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Formation of New Firms and Survival of Old Ones

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This paper introduces a new approach to firm dynamics, named demography of firms. It is the study of demographic events in a population of firms. The paper argues that within a demographic approach, attention should be paid to a broad range of firm dynamics, including both new firm formation and survival and employment growth among long-established firms. The paper presents two arguments for this opinion. First, a strong new firm formation is not a generic phenomenon among economic sectors, but seems to be sector-specific. As a consequence, regional variation in firm birth rates is very dependent upon the sectoral composition in regions. Secondly, the employment contribution of newly established firms seems also to be sector-specific and more importantly, rather over-estimated.

Within a demographic approach to firm dynamics, this paper will first examine firm birth rates and spatial variation in these rates. Attention will also be given to survival rates and employment effects of new firms. The focus of attention will then shift to the analysis of the survival of long-established firms, and strategies that enable firms to continue to exist. To this purpose, a specific micro-approach to strategic change will be introduced, named Company Life-History Analysis. An ‘evolutionary’ perspective to firm survival will then be linked up with management theory and elements of spatial innovation (diffusion) theory. It will particularly be explored empirically what the support of the local environment may be in successful survival strategies of long-established small and medium-sized firms in the Netherlands. The paper will conclude with a number of implications for further research.

Key words: demography of firms, company life-history, micro-research, firm formation, firm survival, technical innovation, local environment, the Netherlands.
Setting the Scene

Regional employment growth is the result of various types of firm dynamics. A distinction can be made between the establishment of new firms (births) and the dissolution of established firms (deaths), expansion and contraction of employment in established firms, and the (partial or entire) depart of firms from a region and settlement of established firms from elsewhere (Figure 1).

Figure 1 Components in regional employment growth

Since the early 1980s, strong attention has been given to the formation of new firms. From a regional-economic perspective, much research has been conducted on the spatial differentiation in this formation and on favourable spatial conditions (cf. Armstrong and Taylor 1993; Keeble and Wever 1986; Reynolds et al. 1994). In addition, there is a growing volume of literature on the contribution of new (high technology) firms to create new employment (cf. Cooper 1993; Fritch 1994; Keeble and Kelly 1988; Oakey 1993; Storey 1994). One of the results of this research is that job growth and contribution to regional growth are often not very impressive and open to debate (cf. Fritch 1994; Oakey 1993).

Against this background it is surprising that research has paid much less attention to established (older) companies, the way in which they succeed in surviving and favourable local conditions to this survival. Established firms encompass a far majority of the stock of firms, witness for example the almost 70% in France (Guesnier 1994). From all firms in 1991 in this country, 68% were more than ten years old.

In the past decades, established firms have clearly experienced an increase of uncertainty and risk. New technologies pervasively changed advanced industrial activity. For example, information and communication technology, biotechnology and new materials had impacts which clearly went
beyond the use of the technology itself, such as the adoption of new modes of organisation of production and work practices. A crucial development was also the increased competition on a global level. A major corporate response to this has been to place more emphasis on the development of new product and process technology in order to improve long-term competitiveness. In addition, product life-cycles are progressively shortening in specific sectors, such as micro-electronics.

At the same time, patterns of consumption have shifted from mass products to (highly) differentiated products with fast changes in demand (cf. Abernathy et al. 1984). In competition, quality has become as much important as price. Accordingly, emphasis has moved to some degree from Fordist production for standardized mass consumption to production of customized goods on a flexible basis, including also flexible market relationships. Together with shorter product life cycles and increased demand for new competitive products, this development has caused a need for stronger R and D efforts which in turn leads to a further emphasis on core business, outsourcing and inter-firm cooperation (Nooteboom 1993).

In view of the above changes and uncertainty, companies needed and need to be strongly adaptive. Normally, companies adjust to their environment in an incremental way. From time to time however, there is a need for a more radical change ('jump'), such as a merger, the implementation of a radically new technology, a shift to new product-markets, a relocation, a large reduction in workforce, etc. A critical factor in these adjustment processes is their management (cf. Pettigrew and Whipp 1991).

The article first introduces firm demography as a new approach to firm dynamics. It discusses the object of firm demography, events that are relevant in a demographic analysis, and potential use of research results. Attention will then shift to the issue that has caught most of the research efforts to date, i.e. new firm formation and spatial variation in this process (Section 2). Furthermore, survival
rates and employment effects of newly established firms will be taken into consideration (Section 3).

In a second part, this article will focus on the issue of survival of long-established firms. It will explore an explanatory framework of corporate survival in a spatial context, i.e. an evolutionary approach to corporate change will be linked up with management theory (Section 4). Furthermore, the article will explore empirically survival strategies (particularly technical innovation) and the role of the local environment in these strategies (Section 5). The paper will conclude with a number of implications for further research (Section 6).

The empirical results in this paper are concerned with newly established and older firms in the Netherlands. The results are based on a blend of applied Dutch research and research in various European Community countries.

New Firm Formation

Since the late 1980s, a new methodological approach to firm dynamics has been developed in the Netherlands, i.e. demography of firms (cf. EIM 1992; Ekamper 1994; Gordijn and Van Wissen 1992; Ritzen and Van der Ven 1990; Struys and Willeboordse 1990; VVK 1994; Wever and Schutjens 1994; Willeboordse 1986). Demography of firms can be described as the study of demographic events in the population of firms in a particular area. From a regional perspective and analogous to population demography, demography of firms focuses on the processes of birth, death (mortality) and migration of firms (Gordijn and Van Wissen 1992). In addition, survival rates and changes in firm size are important as they affect the aggregate employment outcome in a region.

While early research on new firm formation ‘suffered’ from a narrow scope in the sense of covering a small number of of selected regions and economic sectors (cf. Wever 1984), recent research benefits from a much broader perspective
including entire nations and all economic sectors (cf. EIM 1992; Keeble et al. 1993; WK 1994; Reynolds et al. 1994).

A demographic approach to organisational change is not novel. In organisational sociology (ecology) a similar approach has been developed since the late 1960s (cf. Stinchcombe 1968; Freeman et al. 1983; Hannan and Freeman 1989). The fact that so little empirical work on firms has been done to date, reflects problems in collecting suitable longitudinal data. In this respect, also conceptual problems have played a role.

Firms can be conceived of in different ways, dependent on the aim of the study. For example, a firm may be viewed as a juridical entity, or as an organisational unit involved in a particular production process. Furthermore, a firm may have organised its production in one or more production establishments. In a spatial (regional) approach, these establishments are important entities since they constitute the physical representation of production in an area.

Firm demography is essentially a dynamic approach at the micro level, which means that individual firms are followed through time. This causes additional problems of definition, particularly regarding death and survival (cf. Hannan and Freeman 1989). For example, when a firm shifts to a radically new product, it may be questioned whether it is still the same firm. A similar situation arises when the majority of a firm's shares are acquired by another firm.

In a demographic approach to firm dynamics, use can be made of analytic models popular in demography of human populations, such as the age-period-cohort (APC) model. Firm deaths are among others related to age in that mortality decreases with age. The second effect, cohort, can be described as follows. A cohort is a group of firms that share the same event (experience) in a particular time, such as birth in a particular year. Cohort-effects are all effects related to such a context, shared in the past. The third effect, period, encompasses various influences that varies in time, such as conjunctural moves, inflation, interest rates,
etc. Period-effects seem to be relatively important in the explanation and forecasting of firm dynamics. The forecasting of relevant indicators in question is however, a difficult matter. In addition, there is the 'endogeneity' problem (Gordijn and Van Wissen 1992). Macro-economic indicators, such as business cycle developments are the aggregate outcome of the micro-decisions of individual firms. This observation indicates that the standard APC-model is not entirely appropriate in modelling firm dynamics and that perhaps more attention should be given to ecologic approaches emphasizing the relationship between population characteristics (size) and population dynamics.

Firm demography has an important (potential) field of application in the (spatial) projection of economic activities. Future projection of the number of firms can be used for the planning of industrial premises (zones), and as an input for projections of transport and housing (Gordijn and Van Wissen 1992).

There are various reasons why of all types of firm dynamics, new firm formation has attracted much concern (cf. Reynolds et al. 1994). Perhaps most significant is the fact that new firms provide new jobs. A second reason is that new firms are often involved in the introduction of new products and processes in the market. Accordingly, they may provide a major challenge to established firms and encourage them to improve their product quality and service or reduce prices. Firm births and employment growth among new firms can be illustrated by some empirical evidence from the Netherlands.

The number of firm births in the Netherlands in 1990 amounted to almost 22,000 (EIM 1992), given a human population of 14,9 million. Since the mid 1980s new firm formation has clearly increased, witness the index number of 151 in 1990 (Table 1). A high growth rate can particularly be observed for business services (201), transport (164), and wholesale trade (160). By far the largest share of new firm formation is observed for business services (32%). Wholesale trade holds a second position (19%), while retail trade is third (13%).
These three sectors encompass almost two-thirds (65%) of all firm births. Firm births in manufacturing are however, relatively unimportant (9%).

Table 1  Firm births in the Netherlands, development (1985-1990) and sectoral structure (1990)

A similar pattern is reported for other European countries, such as the United Kingdom (Keeble et al. 1993) and France (Guesnier 1994). In France, 30% of all firm births in 1981-1990 were observed for trades, and 39% for various services. Only 10% is found in manufacturing.

When we shift our attention to regional variation in firm births in the Netherlands, it becomes clear that comparable regional figures are only available for recent years (and also from a different source using a slightly different definition). Table 2 indicates a considerable regional variation of new firm formation in the Netherlands, as observed in the 1992. It must be emphasized that firm birth rates can be measured in various ways dependent on the unit of reference. This unit may be the stock of established firms (ecological approach), the human population, or the workforce (labour-market approach) (cf. Fritch 1994). For reasons of an international comparison, we select here the stock of established firms and the size of the human population in the area. Our comparative analysis focusses on those countries for which figures in the late 1980 or early 1990s were available (the early 1980s constituted a different entrepreneurial 'atmosphere').

When we disregard outliers, the range of the regional variation in the Netherlands (based upon the ecological approach) is somewhat smaller than that in Germany and Italy (namely 1.4, as opposed to 1.6 and 1.9). This is due to a relatively high regional minimum of births in the Netherlands (8.3). Related to the size of the human population, the picture in the Netherlands is different in that the regional minimum is rather low (32, as compared to 41 and 74 for
Germany and Italy respectively) as is the regional maximum (72, as compared with 90 and 202 for the same two countries).

In addition, it appears that figures tend to be slightly higher in regions in the economic core of the Netherlands compared to other zones, witness the positive deviation from the national average for both types of birth rate (Table 3).

A spatial pattern like this is far from unusual in Europe, and is reported extensively for example, for the United Kingdom (Keeble et al. 1993) and Sweden (Johannisson 1993). It follows partially from a strong sectoral specialization in business services in economic core areas, such as the Dutch Randstad, Southeast England and the Stockholm, Gothenborg and Malmo regions. In fact, the number of start-ups in a region is strongly determined by the sectoral structure in that region (Fritch 1994).

Based upon the above observations, we can conclude that the phenomenon of new firm formation is sectorally biased and (related to this) also regionally biased. It has also become clear that new firm formation in the Netherlands is rather low in relation to the size of the human population.

Table 2 Regional variation in firm birth

Table 3 Firm birth in three zones in the Netherlands (1992, per province)

New Firms’ Survival and Employment Growth

It is a well known fact in organisational sociology (or ecology) that newly established firms face relatively large risks, due to a lack of organisational experience and cohesion (cf. Stinchcombe 1968). Accordingly, the death rate among start-ups is relatively high and decreases with time. In this respect, the life courses of Dutch firms established in the fourth quarter of 1985 figures indicate the following pattern
(CBS 1991). Firm dissolution amounts to 18% after one-and-a-half year, and 34% after three years. Then, after four-and-a-half year firm ending amounts to 40%, meaning a survival rate of 60% (Table 4). For a differently defined cohort in the Netherlands, survival rates appear to be much lower. After a period of 13 years, only 25% of the new firms have survived (Wever and Schutjens 1994).

Survival rates strongly influence the contribution of newly established firms to employment growth. First, there is the employment loss among firms that are forced to end their activities and secondly, there is the employment (gain) among firms that survive. In the Netherlands, the above mentioned 1985-cohort (3,000 firms) has generated 4,500 jobs in the year of establishment (Table 4). In 1990, the net employment gain (employment growth among survivors minus employment losses among dissolved firms) amounts to 5,600, which implies an increase of 24%. When only survivors are taken into account, the percentage increase is 106%. In terms of average employment per firm, there is an increase from 1.5 to 5.2 jobs after four-and-a-half years. Based upon a differently defined cohort in the Netherlands, the average employment per firm amounts to 6.5 after thirteen years (Wever and Schutjens 1994).

Similar to birth and survival, employment growth among start-ups is not uniform across the sectors. The strongest growth occurs in manufacturing (Table 4), witness the average job generation of 13.8 compared with 4.1 among services (Wever and Schutjens 1994). It should also be emphasized that employment growth is only generated by a small number of firms and not throughout the whole population of start-ups (EIM 1992; Oakey 1993; Westhead and Cowling 1994).

It can be concluded so far that both firm birth and employment growth are strongly sectorally biased. Business services and wholesale trade play a prominent role in new firm formation, while manufacturing plays only a substantial role in job generation per firm.
It is a difficult task to compare Dutch developments with patterns in other countries, because there is no universally accepted definition of employment change in surviving firms. Direct comparison between studies is hampered by the fact that these studies cover a variety of business conditions in different regions and different time periods, as well as divergent types (sectors, ages) of new and/or small firms. In addition, sample sizes vary considerably, leading to large differences in populations for which the results are valid. Given these considerations, the following can be stated in view of newly established firms in the Netherlands and the United Kingdom (Table 5):

New firms in high technology sectors seem to create significantly more jobs than new firms encompassing all (manufacturing) sectors (17 per firm in a maximum of five years in the United Kingdom, as opposed to 13.8 per firm in thirteen years in the Netherlands). Employment creation in the Netherlands appears to be relatively low, i.e. 6.5 jobs per firm in a mix of sectors over thirteen years, as compared with 7 jobs per firm over ten years in only low technology sectors in the United Kingdom.

The above results indicate the necessity to pay attention to long-established firms and their survival and employment growth. This will be the subject matter of the next sections.
Companies usually change their strategies (product, markets, etc.) in an incremental way. From historical research it appears that radical adjustments do take place but occur infrequently (Mintzberg 1978). Evolutionary economics reports similar insights (Nelson and Winter 1982). In evolutionary economics it is emphasized that organisations develop, stabilize and follow routines. These routines may change over time, but in the short run they function as stable carriers for knowledge and experience. This causes a certain degree of 'inertia'. Related to the latter point is the core concept of search behaviour. Organisations are not invariant but change as a result of search for new solutions when older ones fail to work. Search behaviour follows routines, for example based upon perceptions 'coloured' by the previous situation and biases in information processing.

From these observations it follows that companies have a 'natural' preference for an incremental (or 'stepwise') adjustment (Table 6, Box 1). However, there are situations in which radical changes (or 'jumps') occur. 'Jumps' potentially affect the firm in terms of profitability, employment and overall continuation of existence. 'Jumps' are unexpected, radical adjustments, surrounded with large degrees of uncertainty. For example, the company may adopt a totally new technology, or it may undertake a number of small changes at the same time (large accumulation of minor moves) (Box 11). A second situation of radical change may arise when the company cannot keep pace with market and technology influences (Box 11). After some time a radical adjustment is then inevitable (transition to IV). In view of management of risk and uncertainty, the transition from incremental adjustment to radical adjustment (from 1 to 11, from 1 to IV, and from 111 to IV) calls for particular attention.

Table 6 A classification of corporate adjustment
Apart from the market and technology, an 'internal' source of change must be mentioned here, namely critical development points in the life of the company as an organisation. Reaching the \textit{size} in which there is a need for additional management is one \textit{such} event, as is the succession of the owner-director. These examples point at the interplay of various cycles which small and medium-sized firms undergo or with which they become closely connected in the course of \textit{time} (cf. Taylor 1986), all being the source of various potential \textit{'jumps'}:

- Organisation cycle (micro-level)
- Product life-cycle (technology and market change at the \textit{meso-level} of the sector)
- Life-cycle of the owner-entrepreneur (micro-level)
- Business cycle (macro-level).

The above cycles \textit{cause} various conditions which urge companies to adjust continuously during their lives. ‘ company Life History Analysis’ is the study of development trajectories of individual companies. Within a demographic framework, the analysis \textit{focusses} on developments and strategies related to \textit{survival and employment growth}. Further essential features of this approach can be summarized as follows: longitudinal, qualitative and spatially oriented. In a \textit{retrospective} analysis, the company is ‘observed’ for a period of usually 20 to 40 years in order to \textit{depict} long- to medium-term \textit{changes} from an evolutionary perspective. The results achieved are largely qualitative, in-depth insights. Particular attention is given to \textit{factors} that influence significant corporate change on the micro-level. Thus, company life-history analysis has the \textit{clear} advantage that it enables to identify explanations for survival and employment change on the level \textit{where} the decisions related to these \textit{changes} are taken, namely the individual firm.

Company life-history analysis \textit{makes} use of a limited number of case studies in the first (exploratory) stages of research, in order to \textit{reach sufficient} explanatory background
(cf. Glasmeier 1987; Schoenberger 1991). It may however, be extended to an analysis which covers the whole population by means of a sample survey. In the data collection in the first stages, a multiple source approach is often used, primarily because the data demand cannot be covered with one single source. The second reason for a multiple evidence approach is the opportunity for increasing accuracy and validity of case study results (Yin 1991). Common sources are in-depth interviews, (when available) annual reports, and external sources, such as patent registers.

In the remaining section, we will focus on the ability of companies to secure an appropriate competitive level in order to survive, by conceiving this as the management of change. In addition, the potential role of the local (regional) environment is considered by following various directions in spatial innovation and diffusion theory.

Many factors contribute to (or inhibit) a successful management of change in companies. According to Pettigrew and Whipp (1991), five factors can be distinguished:

1. Environmental assessment. An adequate assessment of the changes in the business environment is of vital importance. Furthermore, it is important that understanding of the economic environment is achieved across the entire organisation by means of open learning. Critical features include the 'catching' of the right information in a timely fashion, the mastering of assessment techniques and the ability to link assessment results to central operations of the business.

2. Leading change. Leadership cannot be described in general terms because it is very sensitive to context. There are nevertheless, various essential conditions, such as the building of a receptive climate for change (by legitimising the need for change, and by building the capability to implement required changes).

3. Linking strategic and operational change. Strategic intentions need to be broken down into actionable pieces and the latter must become the responsibility of change managers.
It is important to note that strategic intentions may transform during the process of implementation, leading to a new framework for strategic choices.

(4) **Human resources as assets and liabilities.** Human resource management (HRM) is of vital importance as it is concerned with all capacities necessary to be successful in competition. It includes recruitment and training, as well as employee relations.

(5) **Coherence in management.** The need for coherence arises in many ways from the demands of the previous four factors. Both intended and operational action should have an appropriate level of consistency, consonance, advantage and feasibility. HRM activity has an important task in producing an internal knowledge base to serve this coherence in change.

The local environment may offer benefits particularly for two components in the management of change, i.e. environmental assessment and human resource management. Environmental assessment is based upon new and specialized information, to be achieved via general and specific networks. Essential in this respect is that the company receives the information in a timely fashion, so that it can anticipate changing circumstances or respond quickly. According to the classical incubation, filtering-down (diffusion) and contact-systems theory, the conditions that satisfy these needs are favourable in metropolitan areas, based upon large concentrations of (dis)similar firms, institutes and population (Davelaar 1989; Leone and Struyck 1976; Pred 1977; Thompson 1968). In this hierarchical line of thinking, metropolitan areas also offer the best conditions for human resource management, by means of their many (specialized) education and training facilities, and labour market characteristics.

It has however, recently been acknowledged that also specific non-metropolitan areas may offer strong supportive conditions to the management of corporate change. In such regions, information needs are satisfied in localized learning processes, based upon a dynamic territorial interplay between actors in a coherent production system, local culture,
tradition and experiences (cf. Camagni 1991; Ratti 1992; Storper, 1992, 1993). This line of thinking comes close to the one which puts a strong emphasis on the trend for localization. Writers in the latter stream adhere to a vertically disintegrated and locationally fixed production, based on a shift to flexible specialization. The empirical evidence is found in high technology regions such as Silicon Valley, Boston, the M4 Corridor, and in semi-rural areas such as the Third Italy. Although the success of economic restructuring in these regions is without doubt, the pervasiveness of the trend for flexible specialization and concomitant localization is not sufficiently proven (cf. Van Geenhuizen and Van der Knaap 1994; Gertler 1988). Aside from a trend towards localization there is a trend towards globalization, associated with the growing influence of multinational corporations and their global networking with smaller firms (cf. Amin 1993).

The above viewpoints indicate a lack of consensus on the type and scale of the relevant spatial environment for the survival of companies. The following section will explore empirically an important survival strategy among long-established companies, located in different regions in the Netherlands. To this purpose company life-history analysis will be used by focussing on a few interesting case studies.

Old Firms’ Survival: Empirical Explorations

In this section we will explore the acceptance of a major process innovation among carpet manufacturers, i.e. the process of tufting. The adoption of this technology can be considered as a good example of strategies underlying significant employment expansion of firms. The analysis draws on various case studies of firms in the region of North-Overijssel (Outer Zone) and in Northeast North-Brabant (Intermediate Zone). For confidentiality reasons, these firms are denoted by T1 to T5 (Table 7). The analysis will
particularly consider influences on the time of adoption of the new technology.

The introduction of tufting made carpets much cheaper than similar woven qualities, due to a larger labour productivity. As a consequence, tufted floor covering came within easy reach of mass consumption. Accordingly, tufting can be considered as an important process innovation in the textile industry (Toyne 1984; Rothwell and Zegveld 1985).

Regarding the time of adoption, a clear variation can be found between carpet factories in North-Overijssel and those in Northeast North-Brabant. Compared with the average adoption time for the total country (1968), adoption was relatively early in North-Brabant and late in North-Overijssel (Table 7).

Two factors have contributed to a late adoption in the region of North-Overijssel. The shift to tufting here involved not only a new process technology but also new product types and particularly a new production organisation. The adoption included a shift from hard to soft floor covering and concomitantly, a move from small scale (home) industry to large scale factory work. Such a ‘jump’, including impacts beyond the technology itself, caused a wait-and-see policy. In other regions however, the adoption of tufting was additional to an existing large-scale weaving of carpets, and accordingly, it was not considered a major shift.

The results point also to an influence of firm size. The companies in Overijssel were significantly smaller than the ones in North-Brabant, regarding the number of employees (Table 7). The concomitant modest financial capacity of the former advanced the previously mentioned wait-and-see policy. In addition, the results point to an influence of the strategic context of innovation adoption. Adoption may be delayed or absent when the technology in question does not fit the core of the firm’s activities and products. Both T1 and T3 illustrate a late adoption caused by a preceeding acceptance of product improvement (new technology) in a product area slightly outside the one in question.

Tufting has been an innovation that caused an employment
expansion among carpet manufacturers (Van Geenhuizen and Van der Knaap 1994). The chance for (early) adoption of the technology seems however not equally distributed among firms. Our analysis has indicated a differentiating influence of the preceeding strategies and of company size. It has also pointed to a spatial influence of information availability, conform with hierarchical diffusion theory.

Table 7 Strategic shift in the carpet industry

The previous analysis has considered the influence of the spatial environment in an indirect way. The remaining section will therefore, explore the direct significance of various local attributes for surviving and employment growth, particularly in relation to technical innovation. The focus will be on the role of the local environment in terms of needs for the management of change, i.e. information availability and human resource management. To this purpose, twenty-one case studies have been conducted in the Netherlands. The case studies satisfy the following criteria:

Innovative, in that major product and process innovations have been introduced.
Covering traditional as well as modern manufacturing, i.e. textiles, and machinery and electronics.
Mostly older than 20 years.

The importance of the local environment has been measured in a standardized way by means of scores, whereas explanatory background information has been gathered in an open-ended fashion (Note 1).

Table 8 indicates the prime importance of the local labour market and of local training support among long-established firms. These attributes gain almost 40% of the maximum possible score, regarding the aggregate picture. A second position is held by suppliers (of material, equipment, etc.), with a good 20% of the maximum possible score. In
machinery and electronics industry however, subcontractors and customers are equally important.

The prime importance of labour market and training support calls for attention in view of various specific labour shortages, such as in handicraft skills and skills to apply modern technology in traditional fields (e.g. industrial process management and informatics in the textile industry). A general bottleneck in the labour market appears to be shortages of practical skills among young people that complete vocational training. A lack of adequately qualified personnel as a major bottleneck in innovation has also been reported in other Dutch research (Kleinknecht and Reijnen 1992).

When considering information transfer, it appears that specific knowledge institutes or knowledge service companies are relatively unimportant (Table 8). It is particularly striking that the local (regional) universities play such a minor role among long-established firms (with only about 5% of the maximum score). This finding is underlined in a large survey among Dutch small and medium-sized manufacturing firms (BEA 1993). Universities (or their transfer institutes) are found among the lowest rated sources of knowledge. Table 8 also indicates that the local ‘incubation’ function (as evident in various formal and informal networks across the business world) is more important than the university. This is particularly true for the machinery and electronics industry (15% and 5% of the maximum score respectively).

Table 8  Scores on strongly significant local attributes

Case study analysis offers the great advantage to explore differences between various cases. Our results indicate a large variation in importance of local attributes between high technology small firms. Two extreme types can be distinguished:

Companies with a strong local focus, such as machinery and electronics companies which strongly depend on local
modern skills and training support, subcontractors and customers, and the local incubation function. Companies for which the local environment is not important at all. 'Non-locals' have a strong orientation outside the region in common dating back in some instances to the 1960s and 1970s, e.g. based upon an origin elsewhere or product technology from abroad. These companies have developed 'mobile' resources related to top segments of global markets.

From the above observations it may be inferred that chances for a successful survival are not equally distributed among companies. Companies in cities (regions) that provide an appropriate match between demands for and supply of labour and training infrastructure, seem to have a better chance for survival and innovation than companies located elsewhere. There may however, be a large variation between firms in their 'dependence' on the local environment.

Conclusion

A demographic approach to regional economic growth is a promising research method, as it unravels various components in firm dynamics, such as births and deaths, firm migration and employment growth of surviving firms. This paper has made a plea for incorporating employment growth and survival of long-established firms in a demography of firms.

Major steps in international comparative research have already been taken in the area of new form formation. Other firm dynamics are still an open research area, where various conceptual (definitional) problems need to be solved, aside from the establishment of longitudinal datasets that allows for international comparison. Particularly, the analysis of survival and employment dynamics of long-established firms asks for a further elaboration of the method outlined in this paper, i.e. company life-history analysis.
By using this method the paper has explored the adoption of a major survival strategy in Dutch manufacturing and potential support of the local environment in such strategies. The chance for (early) adoption of the technology appeared not to be equally distributed among firms. Our analysis has indicated a differentiating influence of preceding strategies and of company size. The results also pointed to a spatial influence of information availability.

The analysis has brought to light that the labour market, including training support, forms the single most important factor in the local environment. All other attributes in the local environment, including various knowledge sources, are clearly less important for long-established firms. It could once more be inferred that the chance for a successful survival is not equally distributed among firms and across regions (cities). Firms in regions that provide an appropriate match between demands for and supply of labour and training facilities, seem to have better outlooks on survival and innovation than companies located elsewhere. Results like these clearly underline the need for a further elaboration of the method of company life-history analysis as a part of a demographic approach to regional economic growth.
Note 1

Each company valued a number of precoded local attributes at three point scale as follows: not important, important and strongly important. The latter valuation has been taken into account in our study as it was experienced that only this one discriminated seriously between companies. Accordingly, three series of scores were measured, i.e. related to the general performance of the firm, the introduction of a major product innovation, and the introduction of a major process innovation.
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Figure 1 Components in regional employment growth

Region
  . Births +
  . Expansions +
  -------->
  . Inward Migration +
  . Deaths -
  . Contraction -
  . Outward migration - -------- >
<table>
<thead>
<tr>
<th>Sector</th>
<th>1990 (index 1985 = 100)</th>
<th>1990</th>
<th>% share</th>
</tr>
</thead>
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<tr>
<td>Manufacturing</td>
<td>144</td>
<td>144</td>
<td>9.3</td>
</tr>
<tr>
<td>Construction</td>
<td>153</td>
<td>153</td>
<td>8.3</td>
</tr>
<tr>
<td>Wholesale</td>
<td>160</td>
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<td>6.9</td>
</tr>
<tr>
<td>Transport</td>
<td>164</td>
<td>164</td>
<td>3.2</td>
</tr>
<tr>
<td>Business Serv.</td>
<td>201</td>
<td>201</td>
<td>32.4</td>
</tr>
<tr>
<td>Remaining Serv.</td>
<td>130</td>
<td>130</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>151</strong></td>
<td>151</td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td><strong>Totals (abs)</strong></td>
<td><strong>21,600</strong></td>
<td>21,600</td>
<td><strong>21,600</strong></td>
</tr>
</tbody>
</table>

Table 2  Regional variation in firm birth

<table>
<thead>
<tr>
<th></th>
<th>Annual firms birth (a)</th>
<th>Per 10.000 human population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per 100 firms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1  2  3</td>
<td>1  2  3  4</td>
</tr>
<tr>
<td>NL ('92) (b)</td>
<td>10.7 8.3 11.6 1.4</td>
<td>52 32 72 2.3</td>
</tr>
<tr>
<td>Germany('86)</td>
<td>8.6 6.5 10.1 1.6</td>
<td>55 41 90 2.2</td>
</tr>
<tr>
<td>Italy('87-91)</td>
<td>9.3 6.1 11.8 1.9</td>
<td>144 74 202 2.7</td>
</tr>
</tbody>
</table>

Source: Figures for NL adapted from Unified Chambers of Commerce (VVK) (1994); remaining figures adapted from Reynolds et al. 1994.

Notes (a): 1 = Regional Average; 2 = Regional Minimum; 3 = Regional Maximum; 4 = Regional Maximum/Minimum
(b): In fact, the maximum value per 100 firms is 17.9, but this clearly represents an outlier.
Table 3  **Firm birth in three zones in the Netherlands** (1992, per province)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Per 100 firms</th>
<th>Per 10,000 human population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CORE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Holland</td>
<td>11.5</td>
<td>72.1</td>
</tr>
<tr>
<td>South-Holland</td>
<td>11.1</td>
<td>57.0</td>
</tr>
<tr>
<td>Utrecht</td>
<td>11.6</td>
<td>60.8</td>
</tr>
<tr>
<td><strong>INTERMEDIATE ZONE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gelderland</td>
<td>9.7</td>
<td>42.9</td>
</tr>
<tr>
<td>Flevoland</td>
<td>17.9</td>
<td>69.6</td>
</tr>
<tr>
<td>Overijssel</td>
<td>9.9</td>
<td>40.7</td>
</tr>
<tr>
<td>North-Brabant</td>
<td>10.5</td>
<td>51.0</td>
</tr>
<tr>
<td><strong>OUTER ZONE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groningen</td>
<td>10.9</td>
<td>39.7</td>
</tr>
<tr>
<td>Friesland</td>
<td>8.3</td>
<td>31.9</td>
</tr>
<tr>
<td>Drenthe</td>
<td>9.0</td>
<td>33.1</td>
</tr>
<tr>
<td>Limburg</td>
<td>9.0</td>
<td>38.9</td>
</tr>
<tr>
<td>Zeeland</td>
<td>8.8</td>
<td>42.5</td>
</tr>
<tr>
<td><strong>National average</strong></td>
<td>10.7</td>
<td>52.2</td>
</tr>
</tbody>
</table>

Source: Adapted from Unified Chambers of Commerce (VVK) 1994
### Table 4  Firm survival and employment growth in the Netherlands

<table>
<thead>
<tr>
<th>Cohort established</th>
<th>1985</th>
<th>End of June 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survivors (abs)</td>
<td>3,000</td>
<td>1,800</td>
</tr>
<tr>
<td>Survival rate</td>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>Net Employment</td>
<td>4,500</td>
<td>5,600</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td></td>
<td>24%</td>
</tr>
<tr>
<td>Gross Employment</td>
<td>4,500</td>
<td>9,270</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td></td>
<td>106%</td>
</tr>
<tr>
<td>Average employment</td>
<td>-</td>
<td>5.2</td>
</tr>
<tr>
<td>per surviving firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(aged 4.5 years)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort established</th>
<th>1980</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 (three regions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survivors (abs)</td>
<td>1,222</td>
<td>301</td>
</tr>
<tr>
<td>Survival rate</td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>Average employment</td>
<td>-</td>
<td>6.5</td>
</tr>
<tr>
<td>per surviving firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(aged 13 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Only Manufacturing</td>
<td>13.8</td>
<td></td>
</tr>
<tr>
<td>- Only Prod. Services</td>
<td>4.1</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5  Employment creation in surviving new firms in United Kingdom

<table>
<thead>
<tr>
<th>Study</th>
<th>Sector/Firm type</th>
<th>Time period</th>
<th>Average jobs per firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oakey (1984)</td>
<td>Instruments and Electronics Firms &lt; 5 years</td>
<td>1977-82</td>
<td>17</td>
</tr>
<tr>
<td>Keeble &amp; Kelly (1986)</td>
<td>Computer hardware and services</td>
<td>1975-84</td>
<td>28</td>
</tr>
<tr>
<td>Storey &amp; Strange (1992)</td>
<td>Low technology</td>
<td>1979-90</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Adapted from Westhead and Cowling 1994 (Table 5).
Table 6 A classification of corporate adjustment

<table>
<thead>
<tr>
<th>Company Adjustment</th>
<th>Incremental ('steps')</th>
<th>Radical ('jumps')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market and Technology Influence</td>
<td>Gradual</td>
<td>1</td>
</tr>
<tr>
<td>Technology Influence</td>
<td>Fast</td>
<td>111</td>
</tr>
</tbody>
</table>

Source: Adapted from Van Geenhuizen, Nijkamp and Townroe (1992)
Table 7  **Strategic shifts in the carpet industry**

T1  (North-Overijssel)

1950  *(state)*  Small scale manufacturing of mats (carpets) of coir.
1970  Major product improvement (PVC backing of coir mats).
1976  Adoption of tufting of soft floor covering (in 1973 in cooperation with another local firm).
1980  Upgrading of the product quality of tufted floor covering.

T2  (North-Overijssel)

1950  *(state)*  Manufacturing of mats (carpets) of coir/sisal.
1969  Adoption of tufting of soft floor covering.
1974  Additional specialization in carpet backing and dying in order of other carpet manufacturers.
1986  Adoption of tufting of synthetic grass.

T3  (North-Overijssel)

1950  *(state)*  Small scale manufacturing of mats (carpets) of coir.
1967  Adoption of product technology of needle-felt.
1972  Adoption of tufting of soft floor covering.
1985  Product differentiation of needle-felt.
1989  Upgrading of the product quality of tufted floor covering.

T4  (NE North-Brabant)

1960  *(state)*  Large scale manufacturing (weaving) of high-quality carpets and furniture coverings.
1965  Adoption of tufting of carpets/floor covering.
1977  Closing down of weaving department and major contraction
1982  Liquidation

T5  (NE North-Brabant)

1950  *(state)*  Large scale manufacturing (weaving) of carpets, also needle-felt.
1963  Adoption of tufting of carpets/floor covering.
1965  Expansion by means of various takeovers (in Belgium).
1975/6  Adoption of new dying technology (within a joint venture).
1981  Generation of new product technology of synthetic grass covering (for sports grounds).

*a.* The size (workers) of the companies in 1970 was as follows: T1 25 workers, T2 150 workers, T3 50 workers, T4 700 workers, T5 1,000 workers.
Table 8  Scores on strongly significant local attributes

<table>
<thead>
<tr>
<th></th>
<th>Textiles</th>
<th>Machine and Electronics</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abs % max. score</td>
<td>Abs % max. score</td>
<td>Abs % max. score</td>
</tr>
<tr>
<td>Labour market</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Training support</td>
<td>8</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>Suppliers</td>
<td>6</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Subcontractors</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Customers</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Marketing services</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Techn. University</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Technical services</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Incubation</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Financial services</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Maximum Score</td>
<td>24</td>
<td>39</td>
<td>63</td>
</tr>
</tbody>
</table>

Maximum Score

37.5

33.3

25.0

16.0

41.0

43.6

100

39.7

25

39.7

13

20.6

7

11.1

7

11.1

1

1.6

3

4.8

3

4.8

6

9.5

3

4.8
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