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in Entrepreneurial Firms:
An Evolutionary Perspective**

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A Process Model of Locational Change in Entrepreneurial Firms: An Evolutionary Perspective¹

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Abstract: How do changes in the spatial organization of entrepreneurial firms come about? This paper provides a conceptualisation of the process of locational change. A process model of locational change is constructed on the basis of an empirical study of 109 locational events during the life course of 25 young firms in knowledge intensive sectors (knowledge services and biomedical). This process model of locational change maps both internal and external variation and selection processes. This model contributes to the development of a causal process theory of the spatial development of (new) firms.

Keywords: location, entrepreneurial firms, evolutionary theory, decision-making, process models

1 Introduction

Entrepreneurship is a highly localized process. Many studies have shown that almost all entrepreneurs start in their home region (Cooper 1985; Allen and Hayward 1990; Stam 2003), or even within their home (Stam and Schutjens 2000). Most of these firms do not survive the first ten years after start-up (Storey 1997). It seems irrelevant to study the location of new firms, as new firm formation is almost per definition a local process, and most new firms fail. However, a small percentage of the firms in new cohorts is responsible for the majority of the net new job creation in the region where they are located (Birch 1987; Kirchhoff 1994; Storey 1997). These fast-growing firms reveal very high locational dynamics, within as well as outside their region of origin (Stam 2003). This special group of young fast-growing firms is highly relevant both in a societal perspective as job creators and in a scientific perspective as revealing very high locational dynamics. In contrast to the location of new firms in general (Cooper 1998; Stuart and Sorenson 2003) and the location of multinational enterprises (Dunning 1998; Cantwell and Santangelo 2002), we know almost nothing about the location of young fast-growing firms. This paper aims to gain insight into the locational dynamics of these firms. Locational dynamics involves changes in the spatial organization, which is defined as the spatial configuration of physical resources of the firm. These changes necessarily involve (dis)investment decisions.

The research problem in this paper is “How do changes in the spatial organization of entrepreneurial firms come about?” and the main purpose of the paper is to provide a conceptualisation of the process of locational change. A process model of locational change is constructed on the basis of an empirical study of 109 locational events during the life course of 25 young firms in knowledge intensive sectors (knowledge services and biomedical). This process model of locational change maps both internal and external variation and selection processes. This model contributes to the development of a causal process theory² of the spatial development of (new) firms.

The paper is organized as follows. In the next section we will discuss the relevant concepts and theories on location and the firm. The following section describes the comparative longitudinal research design and methods. Subsequently, we present a process model of locational change that is based on the empirical study and the conceptual framework. The final section presents the conclusion.

2 Theorizing locational change and the entrepreneurial firm

In the 1990s a new genre of research in mainstream economics – the so-called “new economic geography” (Krugman 1991; 1998; Fujita et al. 1999) or “geographical economics” approach (Brakman et al. 2001) – has rediscovered location theory. In spite of the contribution of this new approach to the understanding of the location of production, there are at least three problems with using this approach for our study. First, this approach aims at explaining industry location, not location of individual firms (cf. Arthur 1994; Boschma and Frenken 2003). Second, this approach takes an atomistic view of firms and entrepreneurs, placing the whole explanatory burden on the (spatial) situation of the agent and a rationality imposed by the analyst (see e.g. Krugman 1998; Fujita et al. 1999). Third, this approach, like neoclassical economics in general (see Foss 1994) does not offer an explanation of novelty (see Witt 1992; Nooteboom 2000), for example novel spatial structures. Locational change might involve new markets and new sources of supply for inputs, i.e. two types of Schumpeterian innovation (Schumpeter 1934, p. 66; see also Mucchielli and Saucier 1997). The first and third problem concern the explanandum of this study: not the location of industries (like in most neoclassical economic location theory) but the location behavior, the novel spatial organization of firms. This brings us to the second problem: the explanans are not only to be found in the spatial situation of the firm, but also in the characteristics of the firm and the entrepreneur.

In order to choose the most useful theories or concepts, one should first specify the research object and the explanandum. Our research object is the entrepreneurial firm. Entrepreneurial firms are independent young firms that are still owner-managed (most likely by the founder-entrepreneur), in contrast with managerial firms, in which ownership and management are separate (Hart 1983). These entrepreneurial firms can be life style' firms, that fail to grow after start-up (Hanks et al. 1993), but in this study we focus on the new firms that have grown substantially after start-up; these entrepreneurial firms are neither small (anymore) nor (yet) large. The explanandum in this study is the spatial organization of entrepreneurial firms. Spatial organization is defined as the spatial configuration of physical resources³, resulting from a location decision-making process. Our definition of spatial organization is based on both behavioral economics, as it can be considered as the outcome of an (investment) decision-making process, and on the resource-competence based view of the firm, as it conceptualizes the firm as a collection of productive resources.

In order to solve our research problem – “How do changes in the spatial organization of entrepreneurial firms come about?” – we will present a conceptual framework based on behavioral economics (March and Simon 1958; Cyert and March 1963; Simon 1979); the resource-competence view of the firm (Penrose 1959; Richardson 1972; Teece et al. 2000) and evolutionary economics (Foss 1994; Boschma and Lambooy 1999; Hodgson 1999; Loasby 2001) in the next sections.

2.1 Behavioral economics

Four concepts of behavioral economics are especially helpful for our research problem: *bounded rationality*, *satisficing*, *problemistic search*, and *organizational slack*. According to behavioral economics, decision makers are intendedly rational, but are only limitedly so due to the informational and computational limits on the decision making capacity of human beings (Simon 1959; Conlisk 1996). Next to this bounded rationality, decision makers do not have

optimal beliefs and choices as assumed in rational-agent models: instead of utility maximization they reveal satisficing behavior. Strategic decision making is based on comparison of actual performance with an aspiration level (March and Simon 1958). As a result they are not constantly searching for the optimal location, but only considering a locational change if the organization functions below their aspiration level (when it fails to satisfice). When the firm performs poorly, decision makers engage in problemistic search. Cyert and March (1963, p. 121) have defined problemistic search as “search that is stimulated by a problem (usually a rather specific one) and is directed toward finding a solution to that problem”. Problemistic search is motivated by constraints or problems that cause an insufficient performance of the firm. These problems lead to a search for a quick solution in the immediate environment (of alternatives), rather than trying to develop the optimal solution with extensive search. This solution is often chosen to ‘satisfice’ (satisfy and suffice) the organizationally determined targets rather than to optimize. This problemistic search is driven by heuristic rules.

These location decisions are probably not wholly rational, but – at least to some extent – are intended to be so (Simon 1957). The (spatial production and transportation-cum-transaction; see McCann 1995) costs and benefits of a certain location are of course taken into account in arriving at a satisficing outcome. Next to this problemistic search, firms are also assumed to search when they have slack resources⁴, such as extra time and financial resources that can be used for investments (Cyert and March 1963).

Summarizing, in behavioral economics the firm is conceptualized as a ‘processor of information’ (Cf. Cohendet et al. 1999; Pred 1967) and performance and slack are the causal drivers of locational change.

2.2 Resource-competence view of the firm

The resource-competence view of the firm offers several conceptual building blocks like *resources*, *competences*, *interfirm cooperation*, and *productive opportunity*. According to

Penrose (1959) a firm is “a collection of productive resources the disposal of which between different uses and over time is determined by administrative decision”. If we want to know how these resources affect the performance of the firm⁵, we have to know how they are organized, and for what purposes they are used. The concept of competences refers to the firm-specific way in which these resources are deployed and organized (Penrose 1959). The general purpose of the firm is “to organize the use of its ‘own’ resources together with other resources acquired from outside the firm for production and sale of goods and services at a profit” (Penrose 1959, p. 31).

This resource acquisition often takes place between interrelated firms in a dense network of co-operation and affiliation (Richardson 1972). The productive activities of a firm are governed by its ‘productive opportunity’ which comprises “all of the productive possibilities that its ‘entrepreneurs’ see and can take advantage of” (Penrose 1959, p. 31). Opportunities are objectively identifiable but their recognition is subjective and requires exploratory activity. To realise the opportunity it is necessary to organise business activity, which calls for some kind of productive base. As it grows, the firm’s resources may come to support a variety of productive bases, but Penrose pointed out that: “(...) movement into a new base requires a firm to achieve competence in some significantly different area of technology” (1959, p. 110). Obtaining or creating complementary resources are solutions that enlarge the firm’s knowledge base, from which new opportunities can be pursued (Penrose 1959, p. 54). With regard to these opportunities, Penrose (1959, p. 32-33) makes a distinction between entrepreneurial and managerial services. Entrepreneurial services are “those contributions to the operations of a firm which relate to the introduction and acceptance on behalf of the firm of new ideas, particularly with respect to products, location, and significant changes in technology, to the acquisition of new managerial personnel, to fundamental changes in the administrative organization of the firm, to the raising of capital, and to the making of plans for expansion, including the choice of method of expansion” which are contrasted with managerial services, which relate to “the execution of entrepreneurial ideas and proposals and to the supervision of existing operations” (Penrose 1959, p. 32-33). This view on entrepreneurship resembles the Schumpeterian view

(1934, p. 66) to a large extent. Entrepreneurial services may involve a new locational strategy that is enabled by certain resources, competences and dynamic capabilities that belong to managerial services, and which leads to an increased performance of the firm.

The causal mechanism of the resource-competence view is situated within the conceptualisation of the firm as a bundle of resources co-evolving internally and externally. A firm's resources and competences together with additional resources and competences outside the firm will directly affect its choice of strategy, and the options open to it. On the one hand these resources and competences may constrain locational changes of firms as they have coevolved internally and externally with resources and competences that are to some extent place-bound (e.g. human resources) and hard to replace⁶ (e.g. relations with specialized resource providers). Firms can and perhaps need to be located in certain spatial contexts as they have to be in spatial proximity of resource providers. On the other hand specific resources and competences may enable locational changes of firms, for example in becoming multilocational. To some extent firms create their own environments. Changes in the spatial organization may broaden the firm's 'productive opportunity': it may increase the entrepreneur's awareness of opportunities in the environment and it may enable the firm to take advantage of these opportunities.

2.3 Evolutionary economics

Evolutionary economics offers valuable concepts for the analysis of locational change of entrepreneurial firms. We will discuss four concepts here: *market selection*, *routines*, *chance*, and *novelty*.

While behavioral economics and the resource-competence view mainly focus on the internal structures of the firm, evolutionary economics shifts the focus to the environment of the firm. The spatial pattern of firms – their location – is assumed to be an outcome of a market selection process⁷. Only firms that deliver value on a product-market and capture returns as the

outcome of market competition, survive on the long run. The spatial environment affects this survival of firms as it determines the costs of production and transportation: this is comprised in the so-called 'spatial margins of profitability' (Smith 1966; 1970; Taylor 1970). Location is thus not only determined by a decision making process in the firm (ex-ante selection), but also by an ex-post selection process in the market, that is to some extent spatially differentiated (cf. Lambooy 2002).

Next to the selection environment, evolutionary economics takes into account the internal characteristics of firms with the concept of 'routines'. Evolutionary economics also rejects the assumption of optimal decision-making, insofar as this involves some connotations of deliberation: firm behavior is maintained to be basically characterized by automaticity. More precisely, "behavioral options are selected, but they are not deliberately chosen" (Nelson and Winter 1982, p. 94). Routine or rule-guided behaviour⁸ may have a rational basis, as it once was initiated as a thoughtful way to cope with a certain problem. After this initiation it is not questioned anymore, and this is also quite efficient as we cannot continuously dispute our actions. The only thing that probably changes this routine behaviour is a certain trigger that makes us aware that the circumstances have changed so much that the routine behaviour is not efficient (enough) anymore (cf. 'problemistic search'), and then it is consciously debated again. These changes in action type can be clarified by the distinction proposed by Polanyi (1962) into focal and subsidiary awareness. An example of subsidiary awareness is the build-up of routine perception, interpretation, and behaviour in specific relations, by which conformity of behaviour is taken for granted, and awareness of for example opportunities for opportunism has become 'subsidiary' (Nooteboom 2000, p. 105-106). People will stick to their routines until certain tolerance levels are reached, by a triggering event. This trigger brings the action into focal awareness, by which people will consciously reconsider their behaviour (rational action). For locational change this means that after a certain location decision has been made after a triggering event, decision makers will not consider to change the spatial organization of the firm unless a new triggering event makes them aware of needed and possible changes. Location

decisions – especially those involving locational changes outside the region of origin – appear to be more of a strategic non-programmed decision than a routine type of action to the majority of firms, due to their infrequent occurrence and high cost of implementation. So location decision-making is not likely to become a routine.

Evolutionary economics also enables the analysis of the role of chance in the spatial organization of firms (cf. Boschma and Lambooy 1999). Chance events may trigger locational changes: they are potential sources of spatial-organizational innovations. These chance events may relate to problems (cf. ‘problemistic search’) and to opportunities (cf. ‘productive opportunity’). This latter type of trigger relates to the fourth concept: novelty. Novelty is of central concern to evolutionary economists (Witt 1992; Foss 1994; Nooteboom 2000). Novelty refers to radically new things that are the outcome of human creativity. For our study this concerns novel spatial structures of the firm, or locational changes that enable the realization of innovations.

Summarizing, there are infinite numbers of potential triggers for locational change both within the firm as well as in its environment. These sources of variation have to be taken into account in order to analyze which variations were both realized by the firm and selected by the external selection environment. To assess the role of chance and routines in the (non-) emergence of novel spatial structures, we need both ‘pre-revelation analysis’ before locational changes are considered and realized, and ‘post-revelation analysis’ after locational changes are realized (cf. Witt 1992). There are certain necessary conditions for locational changes: for example financial resources to invest and capabilities to realize a well functioning new spatial organization, and the viability of the new form of spatial organization in the market environment (market selection).

3 Research design and method

This study is based on empirical research on 109 realized locational changes (post-revelation analysis) and even more considerations to change the spatial organization (pre-revelation analysis), during the life course of 25 entrepreneurial firms (cf. Eisenhardt 1989). We studied both successful and failed variations: on the micro level, considerations to change the spatial organization that were (not) realized; and on the macro level, closed locations. The focal actors in the empirical study are the entrepreneurial firms. The case studies involved the life histories of these firms as told by the founder-entrepreneurs, but also a survey on indicators about the size, nature, inter-organizational relations and spatial organization of the firm. Next to these data obtained in the interview, also other data from company archives, the press and other media was collected. The explanandum in this study is locational change and has been operationalized in the empirical study as locational events. These locational events can be considered as the microadaptation events (Lewin and Volberda 1999) that reflect the changes in spatial organization of the firms.

Sample

This research relies on theoretical sampling (i.e., cases are chosen for theoretical, not statistical, reasons; Glaser and Strauss 1967). This means that we have chosen polar types (Pettigrew 1995) on critical dimensions. We have chosen entrepreneurial firms in contrasting knowledge intensive sectors, namely knowledge services and biomedical, with contrasting spatial organizations (oversampling firms that realized an exit out of their region of origin), and we have also contrasted the fast-growing with micro entrepreneurial firms ('lifestyle firms') (see table 1, Appendix).

The entrepreneurial firms have been operationally defined as firms that have survived the first four years of existence (which are generally characterized by the highest failure rates), but are not older than ten years (which means that they probably have not become mature and managerial firms, and that the founder-entrepreneur could probably be traced). The fast-growing firms had to have created at least 20 FTEs, which is a rough indicator for company success, and

also means that the nature of these firms has changed. Finally, they had to be independent, which means owner-managed (with a majority stake in the firm). The micro firms had to satisfy the same criteria, with exception of the size: they had to have created at most five FTEs.

The sample consisted of 20 knowledge service firms in five regions and five biomedical firms in two regions in the Netherlands. Within these cases 109 locational events and even more locational initiatives are studied (see table 1, Appendix). The dynamics in the spatial organization of the firms can be analyzed with locational events. Locational events refer to the changes in the state of the spatial organization of firms. The possible states in the spatial organization are summarized and coded in table 1 (Appendix).

A more extensive discussion of the research design and methods can be found in Stam (2003, chapter 5).

4 Process model of locational change

In order to examine the central research question a process model⁹ is constructed based on findings in the empirical research. The basis of generalization in a process model is not from a sample to a population (statistical generalization) but from cases to a theory (analytical generalization; cf. Yin 2003). In that we focus on an explanation of the temporal order and sequence of events that unfold in change processes (observed patterns in the events). This explanation is built on the generative mechanisms that cause events to happen and the particular circumstances or contingencies that exist when these mechanisms operate (cf. Sayer 1992; Hedström and Swedberg 1996). These mechanisms interact with contingent conditions (random, chance events for example¹⁰) in such a way that they cannot fully determine locational change of entrepreneurial firms.

The basic model explains locational events, with elements that have to be explained by necessary and contingent conditions. It may lead to dynamic theory as the variables at a given

time are a function (at least in part) of the same processes at an earlier time. The main thesis of the model is that *locational initiatives* have to be selected by the firm (*internal selection*) in order to become a *locational event*. The resulting new form of spatial organization has to be selected by an external environment (*external selection*) in order to be viable in the long run. Changes in the external environment may be followed by a new cycle starting with (a) new locational initiative(s). This process is depicted in figure 1 with the four key elements.

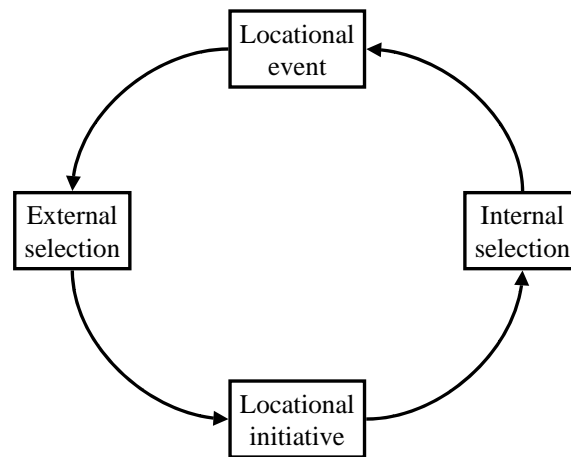


Figure 1 Process model of locational change

4.1 Locational initiative

The first element in the model is 'locational initiative'. By a locational initiative we mean a consideration to initiate a locational event. This locational initiative can be triggered by performance below aspiration levels (problemistic search) and by the recognition of opportunities. The performance below aspiration levels can be caused by constraints in the firm (e.g. lack of expansion space) and changes in the environment (e.g. a shrinking market or increased competition). The recognition of opportunities can also be caused by increased

knowledge of the productive possibilities inherent in the firm's resources and by increased knowledge of the external world and the effect of changes in the external world (cf. Penrose 1959, p. 79). The actors involved in locational initiatives are those who suggest new ways of organizing the firm in space. The locational initiatives in the first development phases are mostly suggested by the entrepreneur(ial team), later on members of the management team or key employees, and members of the personal network of these decision-makers may be important in this respect.

Almost all fast-growing firms in our research have considered to start a branch outside the home region, often triggered by an opportunity. Only six fast-growing firms never considered to become multiregional, i.e. have never been triggered by a problem or opportunity to initiate such a locational change. The micro firms in our research never considered to become multilocal. The consideration to leave the original location is often triggered by a lack of expansion space that constrains the (future) performance of the firm (problemistic search). Only the considerations to move over a longer distance (out of the region), were more often triggered by an opportunity.

4.2 Internal selection

Internal selection involves the ability and willingness to change the spatial organization. This explains whether or not the decision makers in the firm select a locational initiative. It involves the managerial activities through which resources and competences are internally redirected toward locational initiatives: a resource allocation process.

The ability of the firm to realize the proposed locational initiative depends on the resources, capabilities and organization structure of the firm and its dependence on or control over external organizations. There may be considerable locational inertia due to place bound human resources and sunk costs in physical assets (locational assets). Via the resource

mobilization process, resources may be attracted from outside or created internally (e.g. through learning), which also enables a change.

The willingness to change depends on the intentions of the firm. However, as it is problematic to ascribe intentions to the firm, empirical research has to uncover who is defining these intentions. These intentions may be driven by personal factors, but are more often dominated by functional or strategic organizational factors. The strategic intent of the firm gives the evolutionary processes inside the firm something to 'aim' for (March 1994). This strategic intent may even drive locational initiatives. However, for certain types of locational initiatives, especially relocations, strategic intent is often not involved at all. Sometimes the personal intent of the entrepreneur-founder might even overrule the strategic intent of the firm as a whole. Other people in the firm may be unwilling to change the spatial organization, due to vested interests, cultural factors, and fear of change. A few key actors often define the organizational success related to these intentions. A theory of social action is needed to make sense of how intentionality gives rise to outcomes in location decision-making processes.

Two types of agents may be involved in the internal selection: agents of selection and agents of retention. This selective retention shows who has control in location decision-making, and by who they are influenced ('stakeholders'). Agents of selection are those who decide which of the locational initiatives will be acted on, i.e. they are responsible for the level of additional variation in the spatial organization. Agents of retention are those who decide which of the existing parts of the spatial organization will be continued, and which will be discontinued (close down of a branch, relocation). In other words, the agents of selection and the agents of retention are responsible for respectively the level of variation and the level of inertia in the spatial organization of the firm. Entrepreneurs themselves often make the relocation decisions, as it mostly affects their daily workplace. The decision to close down a certain branch is also made by the entrepreneur, as this often involves more or less resistance of the employees involved. In most cases these agents of selection and agents of retention will be the same persons, i.e. the entrepreneur and the management team. In some cases these agents

are different: the agents of retention are often still the entrepreneurs, but the agents of selection may also be ‘empowered’ employees taking up new initiatives, backed by the entrepreneurs. In firms that have developed decentralized control in decision-making employees have the freedom to start new locational initiatives that they regard important, if they can find consensus among stakeholders of the firm and when it is regarded as good for the firm.

There might be an internal competition between alternative locational initiatives a firm may choose to invest their resources in pursuing. The processes of variation (which locational initiatives are considered) and selection (which are started) are guided by the expectations about how a locational initiative will perform. This also explains why not all locational initiatives survived the internal selection process to become a locational event. Many locational initiatives probably fall at the first hurdle (did not even went through the complete internal selection process) or never leave the starting blocks (were only uttered, and have never been recognized as a ‘serious’ locational initiative). Our empirical study showed that many firms that have considered to move out of their region of origin, were not able or willing to realize this in the end. This is in contrast with the firms that considered to start a new branch in another region: those firms almost all realized such a locational change.

4.3 Locational event

The outcome of the internal selection process is the preservation of the initial spatial organization (retention of the form of spatial organization) or a change of the spatial organization with a locational event, leading to a new form of spatial organization. This new form of spatial organization carries all the spatial structures of the past, unless a branch is closed down or a relocation has been realized. A reconsideration at this moment might however lead to a decision not to invest in and ultimately realize the locational initiative.

4.4 External selection

After a change in the form of spatial organization has been realized (as a locational event), the resulting form of spatial organization has to survive in an external selection environment. Fitness to the environment is the selection mechanism determining which forms of spatial organization survive. The introduction of a new form of spatial organization (variation) and its capacity for appropriating resources in the external environment (selective retention) define the evolutionary process. The external selection environment is normally taken to be a product market, but the labour market and the capital market may also be relevant. Competition takes place between firms that are active on the same or related markets. The outcome of this competition differs per market: profits in product markets, attraction and retention of human resources in labour markets, and attraction of different types of capital in capital markets.

The empirical study also showed that there are remarkable differences in the selection environment of knowledge services firms and biomedical firms. The knowledge service firms have to compete in a market on which there is demand from organizations for their services, while biomedical firms have to compete on the capital market to finance their research and development activities. In other words: knowledge service firms are already generating resources on their own, while biomedical firms are still mobilizing resources in order to reach a viable size and/or structure of operations. Both types of firms are affected by selection processes, but not by the same type of selection environment.

The spatial dimension of the selection environment is also highly industry-specific. The market environment for micro knowledge services firms can mainly be found at the regional and for fast-growing firms also at the national level. For biomedical firms the international level is most relevant.

Next to competition on goods and services, there are also other competitive processes that may be relevant as selection processes. Especially for biomedical firms the capital market is highly relevant. The spatial origin of capital providers and shareholders shift from national

venture capitalists at the start to international shareholders after IPO. Finally, as we focus on knowledge intensive activities here, the knowledge inputs via the labor market are highly relevant for the survival and growth of fast-growing firms (not so much for micro firms as these have (almost) no employees). The spatial organization of these knowledge intensive fast-growing firms can in this respect be understood as a trade-off between two selection environments: the product and labour market for knowledge services and the capital and labour market for biomedical firms.

The spatial dimension of the labor market does not discriminate much between the two industries as all firms have 80-100 percent of their employees within region of firm location(s). This does not necessarily mean that the personnel lives in the same region as the firm. It is more probably for biomedical activities as these are concentrated at the site of the firm. For the R&D activities co-location might even be necessary, enabling the transfer of tacit knowledge. This regional concentration is less probable for knowledge service activities as these can be executed at the location of the customers, at the homes of the employees, and of course also at the site of the firm. The offices of these knowledge service firms become more and more meeting points instead of working places.

The external selection environment of a firm (comprising a.o. competing firms, demand from consumers, regulation) is not given. The locational initiatives may include the choice to enter and exit certain selection environments (possibly incurring large entry and exit costs, see *internal selection*). Also without changing the spatial organization of the firm this environment may be changed when the firm chooses to serve other customers or attract other types of employees.

An evolutionary perspective requires a clear view on the unit of selection. What is the unit of selection for the external selection environment? Is it the new part of the spatial organization that is added in the form of a locational event, or the complete firm with its specific new

organizational form in space? The unit of selection differs by the relative size of the firm. The vulnerability of smaller firms means that the entire organization constitutes a possible unit of selection. In contrast, larger firms with 'semi-independent' business units can add or loose spatial units without causing problems for the entire organization. New branches that cannot survive on their own in their specific environment may be retained because resources transferred from other parts of the firm support them. This latter situation is most probable for fast-growing firms that have accumulated organizational slack. Organizational slack and excess capacity may function as a buffer towards a strong selection environment; they have enough (financial) resources to 'subsidize' business units that are not yet viable in the market environment.

If the external selection environment operates very weakly and the regions in which the spatial units are located provide the necessary generic resources then human agency and chance involved in the locational initiatives and the factors related to the internal selection environment provide a more extensive explanation for the spatial organization than the external selection environment. The relative role of the internal and external selection environment cannot be predetermined.

A similar debate on the role of internal versus situational explanations can be found in psychology (Ross and Nisbett 1991). Psychological research has shown that the influence of the person is stronger in explaining the decision to start a business and weaker in explaining the success of the business (Rauch and Frese 2000). In evolutionary economics it has been stated that if the external selection environment operates very weakly¹¹ and the regions in which the spatial units are located provide the necessary generic resources¹², then human agency and chance involved in locational changes and the factors related to the internal selection environment provide a more extensive explanation for the spatial organization than the external selection environment¹³ (cf. Boschma and Lambooy 1999).

5 Implications for the analysis of locational changes during the life course

We have defined and discussed the elements of the basic model of locational change. The basic model just represents one cycle, while a firm life course may consist of many cycles. For a complete understanding of the locational evolution of fast-growing firms during their life-course we have to formulate the initial conditions before the first cycle sets in, and we have to take into account the successive cycles after this first one, with changing conditions, internal as well as external. The spatial organization of a firm at time t constrains, informs, and affects probabilities of realizations of a certain new form of spatial organization at time $t+1$ (cf. Murmann et al. 2003, p.10). This involves different types of *path dependence*: e.g. cognitive path dependence¹⁴ (prior knowledge), previous investments in the form of sunk costs, and structural lock-ins into webs of interdependent relationships.

Prior knowledge and experience of the founders to a large extent condition the location of the first activities of the new firm. However, a large ‘amount’ of experience of the entrepreneur-founders may also give them more possibilities for the location choices. This prior knowledge also explains to a large extent why some knowledge service firms started international activities and also opened branches in foreign countries. These firms were led by entrepreneurs with international experience or with international networks that originate from their former work environment. The biomedical firms in contrast are all active in international markets, both due to their former international experience and the nature of their ‘products’, but do not yet have international branches. During the life course certain firms develop capabilities to realize locational changes: for example to establish or take-over branches in a successful way.

The initial *resource providers* and *customers* of the firm may have long lasting effects on the development paths of fast-growing firms in space. Especially the small firms that are relatively dependent on these large customers are bounded in their locational behavior. The fast-

growing firms become less dependent on specific customers and become multilocal in order to serve other customers.

The founding conditions also have some effects on the possibility of changing the spatial organization, depending on the amount of *sunk costs* involved in the initial location. For example one firm that relocated its headquarters outside the region of origin still had to be located at its initial site in order to keep important human resources and contacts with important knowledge providers (within the 'legal structure' of research contracts).

These path dependences constrain and enable the range of possible options, mainly affecting the emergence of locational initiatives and the internal selection process.

The external selection environment may however also be changed by the firm during the life course, in two ways. First, the firm may seek other external selection environments by entering new product-market combinations in general. Second, the firm may affect its external selection environment by influencing important actors, for example in a process of co-evolution or political negotiations.

Our empirical study revealed that especially the fast-growing firms broaden their spatial selection environments. For example the biomedical firms initially acquire capital at a local or national scale, while in later phases they acquire this capital from venture capitalists and government agencies outside the national borders. The knowledge service firms also most often develop their markets from a regional scale to a national scale. When these firms also start with new products, or with existing products at new markets, they become involved in new selection environments. Exaptation¹⁵ sometimes plays a role here as existing ideas or products are introduced in a new context. The knowledge service firms also affect their selection environment as they co-evolve with important clients. For these firms the competitive process of market selection is to some extent substituted by cooperation.

6 Conclusion

In this paper we have studied the locational changes of entrepreneurial firms. These changes have been analysed in two knowledge intensive industries: knowledge services and biomedical. We have focused on location (initiatives and events), which directs attention to the relationship between the firm and its environment, instead of focussing only on the internal or external environments. We have made three major contributions to the literature on (new) firm location. The first contribution is the addition of 'opportunity-driven' location decision making next to the 'problem-driven' location decision making in the behavioral approach. These two types of decision-making define the willingness to change the spatial organization of the firm. The second contribution is the identification of the contribution of willingness and ability (internal selection) aspects in the location decision-making process. The third contribution is the model of locational change that integrates two units of analysis and the two evolutionary processes involved. The model of locational change combines two basic process theories, teleological and evolutionary process theories, which are applied on the analysis of the spatial organization of entrepreneurial firms. The model conceptualises a double two stage process of variation-selective retention. In a life course perspective this model offers a heuristic to study the successive cycles that make up the spatial development of firms. For the explanation of the changes in the spatial organization we focused on the developmental processes. The developmental processes refer to the accumulation of knowledge and resources (including sunk costs) that enable and constrain changes in the nature and spatial organization of the firms. Evolution becomes a three-stage scheme, not only involving variety and selection, but also including regeneration as firms face new opportunities or threats after they have changed their spatial organization (cf. Metcalfe et al. 2000, p.15).

Future research may test the application of the model in other sectoral (mature industries like shipbuilding and transforming industries like graphics-media) and regional contexts. Further

research may reveal the boundary conditions of the theory, as it has been developed in only one specific country (the Netherlands) and in two specific knowledge intensive industries. Finally, longitudinal research of a cohort of new firms could lead to statistical generalization in addition to the analytical generalization in this paper.

Notes

¹ The author would like to thank Ron Boschma, Jan Lambooy and Jeroen van den Bergh for their comments. As usual, all errors are the responsibility of the author.

² See Foss (1994) and Nootboom (2000) for examples of causal process theories in evolutionary economics.

³ This also comprises the so-called 'locational assets' of firms (Teece et al. 2000). Especially in the restaurant, retail, and hotel industries location can be a key asset, leading to competitive advantage (Aaker 1989). A valuable location can act as an imperfectly imitable physical resource for the firm (Barney 1991), or a tangible resource enabling a firm to exercise its capabilities, leading to a positional advantage (Day and Wensley 1988). In this way, the spatial organization of the firm can be regarded as a portfolio of locational assets.

⁴ Cf. Penrose's (1959) excess capacity of productive services that drives firm growth.

⁵ Location might play a role here as an asset that partly determines the market share and profitability of a firm (Teece et al. 2000, p. 345-346).

⁶ Cf. Penrose (1995, p. 25) and the more recent debate on sunk costs and corporate geography (Clark 1994; Clark and Wrigley 1997).

⁷ The initial evolutionary approach suggested by Alchian (1950) was proposed as a modification of economic analysis based on the assumptions of the homo economicus. Alchian argued that incomplete information and uncertain foresights made it impossible for business firms to maximize profits. And he thus dispensed the rational choice axiom of economic agents, operationalized as profit maximization. This led to the so-called Alchian-thesis, that is "the view that competition represents a Darwinian selection mechanism that produces exactly the same outcome that would ensue from a world in which consumers maximized utility and businessmen maximized profits" (Blaug 1992, p. 249). This means that the bulk of traditional economics would be unaffected if we assumed that purposeful human behaviour does not matter in economic analysis (see Penrose (1952) for a critique on this kind of evolutionary economics).

⁸ Cf. the similar concepts 'traditional action' (Weber 1978) and 'habitual behavior' (Katona 1951).

⁹ See Mohr (1982); Sayer (1992); Van de Ven (1992); Van de Ven and Poole (1995). Process theory is contrasted with variance theory, which aims to account for the input factors (independent variables) that statistically explain variations in some outcome criteria (dependent variables).

¹⁰ *Chance* is defined here in an Aristotelian sense as *the intersection of two causally independent series of events* (Van Woudenberg 2002, p. 21). The term should not be confused with contingent. Something is *contingent* if it is *not necessary*, which does not have to mean that it is improbable or unimportant (Van Woudenberg 2002, p. 23-24).

¹¹ An economic boom period, similar to that during which most of the enterprises in this study were visited, may also reduce the external selection pressures.

¹² The necessary inputs are not localized, but ubiquitous on higher spatial levels (Maskell and Malmberg 1999; Weber 1929). Maskell et al. (1998) see the process of ‘ubiquitification’ as an effect of globalization; many previously localized capabilities and production factors have become ubiquities.

¹³ This proposition relates to the discussion about the ‘spatial margins of profitability’ in section 2.3: firms are not constrained by location to make a profitable business in a relatively large spatial area.

¹⁴ The degree of choice – initiating, realizing, and retaining a change in the spatial organization – is constrained by internal and external selection, but also by limited information and the costs and limits to information processing (cf. Pred 1967; Cohen and Levinthal 1990). The latter constraint affects the range of locational initiatives that may emerge and the uncertainty surrounding internal selection related to the expectations on external selection.

¹⁵ The *Oxford Dictionary of Earth Sciences* defines exaptation as “A characteristic that opens up a previously unavailable niche to its possessor.” ‘Exaptation’ differs from ‘adaptation’: adaptation means changing an entity towards a particular fit of its current context, while exaptation means that a certain entity is functional in a new context, while it was not initially selected in that selection environment; in other words its current primary function is the side effect of another (prior) adaptation in another context (cf. Gould and Vrba 1982).

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Appendix: Locational events

In general the changing states in the spatial organization involve organic growth or decline of firms, but it is also possible that they involve external growth. Two modes of external growth are identified here: Merger or sale (code 'M') and Acquisition (code 'A'). When a change in state goes hand in hand with external growth this is shown with the addition of the relevant codes. For example, 'A5' means an acquisition of a firm outside the home region (acquired new branch). Some locational events occur simultaneously, for example '90' means exit from home-based to business premises outside the region of origin. Table 1 shows the sequences of locational events during the life courses of the firms studied.

Table 1 Sequences of locational events

	Cases:	Sequence of locational events*:
Fast-growing firms:	A	01537851
	B	0155315355596
	C	0156
	D	01
	E	011111A511
	F	01
	G	9015
	H	0A39 A55A5A5A55 [#]
	I	0515
	J	0
	K	90177
	L	901117
	M	0135535777788
	N	01175757
	O	011
	P	0111
Q	0111	
R	01M95	
S	01	
T	01	
Micro firms:	a	0
	b	**
	c	0
	d	90
	e	01

* codes: 0= Initial location at (business) premises

1= In situ or intraregional expansion (relocation to larger premises)

2= In situ or intraregional contraction (relocation to smaller premises)

3= Set up of a branch within the home region

4= Close down of a branch within the home region

5= Set up of a branch outside the home region, within the home country

6= Close down of a branch outside the home region, within the home country

7= Set up of a branch outside the home country

8= Close down of a branch outside the home country

9= Relocation (headquarter) outside the home region

** stays home-based

[#] and at least 10 more new and acquired branches

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