e.g., food, shops, facilities, sports).

2.4 Cultural impacts

As presented in Figure 2, cultural facilities also play a role in the locational choice of companies, especially when it concerns headquarters. In the case of Amstelveen it is obvious that not only Amstelveen's facilities have an influence, but Amsterdam's cultural facilities are also important in the decision to locate in Amstelveen. A minimum level of facilities is important to give a city marketing ability and overall attractiveness. The next types

of cultural impacts may be identified as:

Cultural impacts

* New cultural activities and facilities initiated by the host community.
* New cultural activities initiated by the immigrated employees and/or the foreign based companies.
* Expansion and change in existing cultural activities and facilities.

When investigating these impacts, it is also important to analyse the extent to which the local community benefits and uses the new or expanded facilities and activities. Additionally, these activities may generate higher employment because more people visit these facilities. New clubs and restaurants, for example, may be established thus enhancing the living climate of a city. Consequently, it may increase the attractiveness of a city for new foreign based and national companies.

3.   Foreign-based Companies in Amstelveen: Some Facts

We will now turn to the actual case study of our paper: the city of Amstelveen. The location of Amstelveen seems to be ideal because:
* Amstelveen is a relatively small and non-bureaucratic municipality, which makes access to authorities and institutions relatively easy;
* the living climate in Amstelveen is valued very positively;
* the international Schiphol airport is nearby;
* the city of Amsterdam with all its metropolitan facilities is nearby;
* Amstelveen is easily accessible and connected to other parts of the Netherlands by several highways and by light rail to major railway stations.

As a result, Amstelveen has become an important location and residence for international companies and a relatively large share of the Amstelveen population migrated from foreign countries to work in these international companies.

According to the available statistical data, there are currently 95 companies in Amstelveen which can be regarded as foreign based. In both the Amsterdam region and Amstelveen about 2% of the companies are foreign based. The average size of the companies in this area is, however, far above average and accounts for about 17% of total employment in the Amsterdam region. The origin of these companies is presented in Figure 2a.
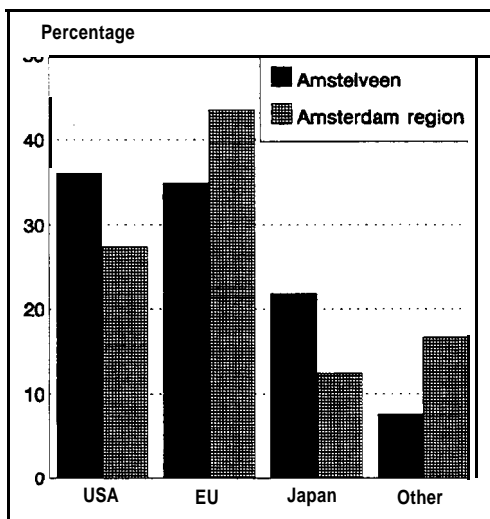
Figure *2a*   ***Origin* of *foreign based companies in Amstelveen and the Amsterdam region***
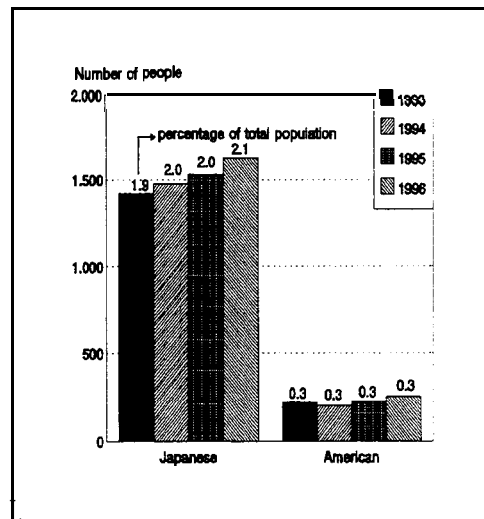
Figure *2b*   ***Development* of *the Japanese and American population in Amstelveen***

Sources: 2a Chamber of Commerce of the Amsterdam region (1996)
2b Figures provided by the Amstelveen Municipality

Most companies are based in the United States (US), followed by the European Union (EU) and Japan. From the total number of Japanese based companies in the Netherlands (133 in total), 46.7% are located in the Amsterdam region of which 7.5% in Amstelveen. The location of US based companies' European headquarters is much less directed toward the Amsterdam region (20% of the US based companies of which 2.4% in Amstelveen).

There are many more Japanese residents (in 1996 1,625 people) in Amstelveen than residents of American origin (254 residents). Of course, there are many more European residents, but these are not all working in foreign based companies. The total Japanese population in the Netherlands is 5,347 people; about 30% of them lives in Amstelveen. According to figures from the Japanese embassy, another 30% of the Japanese lives in other parts of the Amsterdam region (in particular Buitenveldert, which is Amsterdam's quarter bordering Amstelveen). The development and number of the American and Japanese population is presented in Figure 2b. It should be acknowledged that the numbers of Europeans are much higher, but it is unlikely that all are employees of foreign based companies and it is plausible that they would have migrated to the Netherlands anyway. More information about the foreign based companies in the Amsterdam region is presented in Figures 3a and 3b.
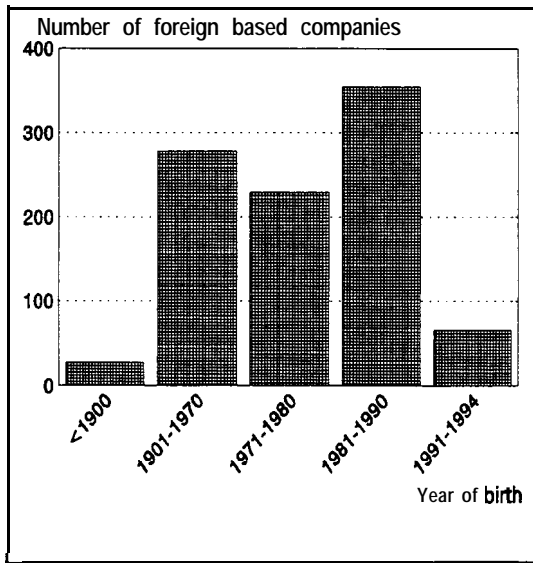
Figure 3a   *Year of establishment of foreign based companies in the Amsterdam region*
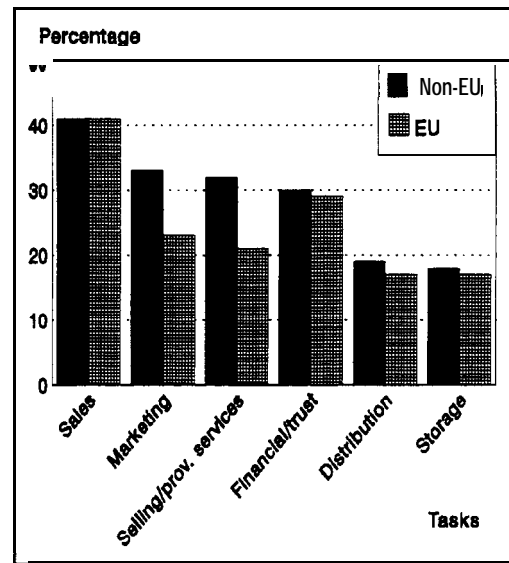

Figure 3b   *Main tasks of foreign based companies in the Amsterdam region*

Source: KPMG (1995)

It can be seen from Figure 3a that in the 1970s and 1980s most foreign based companies located in the Amsterdam region, while before 1970 relatively few foreign based companies arrived in Amsterdam. It is interesting to note that in the first years of the 1990s the number of new foreign based companies is much lower; evidently the internationalization of companies has slowed down, which may partly be explained by the worsened economic situation in Japan.

Figure 3b shows that most companies combine several tasks: sales are the most important task, followed by marketing, financial/trust services, selling/provision of services, distribution and storage activities. Interestingly, non-EU based companies combine more tasks than EU based companies. This holds true especially for marketing and selling/provision of services. This may be explained by the fact that these companies are more often European headquarters, while the mother company is farther away.

Figure 4 presents information about the size of foreign based companies on the basis of their sales and the number of employees. It reveals that the Japanese companies are much smaller than EU and US based companies in terms of both sales and number of employees. The American companies are on average the largest.
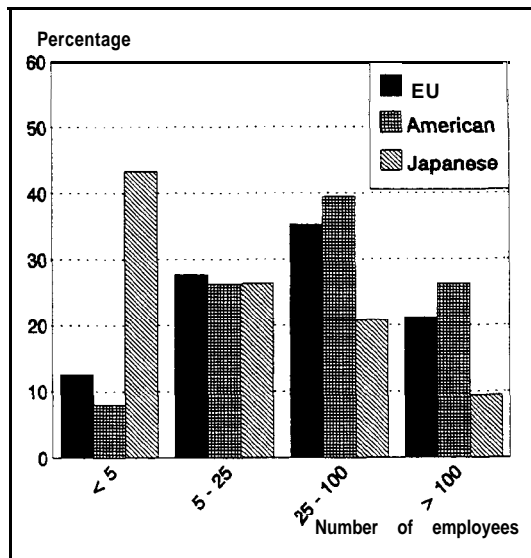
8

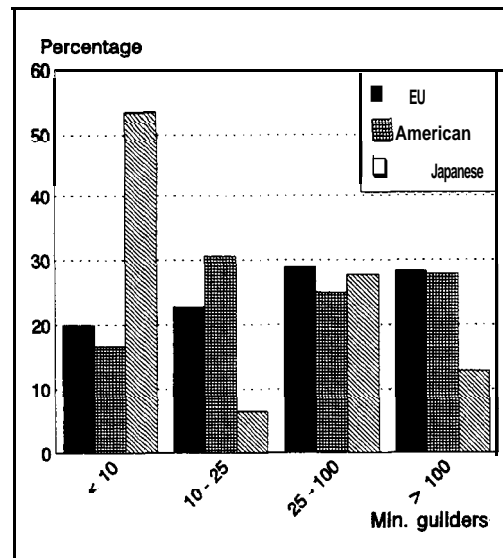| Figure 4a	The number of employees per company in the Amsterdam region

ïgure 4b	The amount of sales per company in the Amsterdam region

Source: KPMG (1995)

It should be acknowledged however, that Japanese companies employ many more non-Dutch residents than do American and EU based companies. The number of Japanese employees in Amstelveen is much higher than that of Americans and Europeans. In the Amsterdam region, for example, 90% of the employees in US based companies is Dutch, in Japanese companies this number is 67%; the number of foreigners in the management of the companies is however much higher.

4 **Local Assimilation in Amstelveen: Empirical Evidence**

4.1 **Introduction**

The above mentioned issues have been investigated by means of a number of in-depth interviews among business firms in Amstelveen. A wide range of people from Japan, American and other countries, along with experts from e.g., Chambers of Commerce, were asked to participate in the research via an interview. In this way, various opinions of foreign residents and experts with local expertise and viewpoints were investigated. We will present the general results from the interviews here.

4.2 The Importance attached to locational factors

The importance of Schiphol airport and other infrastructures

The presence of Schiphol is regarded as an important reason to locate in Amstelveen, especially for clients and managers who often travel by air. The accessibility of Schiphol via the road is thought to be sufficient; only during rush hours is there much congestion, but in reality this causes few

9

problems. It is mentioned that accessibility to Schiphol by public transport is somewhat troublesome; in particular, guests and newcomers find it difficult to discover how to reach Schiphol.

Road infrastructure is often not seen as a problem and is of a good quality, but does annoy commuters. Others think that the capacity of the highway network is too small and should be enlarged, especially in the Randstad. The Amsterdam harbour did not play a decisive role in the locational choice of the companies interviewed. Telecommunication facilities are positively valued, but are not a reason to choose for Amstelveen, since these facilities are good throughout the Netherlands. The same holds for public transport facilities, which are often positively valued, but not seen as an important reason to locate in Amstelveen.

The living climate and dwellings

The living climate is regarded as very positive by the Japanese and other Asian people because of the spacious and rather large houses compared to their home country. Americans on the other hand, think the houses are relatively small and are accustomed to more space. This is an important reason to move to other areas like Het Gooi, Aerdenhout or Wassenaar. Wassenaar is especially attractive for Americans due to the location of the American School.

The Japanese often mention that the existence of a large community in Amstelveen is an important reason for new immigrants to move there, even if the company is located somewhere else. The presence of the Japanese school and to a lesser extent the International School are also important reasons to choose for Amstelveen (see below).

For foreigners, Amstelveen is mainly seen as a suburb of Amsterdam and is presented as such in foreign countries. The major advantage of Amstelveen compared with Amsterdam is the quiet and safe atmosphere. A quiet and attractive living area is thus combined with the facilities of a major metropolitan area.

Safety considerations are very important for foreigners in their choice of where to live. The image of Amstelveen is good in this respect, but maintaining this good image is necessary for the future location of foreign based companies. Partly, due to the selling of houses to Japanese and Americans, the prices of houses are rising, which has negative impacts on other starters on Amstelveen's housing market.

International schools

When Japanese employees bring their families with them, the presence of the Japanese school nearby in Amsterdam is often mentioned as being very important. This school provides 6 years of primary school and 3 years of junior high school; 2 hours a week are dedicated to lessons in the Dutch language. When Japanese students complete this school, most do not attend the International School, but instead attend Japanese high schools in London or Sweden or they return to Japan for further education. An important reason for this is that the stay in the Netherlands is only temporary, so that Japanese education is regarded as more important and

only a limited number attend the international school. Most foreigner residents value the presence of international schools nevertheless as important; this was often not regarded as a reason to choose Amstelveen, but is mainly appreciated after the locational choice has been effectuated.

The average score for Amstelveen
Amstelveen is - in terms of perceived attractiveness - usually valued with a '8' on a lo-point scale and scores are therefore higher than an average location (which would get a '6') in the Netherlands.

4.3 Economic factors

The impact of foreign-based firms on the local economy is generally seen as very positive: every activity attracts new activities and increases demand, from which almost per definition the local economy benefits (the retail sector, suppliers).

Functions of foreign employees
Employees of foreign based companies are often of different national-ities; the companies interviewed are primarily head-offices for the Dutch or European market.

In most companies foreign employees are found on the company's management board; the other employees are mainly recruited from the Netherlands. The education of foreign employees is at least that at university level. Interestingly, US companies often send less experienced managers so they can gain experience, while Japanese managers are often more experi-enced and older. Generally speaking, American companies more often have Dutch employees in their top management than do Japanese companies (it is indicated that only 40% of the top management of American companies are Americans), although also the Japanese companies indicate that their objective is to increase the number of Dutch managers once the company is operating smoothly.

In this respect, it is notable that it is less costly for foreign based companies to employ Dutch employees. Another feature of the Japanese is that they usually stay for a fixed period of 3-5 years; this limits the possibil-ities (and perhaps the needs) of integrating into the host community. The duration of the Americans' varies more, but is often for a limited period as well.

Economic orientation of employees
Shopping is done both in Amsterdam and Amstelveen. Amstelveen's retail shops have partly adapted their supply to the demand of especially the Japanese. Also because of their preference for more expensive goods, the Japanese are for several shops important for the sales of various products. The Japanese are often seen as 'difficult' customers, who ask for a high service level: this is consistent with the observation below that the Japanese regard the service level in the Netherlands as relatively low.

It is often mentioned that during lunch time many employees go shop-

ping: facilities nearby the offices are important in this respect. A shop specializing in Japanese products would be welcomed. Chinese employees or families often go shopping in the China Town of Amsterdam.

Suppliers
It appears that both Americans and Japanese are accustomed to a higher service level of their suppliers, in addition to more sophisticated kinds of services or shops etc. than is offered in the Netherlands. For example, the delivery times of e.g. new copiers and cars are regarded as very long, while e.g., repair services are time consuming. The opening hours of shops are also regarded as a problem, certainly because foreign employees tend to have long work days. This also holds for hospitals and other services, where first appointments are required, leading to a queuing system.

Japanese companies attach a high value to contacts with their suppliers and do not complain a lot, terminate a contract or easily change to a new supplier. In this way, the Japanese have less of a formal business approach to their suppliers, and instead feel more responsible to them: when a contract is terminated, it is seen as a sign of their own poor management. This approach differs from that of the Netherlands or the United States, where it is more common to switch suppliers when necessary.

4.4   Social impacts and facets

Mentality   differences
Japanese and other Asians are more conservatively oriented; status is based more on age and official positions. As a result, there is a greater hierarchy in the Japanese society. In contrast to Western cultures, this hierarchy is mainly expected and awarded in the behaviour of other people (e.g., showing respect etc.) and not by monetary gains: the wage differences in Japan are relatively small. The work mentality is also different: Japanese prefer greater organisation and fixed orders; they are used to working overtime and are more loyal to the company. In this respect it is important to notice that in Japan a company is often the employer for an entire life-time. Dutch employees are regarded as more flexible, open and critical; they work more independently from the management and are better at improvisation. For Japanese managers this different mentality may cause problems at first; when they become accustomed to it, they value the mentality of the Dutch employees as very good and positive. Americans may on the other hand be more open and flexible than the Dutch, which sometimes causes management problems within US based companies.

The desired relation with the government is different in Japan. Japanese maintain contacts with authorities even when there is no problem to be solved or arrangements to be made. The opposite holds for Americans: they are less used to government regulations and interventions. They only approach governments when there is a real problem to be solved. In the Netherlands contacts are often maintained by intermediate organisations such as a business association. Americans and Japanese are less used to such a 'consensus' model.

Integration

The Japanese population in Amstelveen is said ▪ both by Japanese and by others ▪ to be very closed: integration into the Amstelveen population is limited. For example, playing sports is almost exclusively an in-group activity. The main reasons mentioned are:

*   the *language barrier:* despite a high skills level, English is often a difficult language for the Japanese population;

*   the *limited staying period:* Japanese usually stay for 3-5 years; the time is rather short and this limits possibilities and the need to integrate;

*   *cultural differences:* Japanese are often rather reserved;

*   the presence of a rather *large Japanese population:* therefore, there is less impetus to seek new contacts;

*   both Americans and Japanese have *long work hours:* this limits the possibilities of integrating within the host community. In Japan social activities are mostly held within the own company;

*   Amstelveen is a rather *individualised community,* with relatively few clubs, restaurants, pubs etc., it is fairly difficult for foreigners therefore to integrate within the Amstelveen population.

4.5   Cultural and sports facilities

Cultural facilities

It is sometimes thought that cultural facilities in Amstelveen are less important because Amsterdam is nearby. Nevertheless, cultural activities and life are regarded as important and the Japanese population tries to share cultural ideas with the Amstelveen population as they attempt to learn Dutch culture. It is also generally believed, that there is plenty of interest and attention for the Japanese culture: e.g., there have been exhibitions of Japanese artists in the Cobra museum; the Go centre has been created and there is a Japanese video shop, a supermarket oriented to the Japanese population, sponsorships of certain activities, the organisation of the "Japan week", etc.

Furthermore, the Japanese are very active in music and there is even a Karaoke bar in Amstelveen which is attended by many Japanese. The Japanese Women's Club organises activities geared toward giving the host community a chance to experience Japanese culture. These activities are mainly organised in the Go centre; concerts, lectures, sports, a yearly bazaar, and other activities are held. In those activities all people are welcome.

The international school is well-known for organising activities, so it is very positive for the cultural exchange that the school has moved to Amstelveen. Improved cooperation between the municipality and the international school may further increase such activities. The number of cultural facilities (e.g., the Cobra museum) has increased in recent years, and this is regarded as positive for the image of Amstelveen.

As a result of the many foreign based companies, Amstelveen now has a good image and the society has become more open for foreigners.

This atmosphere may be an important reason for foreign based companies to locate in Amstelveen.

Sports

Golf is the most popular sport for Japanese, Americans and other nationalities. It is often a problem to become a member of a golf club: this takes a few years due to waiting lists. Tennis is also an important sport, but other games like aerobics and squash are mentionedas well. The facilities are generally regarded as good and sufficient. Baseball is the only sport that is sometimes missed: this sport is popular both in Japan and the US, but is almost absent in the Netherlands; Americans mostly play baseball in Wassenaar.

Several sports activities are sponsored by foreign based companies. It is not thought that certain activities - except for the Go centre - are there due to the large number of foreign residents or sponsorships by foreign basedcompanies. Nevertheless, severalsportfacilities (e.g., tennis, bowling, fighting sports) might be smaller were it not for the presence of foreign residents.

4.6   The role of the Amstelveen municipality

The accessibility of the municipality (e.g., the short bureaucratic lines) is very much appreciated by all people interviewed. Amstelveen has a 'personal touch' in its approach to Amsterdam. Several times, the accessibility of the Aliens Branch is mentioned, which service is rated as very good compared to Amsterdam: e.g., Japanese do not have to queue, which is appreciated very much. Informal contacts, business visits and e.g. the international weeks are very much appreciated by the foreign residents. It is also said that the 'after sales' (i.e., once the company is located in Amstelveen) contacts with the municipality are very good; this is not always the case elsewhere.

Amstelveen in general has a good image and there is no need to adjust it or to promote Amstelveen differently. It is important to recognize the significant contacts with Amsterdam. For foreigners, Amstelveen is mainly seen as a suburb of Amsterdam rather than an independent city. Therefore, regional cooperation in the marketing of the whole region may be improved. It is emphasized that lack of space should not be a reason to give up green areas for economic purposes (e.g. sports fields, swimming pool). These are important for the quality of life in Amstelveen and therefore for the long run image of Amstelveen.

5.   A Rough Set Analysis of Locational Motives

5.1   Introduction

The information on the cultural environment of the city of Amstelveen for foreign-based companies was based on in depth structured interviews with stakeholders in the area. Given the nature of such interviews, it is evident that most of the information obtained on the relevance of the local

cultural milieu is qualitative or soft in nature. Consequently, this information is not suitable to identify the driving forces and critical success factors for the locational decisions and satisfaction of international business life in the area concerned. In order to derive nevertheless sufficiently rigorous results, a recently developed nonparametric statistical method, viz. rough set theory, is used, which is particularly appropriate for qualitative small-sample data (see van den Bergh et al. 1997, Pawlak 1991 and Slowinski 1992). In fact, our individual interviews may be regarded as distinct alternative cases in a multicriteria sense which can be described by qualitative attributes. Each of these alternative cases has a numerical performance score, i.e. the degree of satisfaction expressed by the interviewee on a ten-point scale. Rough set analysis than aims to trace and identify the most pronounced attributes which contribute to a given satisfaction (or performance) score. We will now first give a concise introduction to the theory of rough sets.

A rough set is a set for which it is uncertain in advance which objects belong precisely to that set, although it is in principle possible to identify all objects which may belong to the set at hand. Rough set theory takes for granted the existence of a finite set of objects for which some information is know in terms of factual (qualitative or numerical) knowledge on a class of attributes (features, characteristics). These attributes may also act as equivalence relationships for these objects, so that an observer can classify objects into distinct equivalence classes. Objects in the same equivalence class are ‑ on the basis of these features concerned   indiscernible. In case of multiple attributes, each attribute is associated with a different equivalence relationship. The intersection of multiple equivalence relationship is called the indiscernibility relationship with respect to the attributes concerned. This intersection generates a family of equivalence classes that is a more precise classification of the objects than that based on a single equivalence relationship. The family of equivalence classes that is generated by the intersection of all equivalence relationships is called the family of elementary sets. The classification of objects as given by the elementary sets is the most precise classification possible, on the basis **of the** available information.

The indiscernibility relationship and the equivalence classes generated by this relationship make up the basic concepts and building blocks of rough set theory. A set is now coined rough if it is impossible to build it up from one ore more elementary sets. In other words, a set is rough if it is not equal to a union of elementary sets. In this framework, two new concepts are introduced, viz. the lower and upper approximation in order to identify a range of uncertainty for the assignment of objects. The lower approximation of a set V is the union of all elementary sets that are a subset of V. The upper approximation of a set V is the union of all elementary sets that have a non-empty intersection with V.

This approach leads thus to an imprecise representation of reality due to the 'granularity' of knowledge; in other words, reality is represented by 'granules' corresponding to the elementary sets, i.e. subsets of the universe whose elements are indiscernible (indistinguishable) by the set of attributes used, because they present the same description in terms of the values of

these attributes. The 'granularity' of knowledge representation is used to define the key concepts of rough set theory. The size of these 'granules' depends, naturally, on both the number of attributes used for the description of the objects and the domain of each attribute. With a suitable variation in these two quantities it is possible to obtain a variation in the dimensions of the 'granules': an increase in the number of attributes and in the number of values which each attribute can assume, results in more 'granules'.

Next, lower and upper approximations can be determined on the basis of the typology ('granules') generated by the available information on the elements of the relevant set (indiscernibility relation), that is, on the ability to observe some real phenomena (objects), classify them and distinguish them on the basis of the information obtained from real-world observations or of prior knowledge from an expert. The representation of reality by means of rough sets is therefore based on the knowledge (objective or subjective) on reality and the capacity to classify the information obtained.

Now we may introduce the concept of a reduct. A reduct is a subset of the set of all attributes with the following characteristic: adding another attribute to a reduct does not lead to a more accurate classification of objects (i.e. more granules), while elimination of an attribute from a reduct does lead to a less accurate classification of objects (i.e. less granules).

Finally, the core of a set is the class of all indispensable equivalence relationships. An attribute is indispensable if the classification of the objects becomes less precise when that attribute is not taken into account (given the fact that all attributes have been considered until then). The core may be an empty set and is, in general, not a reduct. An indispensable element occurs in all reducts. The core is essentially the intersection of all reducts.

Based on the previous concepts, rough set theory is now able to specify various decision rules of an 'if then' nature. For specifying decision rules, it is useful to represent our prior knowledge on reality by means of an information table. An information table is a matrix that contains the values of the attributes of all objects. In an information table the attributes may be partitioned into condition (background) and decision (response) attributes. A decision rule is then an implication relationship between the description of the condition attributes and that of a decision attribute. Such a rule may be exact or approximate. A rule is exact, if the combination of the values of the condition attributes in that rule implies only one single combination of the values of the decision attributes, while an approximate rule only states that more than one combination of values of the decision attributes correspond to the same values of the condition attributes. Decision rules may thus be expressed as conditional statements ('if then').

In this way one may analyze in greater depth the information contained in the original table and enrich it, specifying additional decision rules directly by means of suitable interviews or discussions with experts. In other words, it is possible to acquire information also directly in the form of decision rules supplied by experts, thereby enriching the original information contained in the decision table.

5.2 The information table for Amstelveen

Our decision table contains the qualitative results of 12 interviews among local stakeholders and experts (both Dutch and foreign) in which the perceived importance of 10 location factors is included, next to the degree of satisfaction regarding Amstelveen as a proper location for international business life. Furthermore, 2 qualitative characteristics of the interviews are also added to our decision table, viz.country of origin (the Netherlands, USA, and rest of the world) and commercial business or not (e.g. interest groups, local authorities). The information is represented in Table 1.

Table 1. Decision table based on interviews regarding Amstelveen

Interview nr.	1	2	3	4	5	6	7	8	9	10	11	12
Satisfaction score (*)	8	8	8	8	7.5	8	8	8	7	8	8.5	8
Organisational characteristics												
Nationality (a1)(**)	1	1	2	1	1	3	2	3	2	4	4	1
Organisational form (a2) (***)	1	2	1	2	2	1	1	1	1	1	2	2
Importance of locational motives regarding transport and infrastructure												
Schiphol airport (a3)	1	1	1	1	1	1	1	1	2	1	1	2
Harbour (a4)	2	2	2	2	1	2	2	2	2	2	2	2
Road infrastructure (a5)	1	1	1	2	2	1	1	1	1	2	1	2
Public transport (a6)	2	2	2	2	2	2	1	1	2	1	1	1
Telecommunication (a7)	2	2	1	2	2	1	2	1	2	1	1	2
Importance of other locational motives												
Image (a8)	2	1	1	2	1	1	2	1	1	1	1	2
Residential climate (a9)	1	2	1	1	1	2	2	2	1	2	2	2
Dwellings (a10)	2	2	2	1	1	1	2	1	2	1	2	1
International schools (a11)	2	1	2	1	2	2	2	2	1	1	1	1
Cultural facilities (a12)	2	2	2	2	2	2	2	2	2	1	2	2

Legend:
* Satisfaction scores from 1 (low) to 10 (high)
** 1 = Netherlands, 2 = Japan, 3 = USA, 4 = rest of the world
*** 1 = commercial firm, 2 = interest group/local agency etc.
**** 1 = important, 2 = unimportant

Some of the data in our decision table **do** not strongly discriminate, in particular the satisfaction scores. For the latter category we, therefore, reclassify the information into 3 distinct classes, viz. smaller than 8, (relatively low), equal to 8 (average) and higher than 8 (relatively high). This adjusted information table has now been used to apply the rough set analysis. The results will be described in a series of steps.

First, when an application of the rough set procedure to the entire information table (all interviews, all locational motives and all organisational characteristics) is made, our analysis shows that no single or reducts can be determined. This means essentially that the overall information is difficult to reduce while keeping the same information content. In other words, it is not possible to 'explain' the satisfaction (or performance) scores of the interviews in an unambiguous way with a lower number of attributes than the entire set contained in the decision table. Consequently, it is neither possible to identify a single locational motive that has a relatively higher weight than any other motive. And therefore, we will now move forward to a more in depth analysis of relevant segments of the information table.

5.3 Country of origin

In this step of the analysis we will investigate whether there is a significant difference in the perceived importance of the attributes, if we classify the interviewees according to Dutch or non-Dutch. This means that we apply the rough set analysis only to two distinct subsets of Table 1, namely the information pertaining tot Dutch respondents and non-Dutch respondents, respectively.

The rough set analysis of Dutch interviewees did not allow us to identify a core, but it was possible to determine various reducts. These are represented in Table 2, while the decision algorithms which could meaningfully be extracted from Table 1 are represented in Table 3.

Table 2. Reducts associated with Dutch interviewees

{al 0,a11}, {a8,a11}, {a5,a11}, {a4}, {a2,a11}, {a8,a10}, {a8,a9}, {a5,a8}

Table 3. Decision algorithm associated with Dutch interviewees

Location motive	*Satisfaction score*
* Road infrastructure = 1 = = >	relatively low
* Road infrastructure = 2 = = >	average

It is noteworthy that the motive of 'international schools' and 'image' appear rather frequently in the reducts included in Table 2. Besides, it is interesting that Dutch respondents who attach a high value to road infrastructure (i.e., a score 1) have a relatively low satisfaction score, whereas respondents with a low preference for road infrastructure (i.e. a score 2) have a relatively high appreciation for the road infrastructure in the area.

The application of rough set analysis to non-Dutch respondents did not lead to

interpretable results. Apparently, this group is too heterogeneous to have a common and conclusive locational motive.

5.4 Commercial and non-commercial actors

The next step was to distinguish an information table into 2 distinct sets by classifying the respondents according to commercial and non-commercial tasks.

The rough set results for the class of commercial actors lead to various reducts and decision rules, included in Table 4 and 5, respectively.

Table 4. Reducts associated with commercial actors

{al 1,a12}, {a7,a9,a10},{a3},{a7,a8},{a6,a7,a10},{a1,a7,a9},{a1,a6,a7},
{al 0,a1 1},{a9,a1 1},{a6,a1 1},{a5,a1 I},{al ,a1 1},{a7,a1 I}

Table 5. Decision algorithm associated with commercial actors

Location motive	*Satisfaction score*
* Schiphol Airport = 2 = = = = >	relatively low
* Schiphol Airport = 1 = = = = >	average

It turns out that the locational variables 'international schools' and 'telecommunication' appear rather frequently in the reducts. Commercial firms appear to attach a high value to these locational factors. In addition, commercial firms for whom the proximity of Schiphol airport is relatively less important (i.e., a score 2) are relatively less satisfied with Amstelveen as a location than firms who highly value the proximity of the airport.

Finally, the application of a rough set analysis to non-commercial actors did not generate meaningful results, probably because this group is rather heterogeneous.

5.5 Transport and infrastructure

So far, we have carried out a segment analysis on the respondents according to country of origin (Subsection 5.3) and commercial orientation (Subsection 5.4.). We will now focus on a segmentation of attributes and start here with transport and infrastructure features. In this case we will also include the characteristics of the respondents, viz. country of origin and commercial objectives. All respondents are thus included in our rough set analysis. The results are given in Table 6 en 7, respectively.

Table 6. Reducts and core associated with transport and infrastructure features

---
Reducts	{a2,a3,a4,a7},{a1,a4,a5,a6,a7},{a1,a3,a4,a5},{a1,a2,a4,a6,a7} {a2,a3,a4,a6}{a1,a2,a3,a4}
Core	{a4}

Table 7. Decision algorithm associated with Transport and infrastructure features

Locational motive	*Satisfaction score*
* Rest of the world + commercial orientation	relatively high
* Japanese + low value to public transport + low value to telecommunication	relatively low
* Dutch + high value to harbour + low value to	
* Public transport + low value tot telecommunication	relatively low
* American	average
* Dutch + low value to harbour	average
* Japanese + high value tot airport + low value to harbour	average
Rest of the world + commercial firms + high value to	
* Airport + low value to harbour	average

It is surprising that the harbour shows up in all reducts and hence may be identified as the only core in our rough set analysis. However, an examination of Table 7 teaches us that the direction of influence of this variable is ambiguous. It is also interesting that the class of the respondents with a relatively high appreciation for the city of Amsterdam cannot be explained by the features of this city, but by the backgrounds of the respondents. And finally, those actors who have a relatively low satisfaction with Amstelveen, appear to attach a low value to the quality of public transport and of telecommunication services (features which score very well in Amstelveen).

5.6 Other locational motives

Finally, we will concisely analyse the class of other locational motives. The rough set results are presented in Tables 8 and 9.

Table 8. Reducts and core associated with other locational motives

---

Reducts: {a2,a8,a10,a1 l},{al ,a1 0,a1 1},{a1 ,a8,a11 ,a1 2},{a1 ,a2,a1 l}
Core: {A11}

Table 9. Decision algorithm associated with other locational motives

Locational motive	*Satisfaction score*
* Rest of the world + non-commercial actor	relatively high
* Dutch + good image + good residential climate	relatively low
* Japanese + good image + good residential climate + International schools	relatively low
* Poor image	average
* Good image + poor dwellings supply	average
* Japanese + good image + good dwellings supply + no International schools	average

It turns out from Table 8 that the core is formed by the presence of international schools (al 1) which appear to give for all respondents a high satisfaction   score.

5.7   **Conclusion**

The previous subsections have clearly demonstrated the potential of rough set analysis. It allows to extract from qualitative classes of attributes of phenomena the underlying structure that best represents a given data set. In our case the degree of satisfaction (as a performance measure) in Amstelveen was 'explained' from a set of 'soft' expressions on the perceived importance of various locational factors, besides some general characteristics of the respondents themselves.

Several interesting conclusions came to the fore. For example, Dutch actors with a high priority for road infrastructure are relatively less satisfied with the location in Amstelveen. In addition, actors with a low preference for road infrastructure appear to have a low satisfaction level. Furthermore, commercial firms for whom the proximity to the airport is less relevant are less satisfied with Amstelveen than other firms. This once more confirms the attraction force exerted by the presence of a major international transport hub. The same applies to the prominent importance attached to international schools.

References

- Ball, G.W. (ed.), **Global Companies, The Political Economy of World Business,** Prentice Hall, Englewood-Cliffs, 1975
- Bergh, J.C.J.M. van den, K. Button, P. Nijkamp and G. Pepping, **Meta-Analysis of Environmental Policies,** Kluwer, Dordrecht, 1997
- Daniels, J.D., and L.H. Radebaugh, **International Business Environment and Operations,** Addison-Wesley, Reading, Mass., 1994
- Daniels, P.W., and W.F. Lever (eds.), **The Global Economy in Transition,** Addison Wesley Longman, Harlow, 1996.
- Dunning, J.H. and G. Norman, The Location Choice of Offices of International Companies, **Environment & Planning A,** vol. 19, 1987, pp. 613-631.
- Funck, R.H., Competition among Locations, **Urban Agglomeration and Economic Growth** (H. Giersch, ed.), Springer-Verlag Berlin, 1996, pp. 227-255.
- Hall, E.T. and M.R. Hall, **Understanding Cultural Differences,** Intercultural Press, Yarmouth, 1990
- Kaminarides, J.S. and A.G. Orpharides, The Impact of Culture on International Business, **Journal of Business and Society,** vol. 10, no. 1, 1997, pp. 3-14
- KPMG, The 1995 Survey of Foreign-based Companies in the Amsterdam Area, Amstelveen, 1995.
- Pawlak, Z., Rough Sets. **Theoretical Aspects of Reasoning about Data,** Kluwer, Dordrecht, 1991.
- Poppelaars, J.A.A., Sociaal-Culturele Voorzieningen als Vestigingsplaats-factor, Instituut voor Overheidsuitgaven, The Hague, 1993.
- Price Waterhouse/Plant Location International, **Locational Requirements of Internationally Operating Companies,** London/Brussel, 199 1.
- Sassen, S., **The Global City,** Princeton University Press, Princeton, 1991
- Slowinski, R. (ed.), **Handbook of Applications and Advances of Rough Sets Theory,** Kluwer, Dordrecht, 1993.
- Terpstra, V., and K. David, **The Cultural Environment of International Business,** South Western Publishing Co., Cincinnati, Ohio, 1985.