

# **NEW INDUSTRY CREATION IN KNOWLEDGE-DRIVEN BUSINESSES – CASE MOBILE GAMES INDUSTRY IN FINLAND**

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This paper discusses new industry creation in knowledge-driven industries and presents the Finnish mobile games industry as an empirical example to which earlier theories of industry evolution are reflected. First, traditional approaches to new industry development are introduced: population ecology and evolutionary economic models are reviewed shortly. Second, new knowledge-based approaches are presented to complement the evolutionary theories and special features of knowledge-driven industries are discussed. The empirical part of the paper illustrates the emergence of new industry in Finnish context and identifies some explanations for the favourable development of mobile games industry. The collaboration of major local incumbents, local new ventures and government bodies were seen as a central enabling factors. Also, the recognized need to support certain industries in local economies may result in faster legitimation of a new industry both in national and global context.

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## **1 Introduction**

During the last decades the Western economies have experienced a major transformation from mainly raw material processing and manufacturing activities to the processing of information, and the development, application and transfer of new knowledge (Teece 1998). Such a paradigmatic change in business environment has resulted in changed focus on the academic research on industries. When knowledge is the primary productive resource of a firm (Grant 1996) it contributes also to the process of where and how new industries emerge and evolve. As knowledge is inherently more mobile than most physical resources of production (Yli-Renko et al. 2002), knowledge and ideas – the seeds of new industries – travel rapidly between different locations and take their rooting where the conditions are favourable, thus building global links between the hotspots of emerging new industries. In addition, knowledge-based

industries are driven by new economic logics that result in unpredictability, market instability and multiple potential outcomes (Arthur 1996). The escalating pace of competition, evolution and globalization, thus, contribute to a new urgency to study emerging industries (Murtha et al. 2001).

This paper discusses new industry creation in knowledge-driven industries in the context of changing rules of industry evolution. The development of Finnish mobile games industry is presented as an empirical example to which earlier theories of industry evolution complemented with recent knowledge-driven explanations are contrasted. The main questions for this paper are: How do new industries emerge and evolve according to earlier research? What is the role of knowledge in new industry creation? What are the major factors influencing the development of mobile games industry in Finland?

In the remaining of this paper, first, industry evolution is discussed from evolutionary economics and population economics perspectives. Following that, complementary explanatory tools for new industry development in knowledge-driven industries are applied from recent knowledge-based research on new industry creation. In the second part of this paper this theoretical framework is reflected to recent development of mobile games industry in Finland. Finally conclusions are drawn and some future directions for this research are proposed.

## **2 New industry development: population ecology, evolutionary economics and knowledge perspectives**

Following Van de Ven and Poole (1995), industry evolution is investigated mostly in the framework of evolutionary theory. Darwin and his contemporaries created the first evolutionary theories in the 18<sup>th</sup> century, and evolutionary theories have ever since been deployed in various sciences including organizational science and economics (Van de Ven & Poole 1995). Evolutionary theories have been applied e.g. in the attempts to explain the timely evolution of populations of companies and development of new industries. A variety of evolutionary explanations have been proposed as the explanatory models of e.g. the new industry development.

The aim of this chapter is to discuss traditional evolutionary approaches in new industry development, and present complementing, knowledge-based explanations for dynamic new industry creation processes in knowledge-driven industries. First, established explanations for industry evolution based on population ecological approaches and evolutionary economics are discussed. Second, recent knowledge-based theories of industry development are presented to complement traditional evolutionary approaches.

## **2.1 New industry development according to population ecologists and evolutionary economists**

New industry development and new product market evolution have been discussed in parallel in academic literature (e.g. Agarwal & Bayus 2002, Klepper & Graddy 1990, Porter 1980, Utterback & Abernathy 1975): industry structure is considered to change over both the technological and product life cycles. Also in this paper this view is adopted: emergence of new industry is tied to an innovation and to the consequent development of new product markets. Product or process innovation is seen as a magnet that draws the companies together for building a new industry to satisfy, and – what seems to be more the case in many industries – to create new customer needs. In the following further understanding of the processes of new industry creation will be created by outlining population ecological and evolutionary economic explanations to new industry development, and discussing their explanatory power in knowledge-driven industries.

**Population ecology.** Population ecology bases on evolutionary theories and has its roots in sociology (Suhonen 2002.) It has been among the most popular tools to model and explain industry evolution. According to Hannan and Carrol (1992), the central theoretical question in organizational ecology is the analysis of how social environments affect on rates of creation and death of organizational forms, rates of organizational birth and mortality, and rates of change in organizational forms. Central concepts in population ecology are population, density, niches and legitimation (Geroski 2001, Hannan & Freeman 1989).

Hannan and Freeman (1989) define *populations* as having a unitary character, which translates into common dependence on material and social environment. The members

of a population are affected similarly by the changes in their environment. Populations in new industries develop normally according to following pattern: there are low founding rates and high disbanding rates in the early years of a population within a new industry, followed by a gradual increase in founding rates and decrease in disbanding rates (Hannan & Freeman 1989). Thus, along with the growth of *density* a new *niche* starts to get full and competition for resources begin, which results in the decreasing birth rates and increasing mortality rates (Hannan & Carroll 1992).

*Legitimation* is critical for new industries: according to population ecologists, along with the growth of population in the industry also its legitimation increases (Hannan & Freeman 1989). According to Aldrich and Fiol (1994), explanations for establishing legitimation are tied to the spread of knowledge about a new business (cognitive legitimation), and the process of learning, familiarization and approval of key stakeholders (socio-political legitimation). Thus, learning produces legitimacy in new industry development. Due to the lack of legitimacy, founders of the new ventures in an emerging industry “are navigating, at best, in an institutional vacuum of indifferent munificence and, at worst, in a hostile environmental impervious to individual action” (Aldrich and Fiol 1994, pp. 645). Aldrich and Fiol further state that lack of both cognitive and socio-political legitimacy result in additional pressures for new organizations such as carving out a new market, raising capital from sceptical sources and recruiting untrained employees.

*Critics.* Despite of its popularity and applicability, population ecology offers only partial understanding of the development of new industry. Geroski (2001) criticises population ecologists because they tend to discuss entries and exits in terms of births and deaths, and neglect company mergers and industry consolidation that play a significant role in the development of young industries. Also, ecologists see companies as homogenous mass, which rarely applies to any useful extent in reality (Geroski 2001). According to Fligstein (2001), population ecology has not been well integrated into the literature that examines social relationships in markets - and yet those social relationships define how new industries take their form. In addition, population ecology pays relatively little attention to knowledge that plays the central role in the development of new industries.

**Evolutionary economics and industry life cycle models.** Evolutionary economics and industry life cycle models offer another set of tools to investigate new industry development (Suhonen 2002). According to Geroski (2001), economists tend to take

more market-oriented approach to new industry development, and discuss the epidemic models of diffusion, emergence of dominant design, and creation of standards as the key steps in new market creation. He further argues that market is regarded as a platform that hosts a wide variety of firms some of which compete against each other more closely than the others, and that firms may inhabit many markets simultaneously (Geroski 2001).

In evolutionary economics there are a variety of models explaining industry evolution. Suhonen (2002) identified dominant design model, innovative gamble model, increasing returns model and complex product systems model explaining industry development in evolutionary economics. Dominant design model and innovative gamble model will be discussed next, and increasing returns model will be discussed in the next chapter. Complex product systems model represents a distinctive example of industry evolution models and will not be discussed further in this paper.

*Dominant design.* Abernathy and Utterback (1978) describe the process of new industry development as a process determined by the evolution of product technology. According to Abernathy and Utterback, in the beginning the new industry encounters a *fluid phase* with major product and market uncertainty. During the early years of a new industry there is a variety of firms experimenting and promoting their own product variants. After fluid phase the industry enters into *transitional phase* where some standardisation of components, market needs and product attributes take place. Dominant design emerges which results in substantial reduction in uncertainty and experimentation. In *specific phase* the focus of innovation is on building more efficient production and other processes as the market sets into the phase of stable competition. (Abernathy & Utterback 1978.)

Emergence of dominant design is a process of creative destruction (Schumpeter 1934) where those who are prepared to produce according to the dominant design survive and those who are not, perish. Dominant design is necessary for mass market to be created, and standardization to take place (Geroski 2001, Anderson & Tushman 1990) and thus for the more stable development of established markets to take place.

*Innovative gamble model.* According to Jovanovich and MacDonald's (1994) innovative gamble model, new industry is created by a basic invention and shakeout is set off by a refinement innovation in the later stage of market evolution. Invention leads to a new

product, which leads to new firms entering the industry. Refinement of initial innovation provides new opportunities for firms - but only some will succeed. Incumbents are considered to be in the better position in the further refinement of the innovation as they have experience of the pre-refinement phase. After the increase of output due to refinement, prices for products decrease and shakeout takes place in the new industry. (Suhonen 2002, Jovanovich & MacDonald 1994.)

*Critics of evolutionary economics and life cycle models.* Innovative gamble model has been criticized of potentially not being applicable to all industries (Geroski & Mazzucato 2001). Also, Utterback and Abernathy model has been criticized for not being consistent across many different sectors because the pattern of innovation changes from sector to sector (Pavitt and Rothwell 1976). Klepper (1996) criticized the separation of product and process innovation as empirical evidence proves they take place simultaneously in many industries, not sequentially as Utterback and Abernathy suggest. Further, Porter (1983) has stated that the dominant design model does not apply to all new products especially where buyers' taste are diverse. In the cases of discontinuous industrial change and patenting of proprietary processes dominant design may not emerge at all (Anderson & Tushman 1991). Many of these critics imply that sectoral differences have impact on the way in which new industries emerge and evolve. According to Arthur (1996), knowledge-based industries have different economical logics from the traditional part of the economy: those of increasing returns. Industrial logic of knowledge-driven industries will be discussed further in the next chapter.

**Conclusions on population ecological and evolutionary economic views.** In this chapter, population ecological and some evolutionary economic models were reviewed shortly. Population ecology and evolutionary economics explanations together create a good overall understanding of how new industries evolve in terms of populations, legitimation, cyclical technological development and dominant designs, and they have been applied widely in academic research. However, they have been criticized of being too mechanistic and rigid, and lacking in application to a variety of industries. Population ecological and evolutionary economic models give little implications of the role of knowledge in the markets and challenges related to knowledge-based competition. More explanations are still needed to increase understanding on how new knowledge-driven industries develop. In the following an outlook on recent empirical

findings and theoretical discussions will be made in this domain, and the theoretical base of new industry development will be expanded further.

## 2.2 New industry development in knowledge-driven industries

According to e.g. Teece (2000), industry context matters due to different underlying cost and success drivers in different industries. In knowledge-driven industries knowledge has important implications for the ways in which knowledge-driven markets and industries evolve.

<i>Attribute</i>	<i>Product-Driven Orientation</i>	<i>Knowledge-Driven Orientation</i>
Value creation	cost/differentiation	speed
Gaining advantage	protect, exploit, adapt	create, share, transcend
Sustaining advantage	vertical integration	access and participation
Internationalization	efficiency/market-seeking	knowledge-seeking
Globalization	project, protect national positions	leverage unique national strengths
Nationality	isolate	collaborate

**Table 1:** Product vs. Knowledge-Driven Competitive Orientations (Murtha et al. 2001)

For understanding the further logics of knowledge-driven industries the differences between product-driven and knowledge-driven orientations are presented in Table 1. In knowledge-based industries the focus of value creation shifts from cost leadership and differentiation to speed. This is caused by the logic of increasing returns, and results in more rapid product life cycles and delayed appearance of dominant design. For managing the major uncertainty caused by positive feedback loops in knowledge-driven industries (Arthur 1996), joint processes of knowledge creation must take place in emerging industries.

Consequently, in knowledge-driven industries underlying mechanisms of knowledge lead to new rules in industry creation. In the following first, increasing returns argument will be discussed. Second, the effects of knowledge-driven orientation will be discussed in terms of product life cycle and dominant design that are the drivers of new industry development. Third, an additional model of new industry creation in knowledge-driven industries will be introduced and its implications for the actors in the new industry will be presented.

**Increasing returns.** Contemporary understandings of the underlying mechanisms of markets base on the view of diminishing returns. Diminishing returns assume that the industry participants have identical production functions and identical technologies with increasing marginal costs (Teece 1998). Contrary to this traditional view, Arthur (1996) asserts that increasing returns are the cause of new logic in knowledge-driven high tech industries. He defines increasing returns as the “tendency for that which is ahead to get further ahead, for that which loses advantage to lose further advantage” (p. 100) – increasing returns create mechanisms of positive feedback that breed not equilibrium but market instability, multiple potential outcomes, unpredictability, the ability to lock in a market, the possible predominance of an inferior product and lucrative profits for the winner. Further, the style of competition in increasing return industries is similar to gambling, and those players who are the first ones to make sense of what kind of new games are emerging out of “the technological fog” are rewarded (Arthur 1996).

Teece (1998) argues that increasing returns themselves are driven by several knowledge-driven factors such as standards and network externalities, customer lock-in, large up-front costs and producer learning, which contribute to changing rules for competition in knowledge-driven industries. Thus, increasing returns and its underlying knowledge-driven factors have significant impact on new industry development e.g. in terms of changing product life cycles and delayed emergence of the dominant design.

**Product life cycles and dominant design.** According to Murtha et al. (2001), due to their uniqueness successful new products generally provide high return in the early phase of product life cycle. However, if price competition takes place before a technology has reached the point where dominant design has emerged, innovating companies encounter difficulties in covering the development costs related to successive generations. Companies face pressures for reducing costs at the same time when investments in R&D continue to rise. Such conditions challenge the early stage of a new industry development: companies must simultaneously be able to improve their product innovation processes and keep their cost structures down to reach the broadest possible markets. (Murtha 2003, Murtha et al. 2001.)

Due to large up-front costs of research and development as well as rapid succession of product generations the fluid period in the new industry development with a variety of product designs may continue indefinitely. Anderson and Tushman (1991) identified

two situations where dominant design may not surface at all: when discontinuity follows another in a very rapid manner there is no single equilibrium with established designs; and when several producers patent their own proprietary processes and refuse to license to others. Time between generational changes grows shorter, and new generations are adopted before the predecessor lines are fully started up (Murtha 2003). Also, proprietary ownership may harm the owners of respective intellectual property because patents slow down the new industry development in many cases, however, IPR may end up in lucrative profits as increasing returns models suggest.

**Industry creation as knowledge creation.** The aim of this part of the paper is to further illustrate the special requirements that knowledge poses to the new industry creation. This will be done by discussing the recently presented argument that industry creation is actually a process of knowledge creation. The argument and its implications for new industry creation will be discussed in the following.

Murtha et al. (2001) consider new industry creation as a process of knowledge creation. When knowledge is the central driving force of the new industry creation, the access to knowledge creation processes is more important than the access to physical assets (Murtha et al. 2001). In the new economy development, production and distribution can be organized around the globe with little regard to national borders. Consequently, knowledge creation processes may take place anywhere in the world.

Murtha et al. (2001) conducted an in-depth research in the development of flat-panel display industry proving that by cooperating with only domestic development partners and neglecting the investments in open, global collaboration the US-centric firms weakened themselves in global competition. They concluded that collaboration among firms in an international community located in dispersed hotspots is essential for new industry to emerge and develop (Murtha 2003, Murtha et al. 2001). This has serious implications for organizing collaboration for collective learning in new industries.

Placing knowledge creation in the center of new industry development, indeed, results in novel logics in the industry research area, which stresses physical and relational proximity in new industry creation. In Nonaka and Takeuchi's (1995) work knowledge creation is a dynamic process of socialization, externalisation, combination and internalization of explicit and tacit knowledge. By maintaining that attending knowledge creation processes in various places around the world, Murtha et al. (2001) de facto

claim that access to both explicit and tacit knowledge are essential for new ventures in new industry creation, and that access to both should be secured.

Tacit knowledge created the bottleneck in knowledge creation processes. It is difficult to transmit due to its special characteristics: tacit knowledge is by definition impossible to communicate efficiently in written or verbal form; it remains hidden from those who possess it i.e. individuals are unaware of what they know and how tacit knowledge shapes their attitudes and practices; and it is context-specific i.e. it is embedded within a social context where it is produced (e.g. Gertler 2003, Nonaka & Takeuchi 1995, Polanyi 1966). Malmberg (2003) argues that *spatial proximity* matters in interactive learning and innovation processes due to the very tacit knowledge: it is best transferred in face-to-face interaction with people with short cognitive distance, common language, and trustful relations, and in an environment with easy observation and immediate comparison.

However, Amin (2003) and Amin and Cohendet (2000) argue that *organizational* or *relational proximity* and occupational affinity are more important in supporting the flow of tacit knowledge than mere geographical proximity. According to Sawhney and Prandelli (2000, pp. 31): “any process of knowledge socialization and collective learning is based on relationships of meaning building and sharing. Such relationships cannot be enacted in the absence of a context of co-participation.” They conclude that these prerequisites lead into emergence and adoption of various kinds of communities such as developer communities, which represent a type of community of practice (Wenger 1998), and other communities of knowing (Boland & Tenkasi 1995) and support the claim of relational proximity in knowledge creation.

Implications of the knowledge creation argument in new industry creation are that new industries need to be built around the networks of competition and collaboration both in the local and global contexts. In order to be successful both relational and spatial proximity are required. Accessing knowledge global creation processes translates into participating in the communities of knowledge that are local and globally dispersed to different hotspots

### **2.3 Conclusions on theories on new industry development**

In this chapter the established explanations of new industry development from population ecological, evolutionary economical and knowledge-based views were discussed. Population ecological and evolutionary economic models have very little implications for interfirm collaboration in new industry creation, where knowledge-driven models seem to work better. Development, ownership, protection and astute utilization of knowledge assets define competitive advantage in the new economy (Teece 2000). Thus, knowledge-driven explanations are needed to broaden the understanding of new industry development in modern societies.

When considering new industry creation as a process of knowledge creation, proximity and collaboration between the variety of actors within an emerging industry is essential. In the following chapter, the development of the Finnish mobile entertainment industry will be discussed by reflecting the presented theoretical framework to this context.

## **3 New industry creation in mobile entertainment industry in the context of Finnish ICT cluster**

Emerging mobile games industry is a truly global industry: e.g. global diffusion of handsets and common standards have resulted in the global markets for majority of mobile digital content. The development of the global mobile games market is still in its early stage, but it is considered to be a new industry with very high growth potential.

In this paper, mobile games are defined as digital content<sup>1</sup> delivered to mobile devices. Major growth has been forecast for mobile games industry during the following years. Research company Analysys has estimated the value of mobile games market to 255

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<sup>1</sup> In this paper mobile games refer to mobile digital entertainment content that is delivered to mobile devices. Digital content includes products that are in a binary form and that are distributed through electronic channels. Digital content contains both product and service features – it is a product that has services features from consumers' point of view. (Koiso-Kanttila 2003.) Mobile networks and mobile phones can be seen as the lowest common denominators in the supply chain of digital content due to limited data transfer speed, screen resolution and usability issues limiting the richness of digital content. Mobile devices can be used already today in accessing a variety of relatively rich digital content, and the limitations for content richness will decrease in mid-term along with the development of networks and data transfer speeds as well as mobile terminals.

million euros in 2002, and forecasts that the size of mobile games markets will grow tenfold by 2005, to over 3 billion euros (Analysys 2002). Japanese games company Sega estimates the markets of mobile gaming to grow to 8 billion dollars by 2008 (Talouselämä 21.2.2003). The sales in game industry overall is already higher than the sales in the music industry, over 40 billion dollars per year (Talouselämä 21.2.2003). Mobile games industry is, thus, considered to have high potential to grow to a major branch of the entertainment industry.

In this chapter the knowledge creation as a motor of new industry development will be discussed further in the context of the development of the Finnish mobile games industry. The aim is to define what kind of steps have been taken to encourage joint knowledge creation in Finnish context in terms of government actions and networking activities of big incumbents and challengers i.e. small and new mobile games companies. First, overall description of the status and challenges of mobile games field is given; next the Finnish context is introduced in terms of company and government activities to build this new field of business. Finally, conclusions are made building bridge between empirical example and earlier theoretical discussion.

### **3.1 Mobile entertainment and mobile games industry**

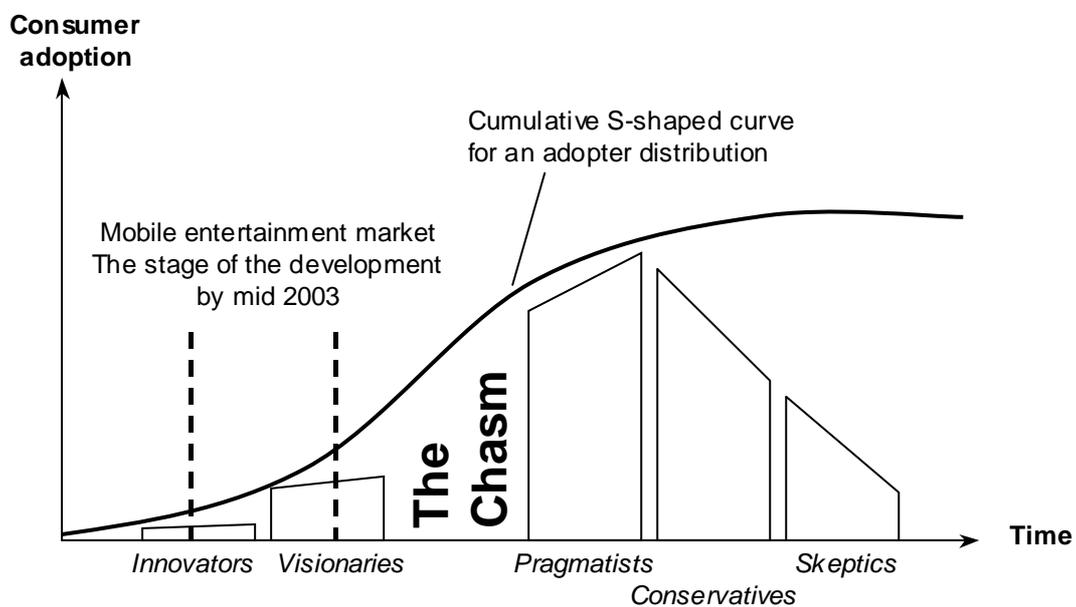
New industries, including mobile entertainment industry and its affiliate mobile games industry, do not exist in a vacuum. According to Agarwal and Bayus (2002), widespread adoption of product innovations often requires the development of complementary products and services. In most cases new industries are created to complement existing ones. This is also the case for mobile digital content industries: the success is based on the adoption rates of platforms through which the content is delivered, and the readiness of mobile networks to transfer such content. Mobile digital content creates more uses for mobile devices and thus increases the attractiveness of new generation mobile phones to consumers.

According to Bovellan (2003), games business consists of three types of companies: those who provide platforms for games, those who provide games i.e. software and those who publish games. There are a variety of games platform in the world: game consoles (Playstation of Sony, Xbox of Microsoft), portable game consoles (Game Boy of Nintendo, N-Gage of Nokia), PC's, mobile phones and PDA's (personal digital assistants such as Palm of PalmOne and iPAQ of Hewlett-Packard) (Talouselämä

21.2.2003). Software is not compatible with different platforms, thus a variety of products exist for different platforms (Bovellan 2003). Thus, software and platform producers are dependent on each other as the devices need the content, and the content needs the devices to be delivered to consumers.

Mobile games in this paper refer to games that are delivered to consumers through mobile phones. As a platform mobile phones of today pose most restrictions for the games content due to e.g. small screen size and resolution, lack of controls and small memory. Thus, developing mobile games have generated a large amount of new companies to challenge the game houses that design games for other platforms.

The development of mobile entertainment industry overall is in its early stage (Figure 1). According to Ollila et al. (2003), for accessing the critical mass of customers the next challenge of the companies in the European mobile entertainment value web is to take the business to mass markets. They maintain that for crossing ‘the chasm’ between visionary and pragmatic customer groups requires further effort in improving e.g. technical quality, usability and reliability of mobile entertainment services as well as solving pricing and distribution-related challenges.



**Figure 1:** Mobile entertainment market: stage of development and different consumer groups (Ollila et al. 2003)

The business has been legitimised by Nokia's recent launch of the mobile gaming phone N-Gage as well as the entry of major games company, Electronic Arts, to the mobile games industry. According to earlier empirical evidence of new industry creation the sales in mobile games industry are expected to take off, and the number of entrants should increase in a decreasing rate. Concluding from the previous chapter, joint processes of knowledge creation and networking on the global level may be the most important explanatory factors in defining the new industry creation for mobile games and the success of individual firms in current and next phases of mobile games market development.

### **3.2 The development of mobile games industry in Finland**

According to Arthur (1996), technological products exist within *local mini-ecologies* that are local groupings of products that support and enhance them. When technological ecologies are taken as the basic unit for strategy in knowledge-driven industries, players compete by building webs or loose alliances of companies organized around a mini-ecology.

Mobile games industry has taken a strong rooting in Finland since its inception. The new industry was born in conjunction of local games industry and mobile entertainment industry, and facilitated by the ecosystem created around Nokia as well as the strong local ICT skills and orientation. Finland offers a fertile base for new ICT industry development. In the following, the development of Finnish mobile games industry is discussed in terms of local government policies to support the emergence of new industry, the actions of local incumbents with the global reach, and their collaboration between the local new ventures in mobile games industry.

**Regional context of mobile games industry development in Finland.** Many writers stress that companies are embedded in local networks and regulatory systems, and nation-state and its institutional legacy has crucial influence over the practices of firms (e.g. Dicken 2003, Gertler 2003). According to Dicken and Thrift (1992), embeddedness translates into networks and their inherent power relations. They argue that all processes take place in an environment defined by specific cognitive, cultural, social and political forms influenced by business enterprises, especially large ones that are able to exert more social power (Dicken and Thrift 1992). In global industries local contexts create foundations where new industries emerge. Without such loci new

industries wouldn't surface, however, the collaboration between the dispersed localities is required for building sustaining global industries.

Strong concentration on information and communications technologies (ICT) of Finnish economy provides a fertile ground for new industry development in related industries. Local ICT cluster creates the basis for national level knowledge creation and links inside the country. Rouvinen and Ylä-Anttila (2003) have identified a variety of explanations for the favorable development of the ICT industry in Finland, including e.g. the early deregulation of telecommunications markets; creative destruction of old industries; technology policies and establishment of special organizations and programs to support R&D; advanced telecommunications developers and users; intense inter-organizational collaboration; and visionary leadership of Nokia. These factors have triggered the virtuous cycle of the development of ICT related industries in Finland.

Domestic institutions and policies create the foundation of new industry development in country and regional level. Murtha (2003) illustrates the role of domestic policies in the local industry creation. In his research on the early development of flat panel display industry, the protective policies in the US led to the failure of the domestic flat panel industry development new industry in the US. According to Murtha (2003), the US R&D subsidy programs encouraged intra-industry collaboration within the United States in order to develop domestic capabilities. By 2001 none of the American flat panel manufacturers that had relied on these programs had succeeded and most had exited the industry (Murtha 2003).

Local policies thus have a significant role in encouraging global collaboration in new industry development. In Finland, a small and open economy, very different policies from the US example are adopted. The National Technology Agency of Finland (Tekes), the principal public promoter of research and development, aids in building links between Finnish and foreign companies and research units. In its activity the international collaboration is supported to a great extent. Also emerging industries are supported in its technology programs. An example of this are the actions taken to support the evolving mobile games business: the new mobile games industry has been adopted as an important focus area in Tekes technology program Fenix that focuses supporting interactive computing related R&D and networking. (Tekes 2004.)

Further, in the late 2003 Neogames, the Centre of Game Business, Research and Development was established from the initiative of the main actors in the game industry and with the support of National Technology Agency of Finland. The goal of Neogames is to build up national game development cluster by acting as a body of networking, business development, research support and coordination, as well as image building (Neogames 2003). Mobile games have a central role in Neogames' manifesto and activities. Local authorities have, thus, taken a strong stance in supporting the development of mobile games industry in Finland.

Such government actions have taken place only after some years of new industry has emerged. The process of legitimation is long: it takes time before a critical mass of companies emerges, and enough evidence is presented of the potential success of the emerging industry. Legitimation may also be considered as a process of joint knowledge creation as increasing knowledge about a new industry leads into legitimation (Aldrich & Fiol 1994). Participation of big incumbents in this process, such as Nokia in Finnish case, is very likely to accelerate the legitimation of the new industry.

**Networks of small mobile games companies and major incumbents.** According to Fligstein (2001), there are two types of actors in the markets: incumbent firms and challengers. In new, fragmented markets such as mobile games market the roles are relatively undefined: it is difficult to say who are the incumbents and who are the challengers in the longer run. A critical mass of companies is needed for new industry to develop: in population ecological terms the mass of firms creates visibility and learning which results in legitimacy (Hannan and Freeman 1989). True knowledge creation processes need to take place within the industry, and cooperation between various members is needed when establishing a new industry.

The primus motor and 'the magnet' of mobile games industry development in Finland is Nokia: the company has supported the emergence of mobile games and other new mobile value added industries by participating in developing and building necessary platforms and networks to promote the new industry creation. Good quality mobile games are essential for the added value of Nokia's handsets. Supporting the new industry in local and global context is of strategic importance for the company (Ali-Yrkkö 2001).

Essential feature of the network building is that dominant players in the network encourage dependent players to lock in to their products and designs (Arthur 1996). This implies that dominant companies in the industry should support the emergence of a new industry and strengthen their position in it by helping and supporting new ventures in the related businesses that increase the attractiveness of the incumbent's offering. Not only Nokia is an active incumbent in Finnish context but also Ericsson, Hewlett-Packard and other major companies have located some R&D functions in Finland (Ali-Yrkkö 2001), a major mobile technologies hotspot in the world.

Nokia has further established its position in Finnish mobile games markets. According to Talouselämä (21.2.2003), Nokia has become the first Finnish games publisher: it both publishes and distributes games but the games as such are produced by Nokia's subcontractors and partners. For small Finnish mobile games developer companies the greatest challenge has been to have the games distributed worldwide, and Nokia's role as a publisher is likely to change the situation (Talouselämä 21.2.2003). Thus, acting in the Nokia's networks small and new games houses may gain the access to international mobile games consumers using Nokia's and its competitors' mobile handsets.

Population of companies in Finnish mobile games industry has been growing steadily since 1999 to a dozen in Finland. The market has recently gained legitimation in Finnish context due not only the entry of major incumbents Nokia and Electronic Arts, but also somewhat outstanding success stories of local new ventures that have proven mobile games to be a potentially lucrative business for small mobile games developers. Some successful new ventures have gained a lot of publicity and attention in media and even more so within the ICT cluster. They have been able to identify and exploit a narrow window of opportunity in the early stage of new market development.

New venture success in Finnish context is partly due to first mover advantage of mobile technologies in Finland (Rouvinen & Ylä-Anttila 2003), but effective networking and joint knowledge creation with major incumbents present in the Finnish markets has given successful ventures a good start in the business. Moreover, success in mobile game development competitions and resulting cooperation with global mobile operators has provided new ventures with the access to global distribution networks of mobile games.

Such success from new venture point of view may also be explained in terms of both spatial and relational proximity that enable joint knowledge creation in new industries, as discussed in Chapter 2.2. Both levels of proximity are present for mobile digital content developers in Finland: initial access and references to global networks of mobile digital content suppliers may take place through Nokia and its challengers. New ventures are offered a local access point to global networks of knowledge and relationships, which enables learning and success in terms of e.g. creating global distribution networks for mobile games.

Thus, Nokia exerts social power in Finnish national context and also in its ecosystem of globally dispersed developers also for mobile digital content development (Nokia Success Stories 2004, Ali-Yrkkö 2001). Nokia's competitors have similar strategies: also other mobile devices manufacturers and operators offer access to developer communities, knowledge databases and company internal networks which enables access to global networks of learning and knowledge creation.

### **3.3 Conclusions on mobile games industry development in Finland**

The development of the mobile games industry has taken a good start in Finland. The strong institutional orientation in ICT industry; existing knowledge base, experience and networks; the presence of major incumbents within the mobile games industry; and entrepreneurial activity have enabled the development of mobile games industry in Finland. Finland is among the global mobile games development hotspots, connected to other hotspots via the networks of locally situated companies and institutions.

Due to major national importance of the further development of ICT cluster in Finland, national institutions have taken a strong role in promoting the development of mobile games industry in Finland. The established global reputation of Finland as a mobile laboratory may also have given additional legitimacy for mobile games industry development both in the Finnish context and global context.

## 4 Conclusions

This paper discussed new industry creation in knowledge-driven industries and presented the development of Finnish mobile games industry as an empirical example to which earlier theories of industry evolution were reflected.

First, traditional approaches to new industry development were introduced: population ecology and evolutionary economic models were presented shortly. These models give a good understanding on the basic mechanisms of new industry development. However, overall these models are criticized of being too mechanistic and lacking in application power in many industries. Major gaps were found in traditional evolutionary explanations of new industry creation and the requirement for complementary models to explain new industry creation was identified.

Second, new knowledge-based approaches were presented to complement the evolutionary theories and, consequently, special features of knowledge-driven industries were discussed. Increasing returns were identified as a central underlying factor in explaining the new rules of knowledge-driven industries. Increasing returns were suggested to result in changed product life cycles and delayed emergence of dominant design, or even the complete absence of any dominant models within an industry. Product life cycles and standardization are traditionally considered to guide also the process on new industry development. Thus, the changes in underlying mechanisms of product life cycles result in the industry level changes in the evolution of new industries.

In the end of the theoretical part of the paper new industry creation was discussed as a process of knowledge creation. When industry creation is regarded as knowledge creation it has consequent effects on how new industries should be organized. Collaboration and knowledge sharing are central enablers in supporting the emergence of a new industry. Consequently, knowledge-related processes require spatial and relational proximity, and joint efforts and will between a variety of actors within a new industry.

The aim of the empirical part of the paper illustrated the emergence of new industry in Finnish context by describing the development of mobile games industry. In Finland, local public institutions, local incumbents with global reach (centring on Nokia but also

its locally situated foreign competitors) and local new ventures are working together to promote the development of the new industry both in national and global context. Incumbents build bridges between locally situated new ventures and global product markets. For Finnish economy it is important to remain among the leading global mobile technology hotspots. Thus, a variety of actions have been taken to support the favourable development of new telecommunications related industries such as mobile games industry.

The development of mobile games business in Finland provides the reader with further understanding of what kind of explanations there are for the favourable development of mobile games industry in Finnish context and in more general terms. The collaboration of major local incumbents, local new ventures and government bodies in small open economies may lead to a rapid emergence of a new industry. In Finland, mobile games industry development takes place in a larger context: further evolution of ICT cluster and especially mobile telecommunications related businesses is important for both the economy and reputation of a nation as a mobile laboratory. This may result in faster legitimization of a new industry both in national and global context. Also, such context is likely to promote joint knowledge creation processes overall as the common goal is shared by local actors.

The early stage of research on the mobile games industry presents some challenges for this paper. Because empirical material was collected from public sources it was difficult to describe the phenomenon in all of its depth. Thus the paper inevitably remains on a somewhat superficial level. There is still very little empirical evidence on how new industries emerge in knowledge-driven businesses, which translates into the requirement of extensive fieldwork. In the next phase of the research the aim is to collect extensive empirical material on mobile games industry development, and produce more profound explanations for new industry creation in knowledge-driven industries.

Also, this paper centered more on local level processes and less so on building the bridges between local and global levels, which is considered essential in the research of emerging new global industries. More of a global approach will be taken in the next phase of the research. Also the literature review on e.g. social networks within industries, local ecosystems of knowledge and global and local links of knowledge will be discussed further and implications drawn for the development of new industries.

ICT industry of today faces extremely uncertain future due to further convergence of information and communication technologies. Future development in the ICT industry do not only shake out companies within industries and does not result only in intra-industry consolidation but it may have much more dramatic impact on the population of industries within the ICT sector - convergence is likely to result in the shakeout and consolidation of entire industries.

Creative destruction of old industries was identified as a one major driver of the development of ICT cluster in Finland (Rouvinen & Ylä-Anttila 2003, also Schumpeter 1934). From the ashes of old industries new industries emerge and completely new paradigms define the rules of product design, industry structure and competition. Research on new industry development is both challenging and important during the period of such a paradigmatic change. Academic community has a strong tradition of sharing knowledge and developing further new ideas as a common effort – such examples are needed when establishing the base for an emerging new industry.

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