

Underlying Principles of Business Ecosystems

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Abstract

Most companies worldwide are still heartstricken by the recent downturns in the economy and are in doubt how to move on. IT companies make great advances in developing more flexible and intelligent computing environments (“on demand business”, “grid computing”, “adaptive computing”) and management authors proclaim the “Quest for Resilience” (Gary Hamel) to give companies the means and ideas how to avoid life-threatening crises in the future. But is it just another fancy fad of management consultants? Or are there underlying principles that give a theoretical context for developments in management and IT currently witnessed in the business world? The short answer is: There are – and in this article a model will be designed that depicts this theoretical framework.

The past 25 years in strategic management have been coined by aggressive strategies striving for market penetration and dominance, entry barriers and exertion of market power on the one side. On the other side niche strategies were developed and recommended to companies that were too small to compete against these dominators. Nevertheless this is just part of the truth. In real business life manifold examples of co-operative behaviour among firms can be observed, and since the last 15 years an increasing number of publications highlight different manifestations of these co-operative strategies – covering a range of attributes from co-evolution over co-opetition to collaboration. An attempt to subsume these observations in a single, holistic strategy-synthesis is not yet undertaken.

Therefore in the first part of this article a business ecosystem model is presented that allows the simultaneous integration of dominator-, niche- and collaborative strategies – the latter will be called keystone strategy – in a single macro-framework. In the second part the focus is laid on under which environmental conditions keystone strategies are appropriate. The perspective of a single company within the business ecosystem is taken and it is shown, which steps have to be taken to translate the strategy into action. Both anecdotal as well as first empirical evidence is provided that illustrate and support the business ecosystem model.

1 Introduction

Competition, coexistence, choreographing, co-opetition, co-operation, collaboration – there are a lot of *c*-words currently circulating that make *company's* daily life complex and *chief executives* curse.

Management science has learnt to live with and sometimes from these manifold trends and developments. Notwithstanding they also contribute to confusion among practitioners (cf. e. g. Kroker et al., 2003). This article offers a perspective on business life that allows integrating fads, fashion, trends and theory and helps to make different strategies encountered in today's business life comprehensible from a macro-perspective. To achieve this perspective the concept of an ecosystem, which in its original meaning only described bio systems, will be applied to economics, thus creating a “business ecosystem model”. It will be shown that three typical strategies of behaviour exist within all ecosystems. Two of these are also found in business life and are regularly addressed in science, teaching and practice. The third is mainly neglected in current literature so far, albeit a lot of anecdotal evidence of its occurrence can be given and although it has a lot to do with the *c*-words enumerated above. In this article this forgotten category of behaviour, which will be called keystone strategy, will be revitalized.

In the first section the business ecosystem model is presented and its main implications are sketched. In the following part a road map will be derived that guides a stepwise implementation of the third, the keystone strategy. Finally the results of a first empirical study are presented, which delivers evidence that this strategy indeed pays off.

2 The Business Ecosystem Model

2.1 Strategies in Business Ecosystems

The term business ecosystem is rather common and widely used by practitioners. Nevertheless it typically is only synonym for a company and its environment with respect to its direct partners. As opposed to this understanding the term will be used in a broader sense here – encompassing both direct and indirect partners, direct and indirect competitors, the institutional environment etc. – and will be closely referring to its semantic origins: biology.

Biologists analyse natural ecosystems in order to understand the interactions of actors within the system and their behaviour and reactions in the instance of external shocks. With a comprehensive knowledge about these interdependencies biologists can keep ecosystems stable or restore them after suffering from damages in a targeted and calculated manner. In addition they get an idea about when human interferences into an ecosystem are unnecessary or even counterproductive. Within ecosystems researchers identified three characteristic types of species (cf. e. g. Townsend et al., 2003, p. 361 et seq., Power, Mills, 1995):

- Dominators
- Niche species
- Keystones

The characteristic feature of **dominators** is their pursuit for an overall coverage of the ecosystem while expelling or defeating other species. **Niche** species are small with respect to their relative size in the ecosystem and weak with respect to the capability to defend themselves against dominators. **Keystone** species¹ do not strive to proliferate but on the contrary contend themselves with keeping the ecosystem in balance and leaving niche species enough space to live.

The classic example for keystones and dominators in nature are starfishes and mussels and was presented in 1966 by Paine. In his experiments he artificially removed starfishes that preyed on mussels from a marine community and kept the mussel-population under checks and balances. In the following the mussels proliferated heavily and aggressively covered the available living space thereby simultaneously repelling other species that originally populated the habitat. The three roles can be depicted as in figure 1.

¹ The keystone image originates from architecture. A keystone is the top-stone in an arch and a removal of this relatively small stone leads to a collapse.

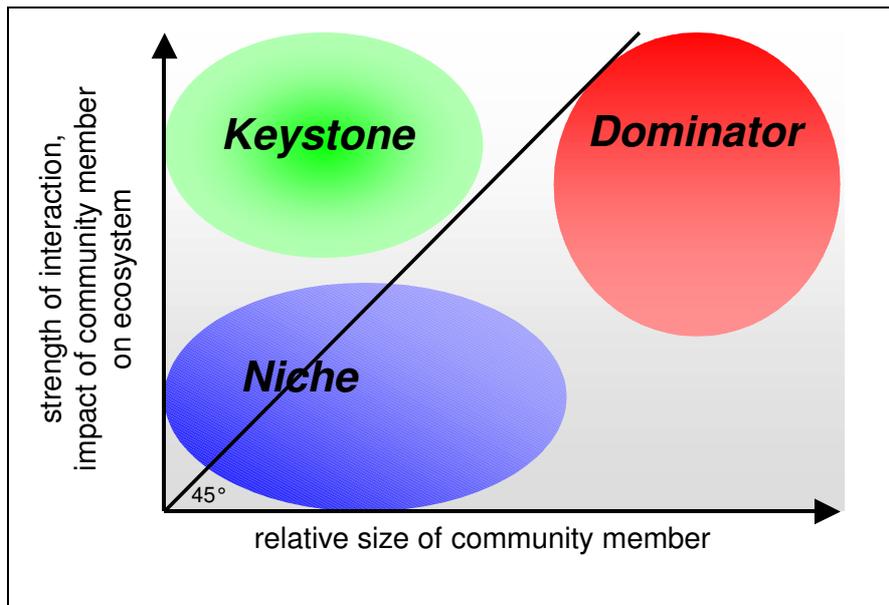


Figure 1: Roles and strategies in business ecosystems (Source: adapted from Power, Mills, 1995, p. 183)

By transferring the findings about biological ecosystems to the business world, important insights into the behaviour of companies can be generated, as the biologists did in their domain. For niche and dominator strategies that task is straightforward: Small companies that specialize on *niche* products (“Hidden Champions”, Simon, 1992, 1996) are well known in business life as well as the fact that anyway many of them are taken over by large, dominating companies. Indeed *dominator* strategies are probably the best described and analysed ones, because a dedicated branch of economics, Industrial Organization, focuses on issues such as deterrence of entry, exertion of market power, erection of entry barriers, exclusionary tactics etc. – not to forget that these strategies are taught to undergraduates in standard marketing-textbooks (cf. e. g. Kotler, Bliemel, 1999, p. 605 et seq.).

The large number of publications shows that the discussion on alliances, coevolution, co-competition, co-operative strategies, virtual corporations and enterprise networks intensified during the last years (cf. e. g. Badaracco, 1991, Eisenhardt, Galunic, 2000, Davidow, Malone, 1992, Miles, Snow, 1986, Bengtsson, Kock, 1999) – giving evidence that the focus on non-co-operative dominator strategies might not be sufficient to describe company goals that maximize profit. Though the analogy might seem obvious, there is no evidence to be found in literature, where three biological ecosystem strategies had been adapted to the business and management world. If *dominator* strategies are comprehensively described in literature and if even *niche* strategies appear as one of Porter’s (1980, p. 35) generic strategies, then it is astonishing why *keystone* strategies are not yet accentuated and why hints at co-operative action

modes – from alliances to enterprise networks – emerge in such a fragmented manner and with little thought about concrete measures on how to pursue a keystone strategy. Therefore, this research is focused on the keystone strategy to achieve a comprehensive business ecosystem model.

Biologists have distinguished several **action modes of keystones** (Bond, 1993, p. 239), among them

- defeating of dominants and competitors, i. e. the protection of niche players
- mutualism, i. e. the direct support of niche players
- system enabling, i. e. enabling energy flows or the exchange between community members

Once again the transfer from biology to business becomes plausible: These are indeed character traits and modes of behaviour that are untypical for dominators and likely to be irrational from an Industrial Organization point of view. Nevertheless they can be witnessed in real business life and obviously lead to success as will be shown below, which makes analysing them in more detail and subsuming them in a keystone strategy concept an even greater necessity.

2.2 Anecdotal Case Examples of Different Behaviour in Business Ecosystems

2.2.1 IBM's History in the Development of the IT Ecosystem

IBM today is the largest company in the worldwide IT sector with revenues of nearly \$90 billion and some 325,000 employees in 170 countries. It achieves a profit of more than \$5 billion and leads the industry in all major IT eco-sub-systems such as services, hardware and software. However, this state is the result of a drastic turnaround, a transformation of a whole company that dominated the IT ecosystem up to the 1980ies and that developed more and more keystone characteristics since mid 1990ies. In the beginning, during the rapid expansion of the IT market, demand was primarily driven by the available supply. Computing systems were fenced products comprised of hardware providing computing power, software to deliver the applications and maintenance to keep the hardware and software performing. All components were tightly linked and would optimally be built and maintained by a single company to guarantee performance throughout the entire life cycle. The market was stable as only large

companies, institutions and governments acquired these systems and only few companies had the competence and critical mass to provide sound manufacturing, programming and services. Therefore the largest player could spread over the entire ecosystem becoming a *dominator* – so did IBM.

With the introduction of personal computers at the beginning of the 1980ies, the traditionally homogenous product became modularised into hardware, the operating system, application software and services all being served by potentially different competing companies. This concept led to a drastically lowered entry level for companies deploying computing systems and thus opened whole new markets. In addition, the modularisation provided many more companies with an opportunity to develop and sell innovative products in the IT ecosystem. The new computing concept itself provided the blueprint for the business model that one needed to adopt to be successful: A hub to provide the standardized core (one for the hardware: the IBM PC, one for the operating systems: Microsoft DOS) and many spokes that linked into the hubs through open interfaces. However, this standardization and modularization on the hardware side made solutions interchangeable and dominance from one player – IBM – was broken. Concurrently as the market grew, it became much less predictable. Not only had the new concept of personal computers and distributed computing power changed the demand. Also sinking prices for the homogeneous systems (mainframes) gave access to computing power to other market participants implying different demand structures: The market fluctuated and became much less stable, but it was still the IT ecosystem to be served.

These changes were drastically reflected in IBM's book of business. In 1993 a record loss of more than \$8b was reported and the need to change the business model became obvious. Through a focused effort that included

- a change of culture now driven by customer orientation and productivity
- the focus on core competencies by outsourcing functions and processes that are not business critical or provide added value
- the integration of disparate IT into common systems and the IT enablement of all business processes
- the enforcement of all central processes throughout the company worldwide and down to the individual employee

IBM managed the turnaround and became highly profitable again (see figure 2).

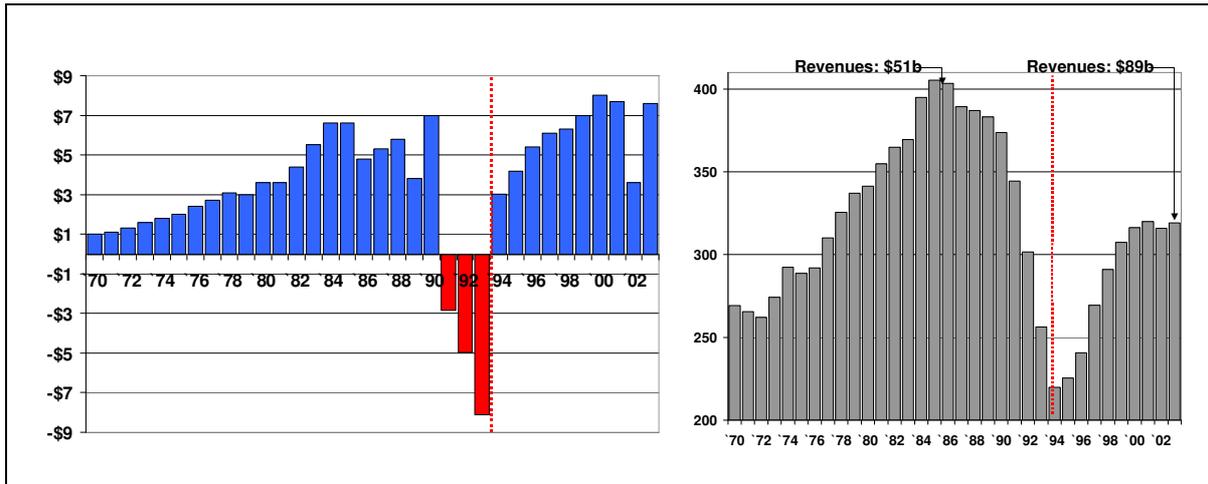


Figure 2: IBM Corporation, net income in billions (left) and employees in thousands (right)

Today the company clearly shows *keystone* traits by providing niche players and even competitors with business opportunities in the ecosystem while at the same time guarding the ecosystem against a potential dominator (speaking in terms of figure 1: IBM is transforming and on the move from the top right corner to the left). For example IBM embraces and pushes Linux as an open standard operating system. At the same time it provides the highly flexible WebSphere platform that uses standard technologies such as XML, Java and J2EE. WebSphere is today applied by thousands of software companies and millions of programmers. In doing so IBM focuses on middleware to decouple applications and systems, provides demand patterns for supply chain partners and emphasizes services as well as strategic partnerships.

2.2.2 Retail Ecosystem

A second example can be found in the German retail-market that is known for being highly competitive. When Wal Mart, an US based retailer and *dominator* “blamed for the destruction of entire communities” (The Economist, 2001), entered the German market with predatory pricing strategies (Handelsblatt, 2000) the incumbents – at its top the retail chain Aldi – managed to assimilate the intruder keeping it on small market shares. Due also to several other mistakes Wal Mart’s engagement in Germany became one of the greatest throwbacks in its history. According to its own explanations Aldi nurtures its suppliers by granting high-volume, long-term contracts. In this way Aldi eases competitive stresses and uncertainty for its suppliers, which gain a basis for long-term strategic planning and investment at lower risk and in turn provide Aldi with extremely cheap products at a very high quality (*keystone* traits

of mutualism). Nevertheless Aldi is known for rigorous outlisting of suppliers that do not match quality- and turnover-standards therewith keeping its supplier base under healthy market pressure. Interestingly Aldi, its products and logistical abilities are perceived as one of the most innovative among German companies (Wirtschaftswoche, 2000). At the same time Aldi does not strive to proliferate into all segments of the entire retail market (*keystone* trait of non-proliferation). It strictly sticks to a product range of just about 500 items and sells no-name commodities only. In doing so it leaves space for other retailers that offer branded products.²

2.3 Resistance versus Resilience

Further examination of biological ecosystems leads to two more analogies: Biologists distinguish between two basic concepts of stability (Begon et al., 1996, p. 838): The term **resistance** circumscribes the ability of a community to fend off external disturbances and invasions into the ecosystem. **Resilience** on the other hand describes the degree to which an ecosystem will return to its original position after an exogenous shock had occurred and the velocity of this adaptation. It stands out that in environments that are relatively stable, with few exogenous shocks, ecosystems rely on resistance. However, in aggressive and quickly changing environments ecosystems foster high reproduction rates and species become specialized to be able to quickly and elastically adapt to new conditions.

The similarity in the business world is apparent. Dominator behaviour as described in Industrial Organization – methods of price discrimination and predatory pricing, vertical control, deterrence of market entry by building up barriers, exclusionary tactics and market leadership etc. – is a typical approach to build up *resistance*. Competitors shall be kept out of the market or be repelled and defeated.

Alternatively, companies can build a network and allow a larger variety of companies to prevail. With this network of high diversity in place, higher probability of efficient adaptation in case of exogenous shocks can be reached and therewith *resilience* achieved: Establishing a keystone strategy.

² More case examples from the electrical industry, retail and consumer-goods, banking and automotive ecosystems are provided in Göthlich, 2003, p. 24 et seq.; see also Iansiti, Levien, 2004.

2.4 The Business Ecosystem View in the Context of Different Schools of Thought

With this knowledge in mind it becomes clear why keystone strategies are underdeveloped, yet. If today's prevailing opinion is correct that after the 2nd World War and until the 1980ies markets tended to be rather stable and supply driven (seller's markets, cf. Ansoff, 1979), it is obvious that dominator strategies concentrating on resistance were in the centre of interest. Since the beginning of the 1980ies business environments became increasingly unstable, unpredictable and volatile. *Volatility* has different origins, whereas the main sources can be seen in an increased competition and innovation pace among competitors (*supply side*), changing and more unpredictable customer needs (*demand side*) and *exogenous* events (market deregulation, retreat of government interventions etc.). These developments are reflected in different scientific schools of thought. In his – albeit socially critical – work on the effects and consequences of deregulation and globalisation Luttwak, 1996, coined the term *turbo-capitalism* and describes the destabilising effects on society and business. Whereas his perspective is the one of the external observer or economist, D'Aveni, 1995, makes the point that an increased pace and *hypercompetition* characterise the business world and analyses the consequences for business strategy. He stresses the meaning of co-operations in hypercompetition, even though he perceives them as part of an aggressive market behaviour. Finally, Eisenhardt focussed in her work on what she called *high-velocity environments*, environments with ever shorter innovation cycles (highlighting the IT industry), and among other issues on modular corporate forms as sensible reactions to these environments, decision making in top management teams and conflicts (Galunic, Eisenhardt, 2001, Bourgeois, Eisenhardt, 1988, Eisenhardt, 1993, Eisenhardt et al., 1997). The keystone strategy goes into all these different kinds of volatility and poses the necessary complement to the classic strategy types of Porter.

In their book on schools of strategic management Elfring and Volberda, 2001, p. 8 et seq., and referring to Mintzberg, 1990, point out that each school lays an emphasis on certain important aspects. But as a whole they leave a rather fragmented picture that is in need for integration or synthesis respectively, when sensible action shall be derived from them. In this sense the keystone strategy firstly is the synthesis of co-operative, **network** oriented traits and **collaboration** mentioned above. Secondly a keystone strategy is striving for **resilience** since resistance is becoming an increasingly less feasible concept of ecosystem stability in today's markets. Keystone strategies may not be mixed up with public management strategies or non-profit-

organisation's behaviour that shall provide public goods or do good to people. It is strictly a strategy for profit oriented companies operating in the volatile markets of the 21st century.

2.5 Business Ecosystem versus Population Ecology Approach

Before concrete steps towards resilience in networked environments will be developed in chapter 3 a short remark on the demarcation of the business ecosystem view against another related branch of organization theory – the population ecology approach – is appropriate. Population ecologists also refer to biological metaphors. In their models they often design businesses like species acting in a more or less blind trial and error mode (for criticism on the population ecology approach see Kieser, 1988, 2002, Kieser, Woywode, 1999, p. 271 et seq.). Trial and error might indeed be effective, unfortunately it is time consuming and rather costly.³

It can therefore be considered as sensible not to rely on mere blind trials, but to learn from deductive reflections, scientific literature and developments in business life about what enhances and fosters resilience in today's markets. Contrary to population ecologists the view chosen here is not the one of an external observer noticing the behaviour of species and populations. The focus is laid on the *individual firm* operating in its specific business ecosystem and pursuing a keystone strategy (see figure 3). This firm acts on markets as well as collaborates with partners, it builds platforms for niche companies in alliances or networks or integrated supply chains. It reacts to intruding companies with competition or coevolution or co-opetition, and it accounts for external factors and actors.

³ In his management book Moore, 1996, also refers to the population ecology approach. He describes different stages in the lifecycle of a firm and derives appropriate strategies for each phase, even though it remains unclear how a company can identify in which phase it currently is.

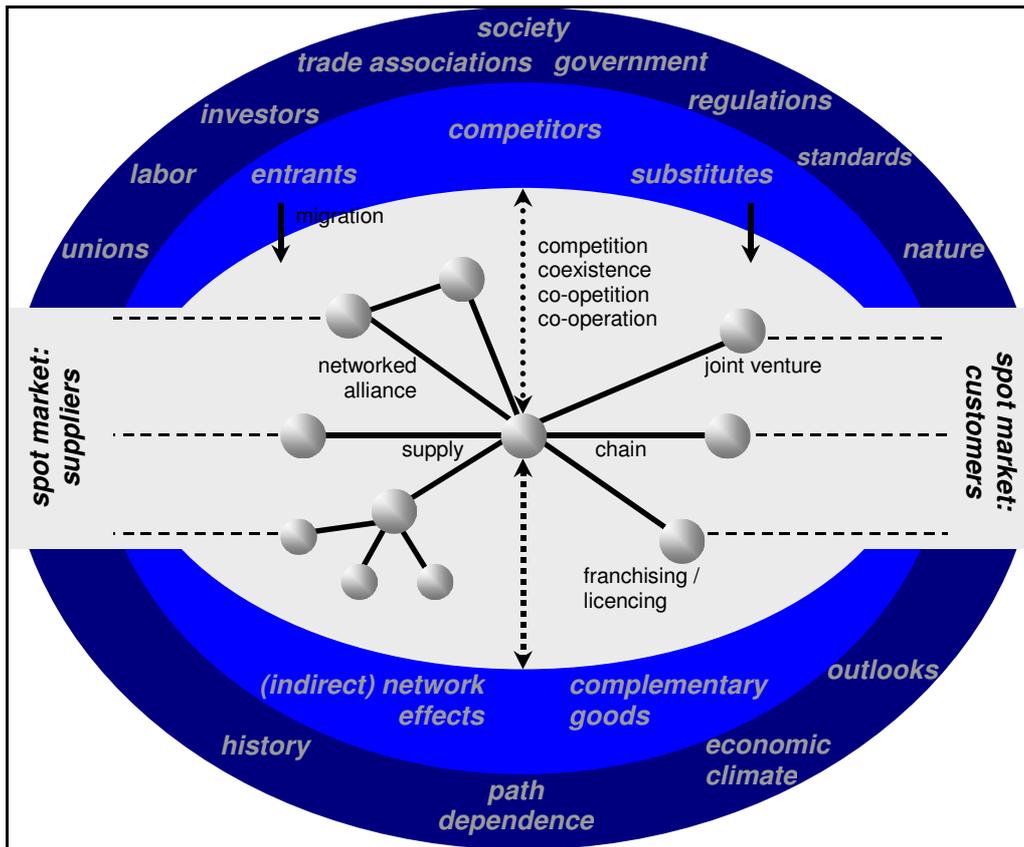


Figure 3: Business Ecosystem

3 Implementing a Keystone Strategy

The business ecosystem model presented in the preceding chapter basically emphasized two core aspects relevant for keystone strategies:

1. Refraining from proliferation, but instead relying on **networked collaborations**, coexistence or coevolution with niche players and
2. The strive for ecosystem stability in the sense of **resilience**.

3.1 Definition of Network Relationships

To start with, a definition of network-links to partners in the ecosystem is required before one can engage in drawing the road map on the way to resilience: A large variety of definitions and typologies of enterprise networks can be found in literature. They range from hub-and-satellite networks (Jarillo, 1988, Kerwood, 1995), clan-like structures and Keiretsus (Ouchi, 1980), regional and temporary networks (Sydow, 2001, p. 301) up to virtual organizations (Davidow, Malone, 1992, Mowshowitz, 1986, p. 389 et seq.). These organizational structures are usually seen somewhere in between markets and hierarchies (Powell, 1990), either as an

organizational form of its own or as a spot on a continuum between markets and hierarchies. For the purposes here it is therefore indispensable to make a clear demarcation of network relationships to market relationships on the one side and purely hierarchical, integrated relationships on the other. It will be *defined* that a *coupling between two entities in the sense of an enterprise network* always exists, when

- *more* than just prices and quantities plus basic information on products/services are exchanged (Arrow, 1971, p. 232) or when
- network effects (Katz, Shapiro, 1985) between products or services prevail.

In this sense **market relationships** exist whenever transactions between firms occur just on the base of prices and quantities and without further involvement. Market relationships are intended as single or spot exchanges. Nevertheless repeated market interchanges with the same partners do not necessarily constitute a network.

Network relationships usually comprise a strategic dimension and are of vital interest for the achievement of the company goals. Therefore e. g. outsourcing the plant security will usually not constitute a network whereas outsourcing of the manufacturing of the company's core products is. The latter typically occurs in the electronics ecosystem – companies that provide these Electronic Manufacturing Services (EMS) are e. g. Flextronics, Sanmina-SCI, Solectron or Celestica – but also in other industries such as the automotive ecosystem with contract manufacturers like Valmet Automotive or Magna Steyr. Relation specific investments are an indicator of network couplings. A look at Porter's value chain model (see figure 4) shows the main interfaces of a company where networked collaborations occur: In this sense for example a *networked supply chain* exists when just-in-time (JIT) supply is implemented, enterprise resource planning (ERP) system's back ends are connected or planning procedures operate on a real-time base. *Procurement* processes can be integrated by e-procurement solutions. Simultaneous engineering is one keyword indicating *networked technology partnerships in research and development (R&D)*. Also service, disassembly and recycling networks could fall in the network relationship category. The partnerships enumerated here often bring about network couplings on *infrastructure* level, e. g. cross-company data analysis or interorganizational cost management (Cooper, Slagmulder, 2001, Cooper, Yoshikawa, 1994). Also it is not uncommon to exchange *personnel* in enterprise networks.⁴

⁴ It should be pointed out that personal networks among individuals are excluded from the considerations here. These personal networks comprise also lobbies or work in trade associations and are not object of analysis here either, cf. also Hess, 2002, p. 8 et seq. Nevertheless the authors acknowledge their importance

On the other side **hierarchical relationships** exist, when companies are integrated, which precipitates the loss of sovereignty of one of the partners.

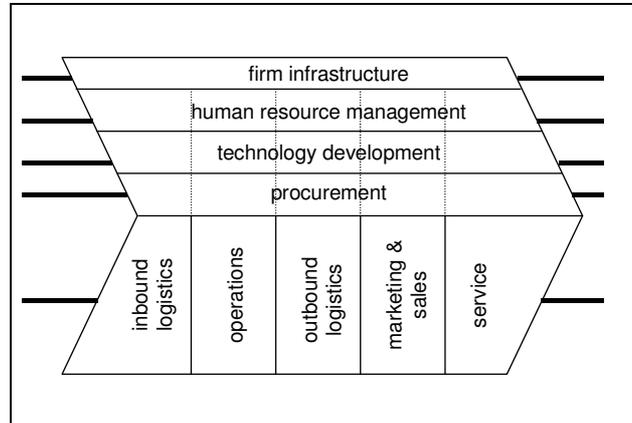


Figure 4: Value chain and interfaces for network relationships (Source: Porter, 1985, p. 37)

3.2 Road Map to Resilience

The interconnection of many different companies – keystones and niches – in a network of a kind defined above entails a central benefit: Ecologically speaking it provides **diversity**. Many different companies with their own cultures and experiences can contribute to network-wide learning, monitoring of the environment and innovation. Therefore diversity must be considered as a prerequisite for resilience. In the same sense Orton and Weick (1990, p. 210) speak of “requisite variety” and that “loosely coupled systems could more accurately register their environments through requisite variety”. From Weick one will also obtain major clues on which steps will lead to resilience. In his case studies and findings on high reliability organizations (Weick, 1987, Weick, Sutcliffe, 2001) he and his co-author point out that a “mindful” management is capable of *anticipating* unexpected shocks to the ecosystem. According to them anticipation must not rely on strict rules and procedures or detailed exception plans and scenarios since this will narrow the perceptions of the involved persons to the variables admitted to these plans. Weick and Sutcliffe focus on cultural aspects, e. g. a culture that encourages the report of failures and demands quick or real-time communication. They see a

(cf. also Granovetter, 1985, p. 495 et seq.), albeit these forms of social relationships are not within reach (or a rather restricted one) of deliberate decisions of organizational designers or controllers. The latter one is the perspective taken here.

necessity to lay particular emphasis on a continuous surveillance of operations that not only relies on data reflected in balance sheets.

Secondly the authors argue that anticipation of failures has to go hand in hand with *containment* of failures. Companies need an idea on how to mitigate the unwanted effects of external shocks and on possible remedies. Self-organizing and interdisciplinary crisis reaction teams are named as one example, or the acceleration of information gathering and analysis (cf. Weick, Sutcliffe, 2001, p. 67 et seq.).

To summarize these results it can be stated that **resilience** basically requires the fulfilment of several prerequisites: Companies have to *anticipate* or notice in its early stages exogenous shocks – wherever they are occurring in the business ecosystem – and rapidly communicate within the ecosystem, which requires a (*loose*) integration, to correctly respond to these shocks.⁵ They can e. g. occur in form of dynamic changes in demand, unforeseen moves of competitors, disruptions on supply side, strikes, new demands from capital markets etc. This requires at the same time a joint recognition of problems, a common language among members of the ecosystem and knowledge of their specific capabilities contributing to possible solutions. Problem-diagnostics alone are insufficient, and such a **responsiveness** also requires that feasible cures are indeed translated into action. Secondly firms need to *contain* the spread of failures or undesired consequences by reacting flexibly from a variable foundation. Such **variability** means e. g. that firms strive to reduce the share of fixed assets and use flexible machinery and processes that can quickly change over to new settings. High demands arise for the financials to provide liquidity and leeway to operate. In addition, couplings between firms in the ecosystem are *loose* in a sense that a failure arising at one place that cannot be cured for any reason does not spread instantaneously over the entire system. In the *tightly* coupled supply chains observed in business life today (see above) failures often even amplify, a phenomenon known as bullwhip or whiplash effect (cf. e. g. Corsten, Gössinger, 2002). Resilience requires that a contagion can be decoupled and isolated from the remaining business ecosystem.

If resilience is the objective and responsiveness and variability are leading the way then the question remains: Where are firms today? The last decade was not insubstantially coined by the resource based view and its translation into business strategy within the concept of core

⁵ Refer also to the “sense & respond” model suggested by Haeckel, 1992, 1999, 2003, for more details on the responsiveness aspect.

competences (Prahalad, Hamel, 1990, 1994). Is a **focus on core competences** at odds with the other concepts named above? Quite the opposite, it is in itself a prerequisite: Only a focussed and therewith specialized firm can be best at detecting failures in its field. Focus is therefore a necessary condition for responsiveness – still not a sufficient one since responsiveness indeed demands that procedures are implemented to provide sensing, responding and communication. In the same manner focus is a precondition for variability. Only a firm that does not bear the burden of second class divisions or departments will be in the position to react variably to changing conditions. Therefore the aspects emphasized here appear in a *logical sequence*, which is depicted in figure 5.⁶

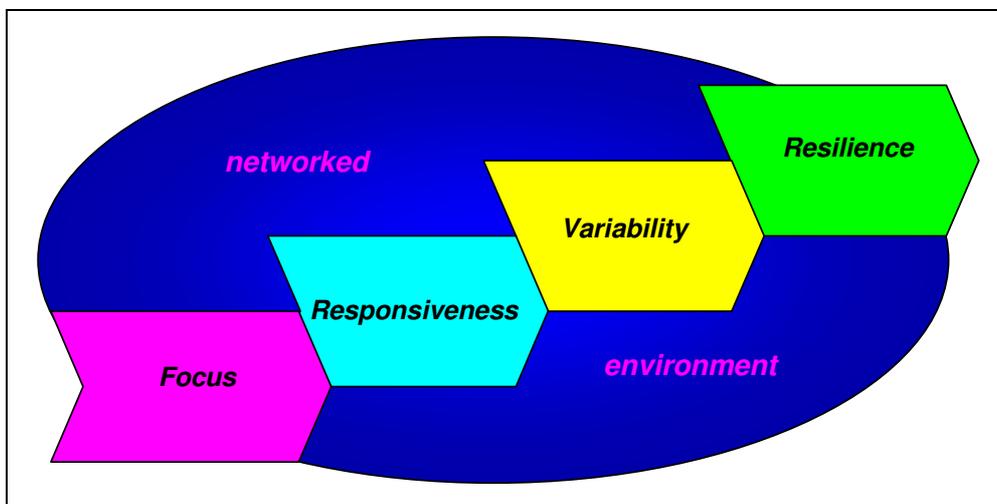


Figure 5: Road map to resilience for keystone strategies

4 First Empirical Evidence

4.1 Hypothesis and Method of Analysis

One central hypothesis derived from the theoretical framework is that

- the higher environmental changes in a business ecosystem are
- the more should a keystone strategy or rather the adoption of keystone character traits pay off and lead to corporate success.

To make a first test of this proposition a closer look was taken at the electronics industry. In a study carried out by the IBM Institute for Business Value (IBV) in the autumn of 2003 20 major global electronics companies from the Americas, Europe and Asia were surveyed. A

⁶ Note that these results are consistent with the recent findings of Nohria et al., 2003, p. 45 et seq., on “old-fashioned” but vital virtues that yield corporate success. Also management author Gary Hamel together with Liisa Välikangas, 2003, highlight the necessity of resilience but without specifying a theoretical model and a concrete road map on how to achieve it.

total number of 35 executives were asked in guided interviews by IBM key account managers or members of the IBV. The perceptions from these interviews were instantaneously coded within a scorecard comprising 54 items regarding the capabilities of the companies with respect to *focus*, *responsiveness*, *variability* and *resilience*. By not referring to the companies directly (e. g. by handing out a questionnaire) but preferring the judgements of third persons, strategic behaviour by the companies could be bypassed and a higher degree of objectivity was obtained. Emanating from this data base the progress of each company with respect to the feature asked for in the respective item was evaluated on a scale from one (being at the outset of initiatives) to five (being highly advanced). The time period to be evaluated was 1998 to 2002. To provide comparability among the answers and to prevent the interviewers from judging arbitrarily detailed descriptions for each level of progress were given.⁷ From all answers an overall “maturity level” was calculated as an arithmetic mean for each company. In a second step these so derived maturity levels were contrasted against the performance data of the companies, which were obtained from public sources such as company reports.

4.2 The IT Ecosystem

Why was the electronics industry chosen as a particular object of interest? As already outlined in chapter 2 the information technology environment must currently be considered as one of the most unstable, changing and innovative business ecosystems in the global economy. Principles like Moore’s Law – a doubling of transistors on the same space every 18 months – or Rock’s Law – a doubling of the cost of the equipment needed to build semiconductors every four years – characterise the industry. As mentioned above the term high velocity environment was already coined in the 1980ies and applied to the computer industry (Bourgeois, Eisenhardt, 1988). This is also reflected in the data on market development. Figure 6 depicts the growth rates of the IT markets during the recent years against the economic development within the industrial countries in the same period. The two curves strongly diverge, displaying a much higher volatility in the IT sector. If the business ecosystem model holds then keystone strategies should be prevailing in the IT ecosystem or should at least be relatively well developed compared to still stable markets.

⁷ For example one question asked “Does the company leverage external partners in its processes” and the answer-levels ranged from “Company rarely uses partners. A ‘we can do it better/cheaper internally’ mentality is pervasive throughout the management organization; little attention is paid to total costs of processes” up to “The company’s ability to manage and transform processes allows them to insert partners for distinguishing activities.”

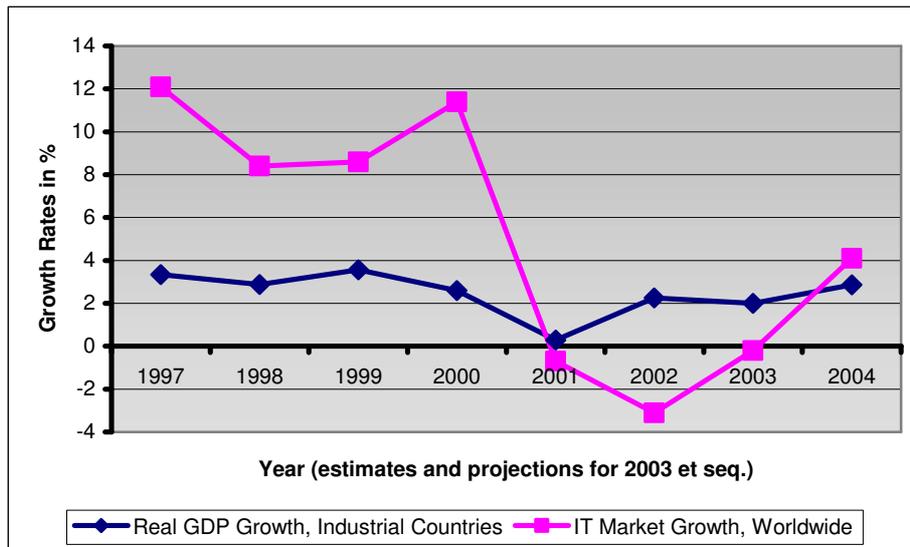


Figure 6: IT markets vs. GDP (Data sources: EITO, 2000, 2003a+b, IMF, 2003)

4.3 Results

The performance measures analysed in this study were revenue as well as profit measures (such as earnings before interest and tax, return on assets, compound annual growth rates, profit margins). The results were consistent and in conformity over all measures. In figure 7 the correlations between maturity level and revenue per employee or earnings margins respectively are depicted.⁸

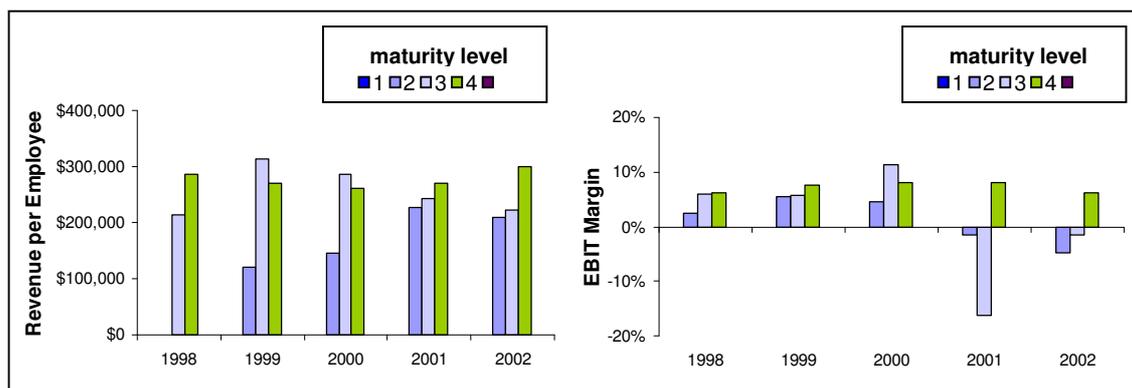


Figure 7: Correlation between maturity level of surveyed companies and revenue or profit respectively (Source: IBV, 2004)

As a general pattern a positive correlation between maturity level and performance can be observed in all diagrams. Albeit no company achieved the admittedly demanding overall maturity level of five revenue and growth rates have been sustainably higher in more mature

⁸ For a detailed summary of the survey data and outcomes refer to IBV, 2004.

companies especially in years when the ecosystem in total suffered from a decline (as in 2001 and 2002). The data on revenue per employee and profit margins show that companies striving for focus, responsiveness, variability and resilience are obviously able to allocate their resources more efficiently than less advanced companies with respect to these efforts. Furthermore the more advanced companies (maturity level 4) show less volatility in their performance and therewith higher stability.

Declaredly the results presented here can just be viewed as first clues. It is remarkable that the highest overall maturity level achieved in the ranking of this survey was a tier four (out of five), which shows that even in the electronics industry there is still a large scope for moving ahead and improving.⁹ Furthermore comparisons of the IT ecosystem with more stable environments would be desirable. Nevertheless from the data brought up here the initial hypothesis cannot be falsified. On the contrary, the data strongly support the business ecosystem model and its implications.

5 Conclusions

Will every company strive to become a keystone now? One can hardly expect so. Game theory as well as behaviourism show the likelihood of opportunism in practical life and the obvious strive of people for power and dominance. Nevertheless it is neither precluded nor unreasonable for companies to begin to adopt single keystone traits.

The business ecosystem model explains the logic behind the simultaneous occurrence of rather different firm behaviour in business. Other theoretical approaches that try to explain an increasingly co-operative behaviour of companies and an increase in coordination by market forces – the most “fashionable” currently might be transaction cost economics (TCE) – fail. Transaction costs lowered by modern ICT might indeed lead to more coordination by market mechanisms as predicted by TCE, but at the same time TCE expects large hierarchical organizations (i. e. the opposite of markets) when costs of communication are reduced (cf. Coase, 1937, p. 397). Like two overlapping waves the propositions of TCE sum up to zero (cf. also Nooteboom, 2002).

⁹ It should be conceded that with the description of maturity levels one exposes himself to some legitimate criticism; cf. DeMarco, Lister, 1999, p. 208 et seq., who hint at that maturity levels can emerge as one-size-fits-all straitjackets for companies. Notwithstanding we claim that maturity levels are a sensible and useful mean for a first assessment of a new phenomenon to be analysed.

Within the framework of the business ecosystem model the manifold and increasingly witnessed forms of co-operations among firms become explainable and can be cast into a holistic strategy – the keystone strategy –, which cannot be perceived as just a fad of our times. Already e. g. during the industrial revolution in the 19th century an increasing number of co-operatives could be observed as a counter reaction of small companies against the emerging giant stock corporations (cf. Eisenhardt, 2002, Stumpf, 1998). The keystone strategy derived from the business ecosystem model poses a feasible alternative to aggressive dominator behaviour with reasonable prospects of success since they nourish diversity and reduce the dangers of ecosystem-wide spread of failures and contagion. A keystone strategy – beginning at a focus on core competences and developing responsiveness, variability and resilience within a networked, co-operative environment – requires an adaptation of the appropriate culture and managerial thinking, of management processes and coordination principles that need to be aligned to networked environments, as well as a support by information technologies. Especially new developments in IT such as “Adaptive Computing” or electronic “On Demand Business” are likely to be able to change traditional business models and support a keystone strategy. Nevertheless a potential does not mean that fundamental changes to business models indeed emerge – this at least should be the lesson learnt from the e-business boom and internet hype. On Demand Business – the idea of near perfectly aligned networks to instantaneously serve the customer – will depend to a large degree on whether technology will keep its promise or not and even more on whether companies are mature enough to pursue a keystone strategy or prefer to stick to the old tried and tested traditions.

At the time of writing *The Economist*, 2004, reported on a strategy change at Microsoft, near monopolist in PC operating systems and regularly accused of and fined for applying aggressive dominator strategies: “Microsoft has decided to grow up, make peace with its enemies and work with its industry to form open standards and share vital technology.” Keystone strategy at work?!

References

- Ansoff, H. Igor (1979): *Strategic Management*, London, Basingstoke.
- Arrow, Kenneth J. (1971): *Essays in the Theory of Risk-Bearing*, Amsterdam, London.
- Badaracco, Joseph L. (1991): *The knowledge link: how firms compete through strategic alliances*, Boston, Mass.
- Begon, Michael, Harper, John L., Townsend, Colin R. (1996): *Ecology: Individuals, Populations and Communities*, 3rd edition, Oxford.
- Bengtsson, Maria, Kock, Sören (1999): 'Cooperation and competition in relationships between competitors in business networks', in: *The Journal of Business & Industrial Marketing*, vol. 14 (1999), no. 3, pp. 178-194.
- Bond, W. J. (1993): 'Keystone Species', in: Schulze, Ernst-Detlef, Mooney, Harold A. (eds.): *Biodiversity and Ecosystem Function*, Ecological Studies, vol. 99, Berlin, Heidelberg.
- Bourgeois III, L. J., Eisenhardt, Kathleen M. (1988): 'Strategic Decision Processes in High Velocity Environments: Four Cases in the Microcomputer Industry', in: *Management Science*, vol. 34 (1988), no.7, pp. 816-835.
- Coase, Ronald H. (1937): 'The Nature of the Firm', in: *Economica*, vol. 4 (1937), pp. 386-405.
- Cooper, Robin, Slagmulder, Regine (2001): *Interorganizational Cost Management and Relational Context*, INSEAD R&D Working Papers, 2001/109/AC, Fontainebleau.
- Cooper, Robin, Yoshikawa, Takeo (1994): 'Inter-organizational Cost Management Systems: The Case of the Tokyo-Yokohama-Kamakura Supplier Chain', in: *International Journal of Production Economics*, vol. 37 (1994), pp. 51-62.
- Corsten, Hans, Gössinger, Ralf (2002): 'ZP-Stichwort: Peitschenschlageffekt', in: *ZP – Zeitschrift für Planung*, vol. 13 (2002), no. 4, pp. 459-464.
- D'Aveni, Richard A. (1995): *Hyperwettbewerb: Strategien für die neue Dynamik der Märkte*, Frankfurt/Main, New York (original title: Hypercompetition: Managing the Dynamics of Strategic Maneuvering).
- Davidow, William H., Malone, Michael S. (1992): *The Virtual Corporation: Structuring and Revitalizing the Corporation for the 21st Century*, New York.
- DeMarco, Tom, Lister, Timothy (1999): *Wien wartet auf Dich! Der Faktor Mensch im DV-Management*, 2., aktualisierte und erweiterte Auflage, München, Wien (original title: Peopleware, 2nd ed.).
- Eisenhardt, Kathleen M. (1993): 'High Reliability Organizations Meet High Velocity Environments: Common Dilemmas in Nuclear Power Plants', in: Roberts, Karlene H. (ed.): *New Challenges to Understanding Organizations*, New York, pp. 117-136.
- Eisenhardt, Kathleen M., Galunic, D. Charles (2000): 'Coevolving: At Last, a Way to Make Synergies Work', in: *Harvard Business Review*, vol. 78 (2000), no. 1, pp. 91-101.
- Eisenhardt, Kathleen M., Kahwajy, Jean L., Bourgeois, L. J., III (1997): 'How Management Teams Can Have a Good Fight', in: *Harvard Business Review*, vol. 75 (1997), no. 4, pp. 77-85.
- Eisenhardt, Ulrich (2002): *Gesellschaftsrecht*, 10., ergänzte und überarbeitete Auflage, München.
- EITO (2000): European Information Technology Observatory (EITO) – European Economic Interest Grouping (EEIG) (eds.): *European Information Technology Observatory 2000*, Millennium Edition, Frankfurt/Main.
- EITO (2003a): European Information Technology Observatory (EITO) – European Economic Interest Grouping (EEIG) (eds.): *European Information Technology Observatory 2003*, Frankfurt/Main.
- EITO (2003b): *EITO Update 2003 - ICT market, October 2003*, <http://www.eito.com>.
- Elfring, Tom, Volberda Henk W. (2001): 'Schools of Thought in Strategic Management: Fragmentation, Integration and Synthesis', in: Volberda, Henk W., Elfring, Tom (eds.): *Rethinking Strategy*, London, Thousand Oaks, New Delhi, pp. 1-25.

- Galunic, D. Charles, Eisenhardt, Kathleen M. (2001): 'Architectural Innovation and Modular Corporate Forms', in: *Academy of Management Journal*, vol. 44 (2001), no. 6, pp. 1229-1249.
- Göthlich, Stephan E. (2003): *From Loosely Coupled Systems to Collaborative Business Ecosystems*, Manuskripte aus den Instituten für Betriebswirtschaftslehre der Universität Kiel, No. 573, Kiel.
- Granovetter, Mark (1985): 'Economic Action and Social Structure: The Problem of Embeddedness', in: *American Journal of Sociology*, vol. 91 (1985), no. 3, pp. 481-510.
- Haeckel, Stephan H. (1992): 'From "Make and Sell" to "Sense and Respond"', in: *Management Review*, October 1992, p. 63.
- Haeckel, Stephan H. (1999): *Adaptive Enterprise: Creating and Leading Sense-and-Respond Organizations*, Boston, Mass.
- Haeckel, Stephan H. (2003): 'Leading on demand businesses – Executives as architects', in: *IBM Systems Journal*, vol. 42 (2003), no. 3, pp. 405-413.
- Hamel, Gary, Välikangas, Liisa (2003): 'The Quest for Resilience', in: *Harvard Business Review*, vol. 81 (2003), no. 9, pp. 52-63.
- Handelsblatt (2000): 'Verbände begrüßen Entscheidung des Kartellamts, Einzelhandel: "Wettbewerbsrecht doch kein stumpfes Schwert"', in: *Handelsblatt*, Sep 11th 2000.
- Hess, Thomas (2002): *Netzwerkcontrolling: Instrumente und ihre Werkzeugunterstützung*, Wiesbaden (zugl. Göttingen, Univ., Habil., 2001).
- Iansiti, Marco, Levien, Roy (2004): 'Strategy as Ecology', in: *Harvard Business Review*, vol. 82 (2004), no. 3, pp. 68-78.
- IBV – IBM Institute for Business Value (2004): *On Demand and Business Value in the Electronics Industry*, forthcoming.
- IMF – International Monetary Fund (ed.) (2003): *World Economic Outlook*, September 2003, <http://www.imf.org>.
- Jarillo, Carlos J. (1988): 'On Strategic Networks', in: *Strategic Management Journal*, vol. 9 (1988), pp. 31-41.
- Katz, Michael L., Shapiro, Carl (1985): 'Network Externalities, Competition, and Compatibility', in: *The American Economic Review*, vol. 75 (1985), no. 3, pp. 424-440.
- Kieser, Alfred (1988): 'Darwin und die Folgen für die Organisationstheorie: Darstellung und Kritik des Population Ecology-Ansatzes', in: *DBW - Die Betriebswirtschaft*, vol. 48 (1988), no. 5, pp. 603-620.
- Kieser, Alfred (2002): 'Evolutorische Ansätze in der Organisationstheorie – eine kritische Bestandsaufnahme', in: *ZfB – Zeitschrift für Betriebswirtschaft*, ZfB-Ergänzungsheft 2/2002, pp. 67-74.
- Kieser, Alfred, Woywode, Michael (1999), 'Evolutionstheoretische Ansätze', in: Kieser, Alfred (ed.): *Organisationstheorien*, 3., überarbeitete und erweiterte Auflage, Stuttgart, Berlin, Köln, pp.253-285.
- Kerwood, Hazel A. (1995): 'Where Do Just-in-Time Manufacturing Networks Fit? A Typology of Networks and a Framework for Analysis', in: *Human Relations*, vol. 48 (1995), no. 8, pp. 927-950.
- Kotler, Philip, Bliemel, Friedhelm (1999): *Marketing-Management: Analyse, Planung, Umsetzung und Steuerung*, 9., überarbeitete und aktualisierte Auflage, Stuttgart.
- Kroker, Michael, Kiani-Kress, Rüdiger, Kuhn, Thomas, Müller, Volker (2003): 'Ohne Sinn und Verstand', in: *Wirtschaftswoche*, no. 30, 17.07.2003, pp. 38-41.
- Miles, Raymond E., Snow, Charles C. (1986): 'Organizations: New concepts for new forms', in: *California Management Review*, vol. 28 (1986), pp. 62-72.
- Mintzberg, Henry (1990): 'Strategy Formation: Schools of Thought', in: Frederickson, James W. (ed.): *Perspectives on Strategic Management*, New York, pp. 105-200.
- Moore, James F. (1996): *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*, New York.
- Mowshowitz, Abbe (1986): 'Social Dimensions of Office Automation', in: Yovits, Marshall C. (ed.): *Advances in Computers*, vol. 25, Orlando et al.

- Nohria, Nitin, Joyce, William, Roberson, Bruce (2003): 'What Really Works', in: *Harvard Business Review*, vol. 81 (2003), no. 7, pp. 42-52.
- Nooteboom, Bart (2002): *A Balanced Theory of Sourcing, Collaboration and Networks*, ERIM Report Series: Research in Management, no. ERS-2002-24-ORG, Rotterdam.
- Orton, J. Douglas, Weick, Karl E. (1990): 'Loosely Coupled Systems: A Reconceptualization', in: *Academy of Management Review*, vol. 15 (1990), no. 2, pp. 203-223.
- Ouchi, William G. (1980): 'Markets, Bureaucracies, and Clans', in: *Administrative Science Quarterly*, vol. 25 (1980), pp. 129-141.
- Paine, Robert T. (1966): 'Food web complexity and species diversity', in: *The American Naturalist*, vol. 100 (1966), no. 910, pp. 65-75.
- Porter, Michael E. (1980): *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York.
- Porter, Michael E. (1985): *Competitive Advantage: Creating and Sustaining Superior Performance*, New York, London.
- Powell, Walter W. (1990): 'Neither market nor hierarchy: Network forms of organization', in: *Research in Organizational Behavior*, vol. 12 (1990), pp. 295-336.
- Power, Mary E., Mills, L. Scott (1995): 'The Keystone cops meet in Hilo', in: *TREE – Trends in Ecology and Evolution*, vol. 10 (1995), pp. 182-184.
- Prahalad, C. K., Hamel, Gary (1990), 'The Core Competence of the Corporation', in: *Harvard Business Review*, vol. 68 (1990), no. 3, pp. 79-91.
- Prahalad, C. K., Hamel, Gary (1994), *Competing for the Future*, Boston, Mass.
- Simon, Hermann (1992): 'Lessons from Germany's midsize giants', in *Harvard Business Review*, vol. 70 (1992), no. 2, pp. 115-121.
- Simon, Hermann (1996): *Hidden Champions: Lessons from 500 of the World's Best Unknown Companies*, Boston, Mass.
- Stumpf, Cordula (1998): 'Die eingetragene Genossenschaft', in: *JuS – Juristische Schulung*, Heft 8, 1998, pp. 701-706.
- Sydow, Jörg (2001): 'Management von Netzwerkorganisationen – Zum Stand der Forschung', in: Sydow, Jörg (ed.): *Management von Netzwerkorganisationen*, Beiträge aus der „Managementforschung“, 2., aktualisierte und erweiterte Auflage, Wiesbaden.
- The Economist (2001): 'Wal around the world', in: *The Economist*, Dec 6th 2001.
- The Economist (2004): 'Kinder, gentler? Microsoft says that it has grown up and learned how to share.', in: *The Economist*, May 13th 2004..
- Townsend, Colin R., Harper, John L., Begon, Michael (2003): *Ökologie*, Berlin, Heidelberg (original title: *Essentials of Ecology*, 2nd ed.).
- Weick, Karl E. (1987): 'Organizational Culture as a Source of High Reliability', in: *California Management Review*, vol. 29 (1987), no. 2, pp. 112-127.
- Weick, Karl E., Sutcliffe, Kathleen M. (2001): *Managing the Unexpected: Assuring High Performance in an Age of Complexity*, University of Michigan Business School Management Series, San Francisco.
- Wirtschaftswoche (2000): 'Innovationskraft: Image folgt harten Fakten', in: *Wirtschaftswoche*, Jun 1st 2000.