

Total Exploitation Orientation in Capability Development: The Cross-case of Google, Ericsson, Microsoft and Nokia

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Abstract

The aim of the research is to cover the important aspects of corporate capability portfolio development – its co-evolution and configuration with an alliance portfolio. Capability portfolio management has received less attention than it deserves, and the co-evolution of capability and alliance portfolios is not looked at together. Here a closer look is taken from the perspective of exploration and exploitation capability portfolios in the context of large global ICT companies as cases in the multiple case study. As a result some prior findings are confirmed, but some contradictions are also found. This research reveals that capability development is a more externally oriented exploitive phenomenon than the extant literature presents. Alliance configuration parameters: tie strength and diversity behaviour is similar in scale to exploration-exploitation and internal-external.

JEL classification codes: M10, M13, L1, L25, D74, O321

Keywords: dynamic capabilities development, alliance portfolio, capability portfolio

1. Introduction

While a moderate amount of literature exists about capabilities development (e.g. Helfat & Peteraf, 2003; Winter, 2003; Eisenhardt & Martin, 2000) and an adequate amount for alliances (e.g. Hoffmann, 2007; Chesbrough, 2003; Eisenhardt & Schoonhoven, 1996), little is known about value creation from the perspective of co-evolution of capabilities and alliances, there is a lack of extant empirical sources. Capabilities, as with the majority of other company related issues, belong either to an exploration or exploitation related family (March, 1991), and this division is taken as a basis for this paper. Capability evolvments are viewed through the development of alliance portfolios. Portfolio, as such, is defined “as a firm’s set of direct ties” with other companies, which together construct an “egocentric network” (Das & Teng, 2000; Ozcan & Eisenhardt, 2009, p. 246). Gulati and Singh (1998, p. 781) define an alliance “as any voluntarily initiated cooperative agreement between firms that involves exchange, sharing, or co-development, and it can include contributions by partners of capital, technology, or firm-specific assets”. The exploration-exploitation dimension has been looked at for a while, and mostly in alliances’ (e.g. Hoffmann, 2007) and not in the capabilities’ context and interdependencies among alliance partners (i.e. tie characteristics) – open-close dimension – have not been looked at thoroughly.

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This paper compares and contrasts how four outstanding global information and communication technology (ICT) focal firms get things done. Through applying comparison, similar patterns are found for analytical generalisation (Yin, 2003), and contrasting helps to find differences between companies and explain them. The aim of this work is to give best practices in capability development that other companies could follow to achieve similar results and benefits. This is all done through the lens of dynamic capabilities as a key term in modern strategic management. In detail, for this purpose, the idea is to gain a broader understanding of the evolvments of the capability portfolio and specifically to identify a framework and patterns as to how the capability portfolio evolve together with an alliance portfolio.

In this study, the capability portfolio development and related alliance portfolio co-evolution issues are handled. This co-development of capability and alliance portfolios is looked at from the perspective of exploration-exploitation and in the context of ties configuration. The former is a widely used categorization in organizational learning (March, 1991) and this model has been developed further by many authors. Another aim is to extend prior findings by looking at the prevalence of exploitation or exploration capabilities in alliances of the ICT industry. The main research question of this study with two sub-questions is:

How alliances’ and capabilities’ portfolios co-evolve?

- How capabilities’ portfolio is developed based on exploration-exploitation ties?
- How capabilities are developed based on tie strength and diversity?

On the basis of research questions, the authors’ goal is to construct a research model and test it in practice. Development of propositions are carried out on the basis of prior literature and proved in ICT industry companies. The ICT industry is characterized by a fast growing market, heavy competition, and a highly uncertain and unstable environment with fast changes. Data from Google, Ericsson, Microsoft and Nokia were used to find the patterns and work out propositions. All case companies are multinational ones, having branches and development centres in the Eastern Europe geographic area.

This paper first provides a review of the extant literature regarding capability development, and introduces the research environment – framework for capabilities' portfolio configuration, and reaches the propositions. Next, the research method and data sources are discussed. The results of the study are then presented and analyzed. Finally, the conclusion and other implications are proposed.

2. Theoretical Framework

In a theoretical framework the research model is constructed, for this purpose, the dimensions of the research model are introduced. First, the exploration-exploitation dimension is described from the perspective of capability development. Second, the open-closed dimension from ties configuration is explained in the context of alliancing. Finally, these dimensions are put together into a two-dimensional research model.

2.1. Exploration-exploitation

Background of exploration and exploitation. In the theory of organizational learning there are two types of activities – exploration and exploitation (March, 1991). Exploration is defined as learning activities: “search, ..., risk taking, experimentation, ..., discovery, innovation” (March, 1991, p. 71). Exploitation is defined as practicing activities: “..., production, efficiency, selection, implementation, execution” (March, 1991, p. 71). Exploration is “to gain knowledge unrelated to their current areas of expertise” (Bierly et al., 2009, p. 484). Exploration's focus is on “upstream activities of the value chain” (Lavie & Rosenkopf, 2006, p. 799; Kauppila, 2010, p. 284). Innovativeness and fast development are constantly required, but it is not cheap to invest into exploration, as very few ideas reach the product development phase, much less will be brought to the market and one or two may see success. Therefore there is a tendency that only financially successful focal firms can invest better in explorative “innovations because they could better weather a failure” (Bierly et al., 2009, pp. 486–487). Exploitation is to advance existing knowledge (Bierly et al., 2009, p. 484). Exploitation focuses on manufacturing, “commercialization and marketing”, i.e. on downstream activities of the value chain (Lavie & Rosenkopf, 2006, p. 799; Kauppila, 2010, p. 284). Exploitation aims at efficiency and can more easily “take the form of outsourcing” (Kauppila, 2010, p. 287), networking and alliancing provides many ways for this. Merge and acquisition (M&A) is also one of the options that exploitation can use to fulfil its aims.

In real life, a sequence routine of exploration and exploitation happens in a modulated alternating way (Nickerson & Zenger, 2002; Crossan et al., 1999) – learning new knowledge, skills and competences are iteratively changed by practicing learnt knowledge, skills and competences. Some say that exploitation prevails over exploration (Regnér, 2003), and prior literature brings many reasons: exploitation is cheaper than exploration (Bierly et al., 2009), because the exploration process is more clearly illustrated by a funnel, channelling ideas and effort into just one stream. For the same reason, exploitation is less risky (Bierly et al., 2009) and it is easier to outsource (Kauppila, 2010). “The returns to exploiting existing knowledge and capabilities tend to be more certain and immediate than the returns to the exploitation of novel capabilities and opportunities” (Levinthal & Myatt, 1994, p. 47). The complexity is lower in the case of exploitation. On the other hand, some consider the prevalence of

exploitation as a disadvantage and see exploitation's capabilities as short-term zero-level ones (Winter, 2003).

Co-development of exploration and exploitation – separately or together. The choice between exploration and exploitation must be made carefully. Usually, when exploration prevails the company is focused on “long-term viability” and when exploitation prevails the focus is on “short-term profit maximization” (Hoffmann, 2007, p. 840). Cepeda and Vera (2007) see operational capabilities as a source of earning. Operational capabilities are closer to exploitation than exploration.

There is an opinion that exploration and exploitation do not fit together in a single company, a so-called punctuated equilibrium (Gupta et al., 2006, p. 693, 697), two of the reasons are: one crowds out the other (Lavie & Rosenkopf, 2006, p. 801), and there are competition and conflicts for attention (Gupta et al., 2006, pp. 695–696). A company either has to focus on exploration or on exploitation if they want to outperform the other competitors' mixed strategy (Ebben & Johnson, 2005, p. 1249, 1252). There is no clear evidence whether focusing on exploration or exploitation is a better choice (Ebben & Johnson, 2005, p. 1252, 1257).

However, there are ways to balance exploration and exploitation (Lavie & Rosenkopf, 2006), for example, one way is when the integration between them is carried out by the senior management officers (Tushman & O'Reilly, 1996, pp. 27–29; Kauppila, 2010, p. 284) and the second way is if exploration and exploitation are kept structurally separate so they would not interfere as much with each other (Gibson & Birkinshaw, 2004, p. 210; Kauppila, 2010, p. 285). However some say that separation needs to be avoided between exploration and exploitation, instead it is recommended that structural ambidexterity can be used for this (Gibson & Birkinshaw, 2004, p. 222). Some resource problems can still remain after that, such as the strategic role conflict, between keeping current (exploitation) and developing new (exploration) (Floyd & Lane, 2000, pp. 154–155). Ambidexterity deals with the separation issue and ambidextrous companies are good at combining exploration and exploitation efficiently together and “sustain their competitive advantage” (Tushman & O'Reilly, 1997, p. 167). While the companies' middle management has top management abilities, the company can then turn “exploration efforts into new exploitation opportunities” more effectively (Burgelman, 2002, p. 355).

This separation problem of exploration and exploitation is valid at different unit of analysis' levels – e.g. company's general orientation to exploration or exploitation, alliance portfolios orientation, capabilities orientation etc. All these levels need to manage this separation problem and there are solutions for a company's level, for alliance portfolio level, etc. For example, some sources (Hoffmann, 2007, p. 840) show that alliances can be transformed from exploration to exploitation alliances and vice versa, and this also opens up possibilities for reducing separation between them.

2.2. Evolution of Capabilities' Portfolio

It is methodologically reasonable and justified to divide capabilities into exploration or exploitation. Examples of exploration type capabilities are: internal and external R&D capabilities, product development capability in general and ICT capabilities in specific (such as software development capability, mobile software and hardware development capabilities, location based services (LBS) development capability). Examples of exploitation type

capabilities are: manufacturing capability, logistics and supply chain capabilities, quality management capability, internationalization capability, and marketing capability. Only a few of these have received earlier attention in the literature, such as, capability to manage networks – alliance management capability (Anand & Khanna, 2000), both exploration and exploitation type of alliances; and product development and strategic management capability (Eisenhardt & Martin, 2000). Prior empirics have not named and shown the optimum number of capabilities for exploration and exploitation capability families. Only Zook (2007) mentions that in general, a company has “80 to 200 significant capabilities”, but only fewer than 10 are the core capabilities.

In general, theorists have not paid attention to differences between exploration and exploitation capability developments. Most authors (e.g. Helfat & Peteraf, 2003) take capabilities at an abstract level to describe capability developments. There are sources that tie organisational learning and capabilities together (Cohen & Levinthal, 1990; Zollo & Winter, 2002; Helfat & Peteraf, 2003), providing the source for exploration capability development. From the exploitation side, there is a response from descriptions of main earning sources – operational capabilities (e.g. Cepeda & Vera, 2007; Plakoyiannaki & Tzokas, 2002; Helfat & Peteraf, 2003). The difference can be in capability development techniques, the way Helfat and Peteraf (2003) have described the content of certain capability techniques permits to presume that some of them are more suitable for exploration and some for exploitation. For example, Helfat and Peteraf (2003, pp. 1005–1006) define recombination as organisational learning (exploration), redeployment as a product altering technique for another market (exploration), renewal as raising efficiency (exploitation) and replication as internationalisation (exploitation).

The difference between exploration and exploitation oriented capabilities can be searched in organisational learning and innovation (for exploration) and operational management (for exploitation) research streams, which however do not particularly focus on capabilities, but gives some source and base for them. From the list of known capability development techniques (Helfat & Peteraf, 2003) some are more appropriate for exploration and some for exploitation. These development techniques can be extended from the capability level to the capability portfolio level, because capabilities can be aggregated at different levels of activities, from detailed to more generalised.

Capabilities development and market dynamics. New capabilities are often the result of certain techniques (Teece et al., 1997, p. 515), but there is a stance that not all techniques are applicable at the market emergence phase (Adner & Kapoor, 2010). Companies need to have many skills and resources to be successful (Helfat & Peteraf, 2003), but usually there is a lack of them in the first market phases, therefore companies might be stuck to a few capability development techniques. It is advisable to start with the most essential techniques. Only after that companies become ready for other “viable alternatives for capability development” (Helfat & Peteraf, 2003, p. 1001). Capabilities can be derived on the basis of real options’ analysis (Kogut & Kulatilaka, 2001, p. 756). Thus, at the market growth phase companies are mature enough to use a wide variety of techniques. As the portfolio of capabilities is growing larger, the opportunity to exploit diverse techniques is also increasing.

2.3. Evolution of Alliances' Portfolio

There can be exploration and exploitation oriented alliances. Exploration focuses on partners for gaining additional advantages in learning and innovation, and exploitation focuses on partners to increase efficiency and improve manufacturing.

Alliancing and market dynamics. Hoffmann (2007, p. 838) has mentioned that in the market emergence phase “within exploitation strategies, usually only a few alliances are implemented to stabilize the environment and to refine and leverage existing resources” (Hoffmann, 2007, p. 838). It is also known that alliancing takes “20-50% of their assets” (Lin, 2011, p. 331), and this amount of resources might not be available in the market emergence phase. Gulati (1999, p. 413) tested whether entering into “new alliances is influenced by the amount of network resources available to them”. Growing maturity, in the market take-off and growth phases, opens new possibilities for exploitation, “exploitation alliances in mature industries are characterized by high linkage intensity and redundancy because the inter-organizational field is stable and densely connected” (Hoffmann, 2007, p. 835). Tendencies are similar for exploration, being first, in the market emergence phase, internally focused in new product development, and then when becoming mature the open innovation is needed for exploration. Levinthal and Myatt (1994, p. 47) stated that “an established firm may have more incentive to invest in incremental changes in a current technology than in exploring more radical innovation”. It is known that economically prosperous companies can more easily cope with failures from explorative innovations (Bierly et al., 2009, pp. 486–487). Therefore start-ups, built around a certain innovative idea, provide good opportunities for focal firms. The extent to use alliances is also related with a company's wealth, focal firms are “less likely ... invest in radically innovative [exploration] ideas” in order “to avoid costly transitions” and instead of it, “less risky exploitative innovations” are taken for consideration (Bierly et al., 2009, pp. 486–487). Exploitation produces exploitation, and makes it “more attractive due to various sorts of competency learning” (Levinthal & Myatt, 1994, p. 47).

Exploration-exploitation and tie characteristics. Hoffmann (2007, pp. 830–831) proposes the following strategies for managing alliances: (1) adapting, (2) shaping, and (3) stabilizing. According to Hoffmann (2007, p. 831), shaping is characterized by exploration (“to develop new ... capabilities and to explore new ... opportunities”), stabilizing by exploitation (commercializing and leveraging resources, “exploitation of ... competitive advantages”), and adapting by exploration (reactively adapting with environment and delicately “exploring new opportunities”). From an uncertainty point of view, Beckman et al. (2004, p. 262, 263) notes that for firm-specific uncertainty (i.e. exploration), broadening the alliance network “with new partners” is good and for market uncertainty (i.e. exploitation), re-forming the alliances “with existing alliance partners” is good.

Tie strength is one of the oldest traditional measures of alliance portfolios, for example, Granovetter (1973, p. 1361) defined tie strength during the 1970's – “the strength of tie is a ... combination of the amount of time, the emotional intensity, the intimacy ..., and the reciprocal services”. Tie strength has two choices: (1) weak tie – first time partnership and (2) strong tie – more than one time partnerships. The tie diversity among partner domains is another measure, and tie diversity has two options: (1) the same Standard Industrial Classification (SIC) – partner operates in the same business field and (2) different SIC – partner operates in a different business field.

In the tie strength, the strong ties “enable rich and efficient exchange” and weak ties “enable greater flexibility and exploration” (Ozcan & Eisenhardt, 2009, p. 246). Strong ties are exploitations and weak ties are explorations, as even a strong tie in an explorative alliance has an exploitive nature (Lavie & Rosenkopf, 2006, pp. 799–800). In the tie diversity, Baum et al. (2000) found that different SIC alliances offer more information than the same SIC ones. Empirics have shown that different SIC ties are applied more to exploration (Bierly et al., 2009, p. 502). Tie strength and diversity combinations together are also important to consider. Hoffman (2007, p. 834) recommends integration possibilities, “either partially redundant strong ties to similarly positioned alliance partners or non-redundant ... weak ties to partners from different clusters”, Kauppila (2010, p. 295) includes: “weak ties to other explorative actors” and “weak ties with exploitation partners”. From the perspective of separation in a punctuated equilibrium, alliances are good in many ways, but “it is not the network but the firm that balances exploration and exploitation” (Kauppila, 2010, p. 307). A short overview of tie characteristics, i.e. tie strength and diversity, is given for exploration and exploitation in Table 1. Different SIC and weak ties are characterised as a more open strategy, and the same SIC and strong ties as a closed strategy.

Table 1. Tie characteristics in an alliance portfolio

Exploration	Exploitation
Tie Strength	
Weak ties for exploration (Lavie & Rosenkopf, 2006; Ozcan & Eisenhardt, 2009; Kauppila, 2010)	Strong ties for exploitation (Lavie & Rosenkopf, 2006) Weak ties are also used for exploitation (Kauppila, 2010)
Tie Diversity	
Different SIC is applied more to exploration (Bierly et al., 2009: 502)	Not as much information richness needed from different SIC alliances as exploration (Baum et al., 2000)

Source: Authors' compilation

Tie characteristics and market dynamics. Development of strong ties takes a longer amount of time (Gulati, 1998) and therefore they cannot be noticed as much in the market emergence phase. There are benefits for waiting, Bierly et al. (2009, p. 488) note that experience of prior strong ties from alliances may help to “overcome exploration barriers”, which means that it is appropriate to start with strong ties. Koka and Prescott (2008, p. 641) recommend to first choose partners among those with the same SIC. Recommendations to start with the same SIC and strong ties mean that exploitation should prevail in the market emergence phase and exploration should be internally oriented in the same phase. After a company has received some maturity, it can focus more on alliancing in exploration as well (Rungi & Kolk, 2011).

Total alliance configuration. Most authors do not specifically name their research focus and unit of analysis to be total alliance. However, most literature about tie strength and diversity in alliances fit with the total alliance portfolio configuration. In total alliance analysis, the strategical, technological and/or financial proportion is not brought out separately as in the case of the important ties alliance portfolio and a less beneficial partner is equal with a more beneficial/important partner. The difference between the total and important alliance configuration can be brought out implicitly, for example, the tie strength dimension can be used for this purpose instead of the total/important configuration. In total

alliance portfolio, both strong and weak ties, and the same and different SIC partners can exist in a portfolio depending on the orientation and aim: either exploration or exploitation, the need for information etc.

2.4. Towards Total Capabilities’ Portfolio Management and Configuration

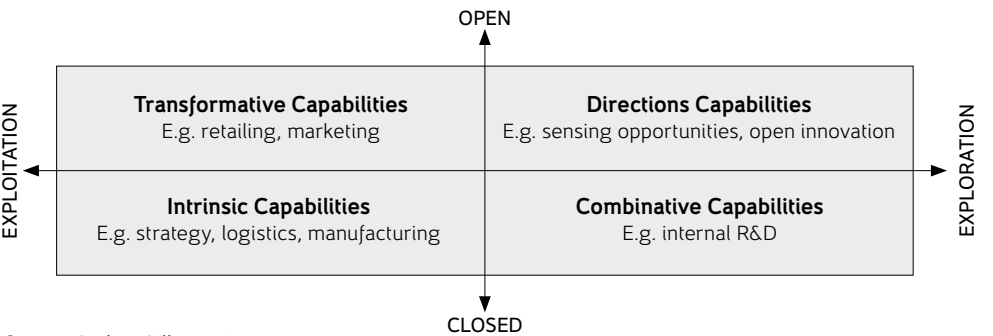
In capability development literature (e.g. Laamanen & Wallin, 2009) it is quite common that matrixes are constructed in order to analyse and observe the development of a capability portfolio. In this research, another simple two-dimensional space was worked out, since one of the interests is the influence from external-internal development an open-close was chosen for the first dimension. This dimension characterises such partnership measures as, tie strength and diversity – weak ties (first time partnership) and different SIC indicate to open, and strong ties and same SIC indicate to close. The second dimension is constructed on the basis of a continuum, where at one end is exploitation and at the other end is exploration. Exploitation and exploration definitions here are consistent with March (1991) definitions. As a result the next two-dimensional space is constructed (Figure 1). Using this matrix all capabilities are placed to a certain quadrant and on the basis of their nature, four quadrants are possible: (1) directions, (2) combinative, (3) transformation, and (4) intrinsic capabilities.

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Direction capabilities have the ability to sense opportunities that emerge from outside of a firm’s established boundaries, e.g. start-ups, open innovation etc. In the current classification, direction capabilities represent an ability to adapt its competences and positions to expected future environmental changes. Direction capabilities are true search, innovation and development capabilities to benefit from future opportunities in collaboration with new partners. These capabilities are developed based on weak ties to reduce the risks of technological or market failure. Ecosystem (Moore, 1993) and network based external research and development (R&D) management is an example of modern direction capability.

Combinative capabilities enable companies to systematically combine local search related competences inside of established firm boundaries to efficiently develop new products and services. Combinative capabilities are also innovation and development capabilities similarly to direction capabilities, but its competences and positions rely on strong ties and established routines. Intramural core R&D management is a classical example of a combinative capability.

Figure 1. Configuration of capabilities’ portfolio



Source: Authors’ illustration

Transformative capabilities exploit firm-specific resources and capabilities inside and outside the boundaries of the firm to transform an established business model while adapting to new market conditions. Transformative capabilities are based on weak partnerships to renew firm's competences, processes and positions in the resource utilisation. Typical transformative capabilities are retailing, servicing or marketing routines.

Intrinsic capabilities lay the foundation for the ability to produce value from efficiency and refinement related processes to the delivery of quality products and services. Intrinsic capabilities are based on strong ties to minimise any negative effect on efficiency based processes, positions or competences in the firm's resources' utilisation. Strategic and quality management, logistics and manufacturing are classical intrinsic capabilities that firms manage strongly internally.

During the within-case analysis the appearance of new capabilities were used through the three evolution phases: market emergence, market take-off and market growth in the landscape of configuration matrix (Figure 1, Table 2). In this way, the full capability portfolio was divided into particular configuration quadrants.

The research model is looked at from the perspective of performance (as one of the most traditional outcome variables in management research). Performance is affected by wellness of dynamic capabilities (Zott, 2003); the exploitation nature – “short-term profit maximization” (Hoffman, 2007, p. 840); increasing total alliance centrality – frequency of entering alliances (Gulati, 1999), number of alliances and tie diversity (Oszcan & Eisenhardt, 2009; Baum et al., 2000). Despite the short-term nature of exploitation, case companies are able to show increasing performance indicators throughout phases; as they are always exploitation oriented – case companies became managing resource leverage companies. Measuring performance in ICT companies and in the case of alliances is problematic (Lavie, 2007, p. 1198). Therefore Lavie (2007, p. 1198) recommends using the market performance measure instead. There is a need to differentiate between portfolio and firm performance (Oszcan & Eisenhardt, 2009, p. 254), where portfolio performance includes “tie diversity”, “tie strength” and “partner importance”.

2.5. Finalising Propositions

For proposition development, the following findings were considered: exploration and exploitation happen in a sequential order (Nickerson & Zenger, 2002), and exploration and exploitation need to be balanced (Lavie & Rosenkopf, 2006; Tushman & O'Reilly, 1996; Kauppila, 2010; Gibson & Birkinshaw, 2004, p. 210; Kauppila, 2010). Exploitation is production (March, 1991) and “short-term profit maximization” (Hoffmann, 2007, p. 840). Stable environments and low uncertainty are suitable for exploitation (Koka & Prescott, 2008). Exploitation prevails over exploration (Regnér, 2003) for several reasons, such as, cheaper, less risky (Bierly et al., 2009), easier to outsource (Kauppila, 2010), and easier to understand. Alliancing is recommended to be used for finding “complementary resources” (Hoffmann, 2007, p. 829), better performance (Gulati, 1999; Rowley et al., 2000, p. 375; Yli-Renko et al., 2001, p. 589); better effectiveness (Anand & Khanna, 2000); better coping with “environmental uncertainty” (Hoffmann, 2007, p. 830; Eisenhardt & Schoonhoven, 1996); and to gain market power (Hagedoorn, 1993). Alliancing helps both exploration's and exploitation's related performance (e.g. Hoffmann, 2007; Gulati, 1999; Rowley et al., 2000; Yli-Renko et al., 2001; Anand & Khanna, 2000; Eisenhardt & Schoonhoven, 1996; Hagedoorn, 1993). Exploitation is characterised by strong ties (closed) (Lavie & Rosenkopf, 2006), and

exploration by weak ties (open) (Lavie & Rosenkopf, 2006; Ozcan & Eisenhardt, 2009; Kauppila, 2010) and more different SIC (open) (Bierly et al., 2009, p. 502). However, there are no clear tendencies to use the same or different SIC for exploitation. Baum et al. (2000) note that different SIC (open) is just a little less used for exploitation than exploration, and “weak ties with exploitation partners” are also recommended for exploitation (Kauppila, 2010, p. 295). Looking at the nature of exploration and exploitation, we can presume that exploration needs a much wider perspective to see all the opportunities that can take the form of many small partners, and exploitation can rely on fewer larger partners in manufacturing and supply. Therefore from an exploration and exploitation analysis weak and diverse ties (open) should prevail. Exploitation orientation consists of transformative and intrinsic capabilities (Figure 1). Most earning-profit focused capabilities are transformative capabilities, such as logistics, retailing, and marketing. Intrinsic capabilities, such as strategy and quality management, are the core activities of every company which cannot be bought in for a long-term perspective. This leads to the next proposition:

Proposition 1: Focal firms have a clear tendency to form open exploitation alliances regardless of market evolution phases and the alliances’ ties co-evolve with transformative capabilities’ development.

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The division to exploration-exploitation are strongly tied with tie strength and diversity configurations (Table 1), in this sense tie strength and diversity behave identically, thus:

Proposition 2: Transformative (open exploitation) capabilities development is based on the same configuration pattern of tie strength and tie diversity regardless of market phases’ evolution.

3. Methodology

This study is part of a long-term study focusing on large multinational firms’ alliance relationships’ based capabilities development. Methodological case studies were compiled for four companies from the ICT sector – Google, Ericsson, Microsoft and Nokia. A mixed method (Cresswell, 2003) – qualitative case study in grounded theory setting (Glaser & Strauss, 1967) with supportive quantitative data – was used. At the beginning of the focal firms’ research, focal firms’ business model evolution (Osterwalder, 2004), financial performance and market growth were analysed (Appendix Table 1) and dividing of focal firm evolution into three specific separable periods was made: market emergence, market take-off, and market growth.

A special framework to study capabilities development and its portfolios evolution (capability portfolio matrix) was designed (Figure 1). To analyse capabilities emergence according to the matrix, the focal firm’s business model evolution over long-term market cycles was analysed. Most important development activities of the case companies were identified and recorded into families of capabilities’ activities. Through in depth extraction the strategic capabilities were selected and defined. Defining was done through open coding, where all identified activities from all data sources (incl. interviews) were associated with a certain category of the activities, and where needed a hierarchy of categories were built and

finally turned into capabilities. First, the key development activities having a major impact on the firm's performance were grouped into one development topic. Second, all capabilities were coded (whether they are exploration-exploitation and open-close on the basis of the nature and characteristics of the involved partners) and then these capabilities were mapped on the capabilities matrix. All the capabilities and its development path were presented to the interviewees of the study who made some adjustments and confirmed the capabilities emergence timeline.

As the primary goal of the study was to analyse how focal firm capabilities' portfolio co-evolve with the focal firm alliance portfolio, the research started to analyse focal firms' alliance portfolio configuration settings through three specific periods/phases – how capabilities emerged and evolved in these periods. Two different settings can be analysed throughout these periods: total alliance portfolio (all ties) and important ties configurations. Here, results are only presented for total alliance portfolio (Figure 2).

This research used several data sources (Appendix Table 1) – primary data sources, such as semi-structured interviewing, and secondary data sources. It is advisable to use data triangulation for corroboration reasons (Yin, 2003, pp. 98–99). Secondary data sources, such as electronic databases (e.g. SDC Platinum <http://thomsonreuters.com/>), archival data – press releases, annual reports, and economical and scientific articles – used the construct history of the companies more adequately. For total alliance portfolio configuration analysis (Figure 2), data from the SDC Platinum database were used. For capability developments and mapping to matrix, other data sources were used.

4. Results

Case companies show an expectedly good performance (Appendix Table 2). The capability development path for case companies shows the following portfolio division for market stages (Table 2). Numbers in the table show how many capabilities existed at a certain market phase. Transformative (T) and intrinsic (I) capabilities indicate exploitation, and directions (D) and combinative (C) capabilities represent the exploration type of capabilities (Figure 1). Exploitation capabilities clearly prevail in contrast to exploration capabilities, especially transformative capabilities, as their cumulative numbers outweigh the numbers of other types of capabilities.

Table 2. Cumulative capability portfolio development (for details see Appendix Table 3)

Company	Market Emergence				Market Take-Off				Market Growth			
	T	I	D	C	T	I	D	C	T	I	D	C
Ericsson	3(2)	3	2(1)	1	5	3	3	1	5	3	5	1
Google	6	1	2	2	7	1	5	2	8	2	6	3
Microsoft	4(4)	3(1)	3(2)	3(1)	6	4	5	4	10	4	6	4
Nokia	1	5(3)	1	3(2)	4	5	3	4	8	5	3	4

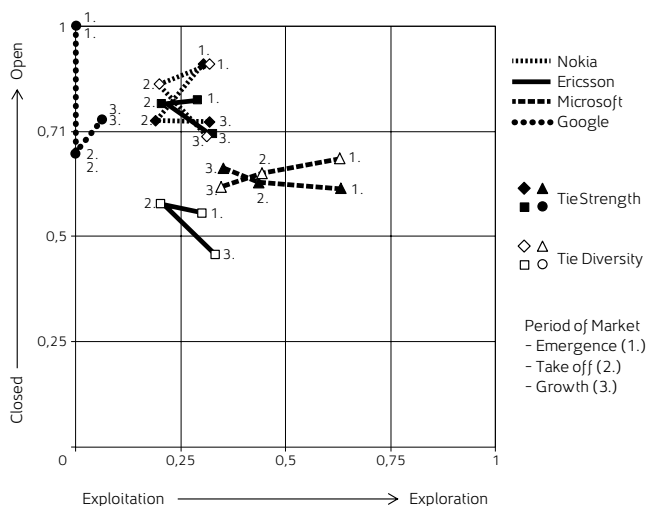
Note: numbers indicate the no. of certain types of capabilities at a certain market stage; T – transformative, I – intrinsic, D – directions, C – combinative capabilities (Figure 1); (x) – no. of historical capabilities before market emergence stage

Source: Authors' compilation

Alliance development results are presented in a capability portfolio configuration model. Developments are calculated on the basis of SDC Platinum. Interestingly, in open-close and exploration-exploitation dimensions (Figure 2) there is a clear pattern for all four companies to be located in the open-exploitation quadrant, not on the exploration's side. Exploration has a tendency to stay at the periphery and exploitation at the centre (Regnér, 2003). In the open-close dimension, companies are more focused on different SIC and weak ties.

Nokia and Ericsson are more oriented to hardware, and Google and Microsoft more to software. This hardware cluster (Nokia and Ericsson) behaves very closely/similarly with each other in the tie strength related questions. In terms of total alliance configuration, focal firms are strongly oriented to exploitation related capabilities with weak and diverse (SIC) ties. Within a prevailing exploitation focus there exist some minor changes through market evolution phases. From the initial position at the market emergence phase, focal firms have a tendency to shift more on exploitation oriented capabilities at the market take-off phase and slightly turn back to exploration related capabilities at the market growth phase. From a tie strength/diversity perspective, companies also share a similar pattern, they become more closed or stay similarly at the same level. At the market growth phase it appears that the case companies did not develop more tie diversity. Companies act mostly in the transformative quadrant (Figure 1), which is typically service and marketing oriented. By the market growth phase, case companies showed good evidence of parallel development of several complex technological capabilities, (e.g. LBS and mobile operating systems), which became possible due to larger capability and alliance portfolios.

Figure 2. Dynamics of capabilities' portfolio configuration based on total ties diversity & ties strength



Note: Tie diversity – diversity of a focal firm SIC code (open = different SIC/closed = same SIC). Tie strength – weak (open)/strong (closed) partnerships of a focal firm

Source: Authors' illustration

Microsoft's starting position was in the innovative directions quadrant (open exploration) and Ericsson's ending position turned to the efficiency oriented intrinsic quadrant (closed exploitation) (Figure 1 and 2), but both these exceptional movements have taken place close to the transformative quadrant (open exploitation). Microsoft was in the market before

others, when the uncertainty was higher and business models not standardised, however, Nokia as a pioneer in the mobile industry didn't follow this Microsoft tendency, since Nokia has been modest when taking into use and marketing its breakthrough technologies (e.g. touchscreen). Ericsson's efficiency behaviour is related with its lower performance indicators than the others (see Appendix Table 2). While others turned back a little towards an explorative direction, Microsoft then turned more exploitive, and the reason may be that Microsoft has behaved sporadically with some of its products, changing and diversifying them in no clear way. Thus, the Microsoft business model was strongly oriented at that stage to capital return generation. The company acted as a classical financial institution, not as a technological innovator. No company has operated in internal innovation (combinative capabilities, closed exploration).

In the beginning, Ericsson put a lot of effort into partnerships with leading companies in the field of mobiles networks/phones and later to the wireless services. The take-off phase resulted in major losses due to various problems (challenges in business and supply problems), and simultaneously the mobile sector repositioned, which led to the important joint venture Sony Ericsson, plus other strong ties with key partners. In the growth phase, the company started diversification, influenced mostly by the new multimedia unit created. Very soon Ericsson made a very strong focus on decisions and finally sold its handset business stake in Sony Ericsson entirely. Sony became the sole owner.

Google's behaviour can be characterized as the most exploitation oriented, as it is almost pure exploitation. First, Google focused on making its core service excellent and internationalising it. Google was active in exploitation related alliancing and started exploration related partnerships relatively late. External focus was rising even more by expanding diversification, which allowed protecting from competitors' attacks. They have kept their core technology in-house and acquired the rest of the innovations externally, including start-ups from new fields (Rungi & Kolk, 2011), such as LBS, video on demand (YouTube) etc. Google developed new capabilities and initiated alliances at an increased pace. Google had a very high profit margin and also a leading technology innovator image. Thus company investment into different areas was in line with the general corporate business model – to bring more customers into the Internet. The extreme diversification and focus on new partners were preparation to compete with competitors like Microsoft and Apple. During the market growth phase Google built most of its capabilities in the area of mobile communications (smart phones, tablets).

Microsoft first tried to achieve dominance in the market, and after that they targeted wide networking. They networked with partners close to the customers, which permitted vast internationalisation. The certification system used allowed them to find the best partners and an emphasis was on marketing and sales (weak ties). During the market development Microsoft also started product and service diversification, and they increasingly focused on the same SIC partners, which made them a rather closed company. They entered the Internet field after a delay, but not before the market take-off phase and it was still under expectations at market growth.

Nokia developed most of its capabilities internally based on resources from their long corporate business history. When volumes started to grow rapidly and the market became international, then Nokia started stronger collaboration with other companies at the market take-off phase – strong ties with important partners and weak ties with the rest of the majority partners. For example, Nokia cooperated with one of its longest competitors

Ericsson in the field of mobile operating systems (Symbian). For Nokia, the situation and their dominance started to change when competition became stronger with the third-generation (3G) telephony standard. Nokia's product portfolio was expanded at the market growth phase when developing geographical areas – Asia and the Middle East provided a high sales volume, but slow global growth. If new markets emerge, it's most reasonable to develop its capabilities with partners.

Common behavioural keywords are dominance and excellence in core service and home market, internationalisation, diversification, increased networking since the take-off phase, joint-offerings, external innovation, and emphasising efficiency and outsourcing in manufacturing, which have led to an open exploitation prevalence. Thus, all the case companies developed its international growth very strongly based on open exploitation activities.

Based on the data from SDC Platinum and other sources (in Appendix), empirical findings – quantitative (Figure 2) and illustrative descriptions – confirm the propositions. Proposition 1 is confirmed since the majority of dynamics locates on the transformative quadrant (see alliances on Figure 2 and capabilities on Table 2), except Microsoft at market emergence stage and Ericsson's tie diversity at market growth stage. These are minor anomalies, because some of them are close to the transformative quadrant and explanative descriptions are given. Proposition 2 finds support while development paths of companies are cross-compared on Figure 2, where most companies move to exploitation and simultaneously openness is reduced (or at least kept at the same level) from market emergence to take off. At market growth stage companies have a tendency to slightly turn back to exploration. Figure 2 is based on quantitative data (four companies – together approximately two thousands alliances, see Appendix Table 1) and its reliability is high.

5. Discussion and conclusion

This research revealed that in the total alliance configuration clear transformative capabilities (open exploitation) orientation exists in companies, which is known by functional activities such as marketing, retailing and logistics. Companies receive external help from alliances only for the development of transformative capabilities. The development of other types of capabilities is based mostly on internal efforts. Prevailing transformative capabilities are mostly exploitive and do not represent explorative behaviour, as the latter would have been expected from ICT companies. The explorative nature of ICT companies seems to be revealed through the acquisitions of innovative start-up companies. O'Connell (2012) says that while Google and some others still develop innovations on the basis of external competition conflict, then perhaps they should instead provide an environment for innovations. Next, while managing alliance portfolio tie strengths and diversities, their development changes should be managed simultaneously in the same directions in the exploration-exploitation open-close matrix.

This empirical work confirmed many prior findings. Regnér (2003) has found that exploitation prevails over exploration. Empirical findings found it to be true from the perspective of alliancing in four big global ICT companies. The evolution of the ICT sector has led to standardized business models, low uncertainty and stable environments where companies imitate each other (institutional theory - Lieberman et al., 2006) rather than take

proactive actions. Koka and Prescott (2008) have showed that stable environments and low uncertainty seemed to fit for exploitation, as it was also confirmed by the current findings. Exploration and exploitation do not fit together in a single company – punctuated equilibrium (Gupta et al., 2006). As companies clearly focused on only one family – exploitation, it could be proven. Bierly et al. (2009, pp. 486–487) note that focal firms innovate in exploitation rather than in exploration, since the least uncertainty exists there. In practice, innovative ideas are searched through start-ups and imitations.

However, this research also revealed some contradictory findings. Prior theory sees exploration and exploitation happen in sequential order (Nickerson & Zenger, 2002). Hoffmann (2007, pp. 830–831) proposes sequential order for managing alliances: (1) adapting (exploration), (2) shaping (exploitation), and (3) stabilizing (exploitation). As a matter of fact, clear exploitation orientation prevailed in case companies through market phases, and only one out of four companies (i.e. Microsoft) indicated a slight tendency for sequential order. Exploration and exploitation need to be balanced – ambidexterity (Lavie & Rosenkopf, 2006; Tushman & O'Reilly, 1996; Kauppila, 2010; Gibson & Birkinshaw, 2004, p. 210; Kauppila, 2010). In practice companies do not try to balance exploration and exploitation, and let exploitation prevail throughout all phases. Exploitation is production (March, 1991) and “short-term profit maximization” (Hoffmann, 2007, p. 840). Empirics show that companies have built long-term plans simultaneously with prevailing exploitation. There is no clear evidence as to whether focusing on exploration or exploitation is a better choice (Ebben & Johnson, 2005, p. 1252, 1257). From the perspective of performance, exploitation was a better choice for the case companies (Appendix Table2). Case companies were rather focused on imitation.

To sum up the most influential theoretical implications, first the novelty of this research is the analytical generalization and replication of prior findings into the ICT industry. Secondly, it provides proof to use exploitation in unstable environments such as ICT. Next, knowledge is acquired that capability and alliance portfolio development is clearly distinct on the basis of exploration-exploitation and open-close dimensions. Fourthly, capability and alliance portfolio co-evolution in open exploitation is discovered. Last but not least, the discovery that ties strength and diversity should be managed in the same directional way (as simultaneous chains).

The qualitative part of this work matches traditional limitations of case study research, for example, research is limited to the ICT industry and the size of sample permits only analytical generalisation; responses are also traditional: triangulation, multiple-case study and longitudinal setting (more than 10 years period covered), theoretical sampling, researchers' reflexivity etc. (Yin, 2003; Silverman, 2002). Findings of the research need to be tested quantitatively in the future.

References

- Adner, R. & Kapoor, R. 2010. Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, 31(3), 306–333.
- Anand, B.N. & Khanna, T. 2000. Do firms learn to create value? The case of alliances. *Strategic Management Journal*, 21, 295–315.
- Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Baum, J.A.C., Calabrese, T. & Silverman, B.S. 2000. Don't Go it Alone: Alliance Networks and Startup Performance in Canadian Biotechnology. *Strategic Management Journal*, 21(3), 267–294.
- Beckman, C.M., Haunschild, P. R. & Phillips, D.J. 2004. Friends or Strangers? Firm-Specific Uncertainty, Market Uncertainty, and Network Partner Selection. *Organization Science*, 15(3), 259–275.
- Bierly, P.E. III, Damanpour, F. & Santoro, M.D. 2009. The Application of External Knowledge: Organizational Conditions for Exploration and Exploitation. *Journal of Management Studies*, 46(3), 481–509.
- Burgelman, R.A. 2002. Strategy as vector and the inertia of co-evolutionary lock-in. *Administrative Science Quarterly*, 47, 325–357.
- Cepeda, G. & Vera, D. 2007. Dynamic capabilities and operational capabilities: A knowledge management perspective. *Journal of Business Research*, 60, 426–437.
- Cohen, W.M. & Levinthal, D.A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Crossan, M.M., Lane, H. W. & White, R.E. 1999. An Organizational Learning Framework: from Intuition to Institution. *Academy of Management Review*, 24(3), 522–537.
- Das, T.K. & Teng, B.-S. 2002. Alliance constellations: A social exchange perspective. *Academy of Management Review*, 27, 445–456.
- Ebben, J.J. & Johnson, A.C. 2005. Efficiency, flexibility, or both? Evidence linking strategy to performance in small firms. *Strategic Management Journal*, 26, 1249–1259.
- Eisenhardt, K.M. & Martin, A.J. 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, 21, 1105–1121.
- Eisenhardt, K.M. & Schoonhoven, C.B. 1996. Resource-based View of Strategic Alliance Formation: Strategic and Social Explanations in Entrepreneurial Firms. *Organization Science*, 7(5), 477–501.
- Floyd, S.W. & Lane, P.J. 2000. Strategizing throughout the organization: Management role conflict in strategic renewal. *Academy of Management Review*, 25(1), 154–177.
- Gibson, C.B. & Birkinshaw, J. 2004. The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity. *Academy of Management Journal*, 47(2), 209–226.
- Glaser, B.G. & Strauss, A.L. 1967. *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Pub.
- Granovetter, M.S. 1973. The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380.
- Gulati, R. 1998. Alliances and networks. *Strategic Management Journal*, 19, 293–317.
- Gulati, R. 1999. Network location and learning: The influence of network resources and firm capabilities on alliance formation. *Strategic Management Journal*, 20, 397–420.

- Gulati, R. & Singh, H. 1998. The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Administrative Science Quarterly*, 43(4), 781–814.
- Gupta, A.K., Smith, K.G. & Shalley, C.E. 2006. The Interplay between Exploration and Exploitation. *Academy of Management Journal*, 49(4), 693–706.
- Hagedoorn, J. 1993. Understanding the rationale of strategic technology partnering: inter-organizational modes of cooperation and sectoral differences. *Strategic Management Journal*, 14, 371–385.
- Helfat, C.E. & Peteraf, M.A. 2003. The dynamic resource-based view: Capabilities lifecycles. *Strategic Management Journal*, 24, 997–1010.
- Hoffmann, W.H. 2007. Strategies for managing a portfolio of alliances. *Strategic Management Journal*, 28, 827–856.
- Kauppila, O.-P. 2010. Creating ambidexterity by integrating and balancing structurally separate interorganizational partnerships. *Strategic Organization*, 8, 283–312.
- Kogut, B. & Kulatilaka, N. 2001. Capabilities as Real Options. *Organization Science*, 12(6), 744–758.
- Koka, B.R. & Prescott, J.E. 2008. Designing alliance networks: the influence of network position, environmental change, and strategy on firm performance. *Strategic Management Journal*, 29, 639–661.
- Laamanen, T. & Wallin, J. 2009. Cognitive dynamics of capability development paths. *Journal of Management Studies*, 46(6), 950–981.
- Lavie, D. & Rosenkopf, L. 2006. Balancing Exploration and Exploitation in Alliance Formation. *Academy of Management Journal*, 49(4), 797–818.
- Levinthal, D. & Myatt, J. 1994. Co-evolution of capabilities and industry: The evolution of mutual fund processing. *Strategic Management Journal*, 15, 45–62.
- Lin, B.-W. 2011. Knowledge diversity as a moderator: inter-firm relationships, R&D investment and absorptive capacity. *Technology Analysis & Strategic Management*, 23(3), 331–343.
- March, J.G. 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Moore, J.F. 1993. Predators and prey: A new ecology of competitors. *Harvard Business Review*, May-June, 75–86.
- Nickerson, J.A. & Zenger, T.R. 2002. Being efficiently fickle: A dynamic theory of organizational choice. *Organization Science*, 13(5), 547–566.
- O'Connell, A. 2012. What We're Reading: Is Innovation Fueled by Conflict or Cooperation? Retrieved from http://blogs.hbr.org/cs/2012/04/what_were_reading_is_innovation_fueled_by_conflict_or_cooperation.html
- Osterwalder, A. 2004. *The business model ontology a proposition in a design science approach*. Doctoral dissertation. Lausanne: Université de Lausanne.
- Ozcan, P. & Eisenhardt, K.M. 2009. Origin of Alliance Portfolios: Entrepreneurs, Network Strategies, and Firm Performance. *Academy of Management Journal*, 52(2), 246–279.
- Plakoyiannaki, E. & Tzokas, N. 2002. Customer relationship management (CRM): A capability portfolio perspective. *Journal of Database Marketing*, 9(3), 228–237.
- Regnér, P. 2003. Strategy Creation in the Periphery: Inductive Versus Deductive Strategy Making. *Journal of Management Studies*, 40(1), 57–82.
- Rowley, T., Behrens, D. & Krackhardt, D. 2000. Redundant governance structures: An analysis of relational and structural embeddedness in the steel and semiconductor industries. *Strategic Management Journal*, 21, 369–386.

- Rungi, M. & Kolk, A. 2011. Trajectory Evolvments of Capability Families: The Google Case. In: G. Prause & U. Venesaar (Eds.), *University-Business Cooperation Tallinn 2011, Regional Business and Socio-Economic Development, 2011* (pp. 214–239). Berlin: Berliner Wissenschafts-Verlag.
- Silverman, D. 2002. *Doing Qualitative Research: A Practical Handbook*. Thousand Oaks: Sage Publications.
- Teece, D.J., Pisano, G. & Shuen, A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Tushman, M.L. & O'Reilly, C.A. III 1996. Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California Management Review*, 38(4), 8–30.
- Winter, S.G. 2003. Understanding Dynamic Capabilities. *Strategic Management Journal*, 24, 991–995.
- Yin, R. K. 2003. *Case study research: Design and methods*. Thousand Oaks: Sage Publications.
- Yli-Renko, H., Autio, E. & Sapienza, H.J. 2001. Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. *Strategic Management Journal*, 22(6-7), 587–613.
- Zollo, M. & Winter, S.G. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13, 339–351.
- Zook, C. 2007. Think of Capabilities as the Building Blocks of Corporate Renewal. *HBR Blog Network*. Retrieved from http://blogs.hbr.org/cs/2007/08/think_of_capabilities_as_the_b.html
- Zott, C. 2003. Dynamic capabilities and the emergence of intraindustry differential firm performance: Insights from a simulation study. *Strategic Management Journal*, 24(2), 97–125.

Appendix

Table 1. Data sources of the case companies

Ericsson Case		
Data Source	Data Period	Periods, Quantity
SDC database	1989-2010	200 alliances
Theoretical literature and articles	1989-2010	
Ericsson Inc. Press Releases	1989-2010	
Ericsson Inc. Annual Reports	1989-2010	
History of Ericsson Inc.	1989-2010	
Location Based Services Analysis	1989-2010	
Interviews	2009-2011	3 top managers

Google Case		
Data Source	Data Period	Periods, Quantity
SDC database + case firm data	1994-2010	83 acquisitions, 221 alliances
Articles	1980-2010	120 articles
Google Inc. Press Releases	1996-2010	14 years
Google Inc. Annual Reports	2001-2009	8 years
History of Google Inc.	1994-2010	16 years
Location Based Services Analysis	1998-2010	12 years
Pilot Research	2010	18 users
Interviews	2010	1 development manager of acquired company
Interviews (ecosystem)	2011	4 Android developers

Microsoft Case		
Data Source	Data Period	Periods, Quantity
SDC database	1987-2009	267 acquisitions, 1043 alliances
Microsoft Inc. Press Releases	1996-2009	14 years
Microsoft Inc. Annual Reports	1994-2009	16 years
Acquisition History of Microsoft Inc.	1994-2009	110 acquisitions
History of Microsoft Inc.	1982-2009	28 years
Location Based Services Analysis	1999-2006	147 pages
Interviews	2009-2011	8 top and middle level managers.

Nokia Case		
Data Source	Data Period	Periods, Quantity
SDC database	1992-2009	250 alliances
Bloomberg Professional Service	1992-2009	17 years
Nokia Inc. Press Releases	1992-2009	17 years
Nokia Inc. Annual Reports	1992-2009	17 years
Interviews	2009	1 top manager.

Source: Authors' compilation

Table 2. Performance

Company	Market emergence	Market take-off	Market growth
Productivity			
Google	304.32 ⬆⬆	900.45 ⬆⬆	987.44 ⬆⬆
Nokia	92.83 ⬆⬆	241.46 ⬆⬆	527.29 ⬆⬆
Ericsson	106.46 ⬆⬆	216.79 ⬆⬆	357.55 ⬆⬆
Microsoft	171.30 ⬆⬆	333.52 ⬆⬆	652.26 ⬆⬆
CAGR (Revenue, %)			
Google	408.54 ⬆⬆	93.32 ⬆⬆	27.14 ⬆⬆
Nokia	7.10 ⬆	18.74 ⬆⬆	11.62 ⬆
Ericsson	19.00 ⬆⬆	21.12 ⬆⬆	3.26 ⬆
Microsoft	42.04 ⬆⬆	20.02 ⬆⬆	7.99 ⬆
CAGR (R&D, %)			
Google	92.41 ⬆⬆	97.60 ⬆⬆	31.88 ⬆⬆
Nokia	11.94 ⬆	27.29 ⬆⬆	10.05 ⬆
Ericsson	17.02 ⬆⬆	-32.97	7.84 ⬆
Microsoft	45.77 ⬆⬆	24.64 ⬆⬆	7.82 ⬆
CAGR (ROA, %)			
Google	313.80 ⬆⬆	-19.65 ⬇⬇	-7.22 ⬇
Nokia		-0.07 ↔	-6.13 ⬇
Ericsson	78.50 ⬆⬆	-212.22 ⬇⬇	-10.33 ⬇
Microsoft	-0.81 ↔	-7.72 ⬇	0.58 ↔

Note: CAGR (compound annual growth rate), R&D (research and development), ROA (return on assets), significantly up >15%, slightly up 15%, staying same ±2%, slightly down -15%, significantly down <-15%; ⬆⬆- significantly up, ⬆ - slightly up, ↔ - staying same, ⬇ - slightly down, ⬇⬇ - significantly down

Source: Authors' compilation

Table 3. Capabilities' development from market emergence to market growth stage

Stage	Google	Microsoft	Ericsson	Nokia
Emergence	<ul style="list-style-type: none"> • Capability to sense business opportunity (D) • Capability to search external funding (T) • Collaboration and networking capability (T) • Internet service development capability (T) • Partner network building capability (T) • Marketing capability (T) • Internationalisation capability (T) • Quality management capability (I) • Advertisement management capability (D) • Internal software development capability (C) • Product development capability (C) 	<ul style="list-style-type: none"> • Capability to sense business opportunity (D) • Internal software development capability (C) • License management capability (I) • Quality management capability (I) • Product development capability (C) • Internal R&D capability (C) • Internationalisation capability (T) • External software development capability (D) • Collaboration and networking capability (T) • Capability to find external funding (T) • External R&D capability (D) • Marketing and sales capability (T) • Strategic management & diversification capability (I) 	<ul style="list-style-type: none"> • Capability to sense business opportunity (D) • Manufacturing capability (I) • Patenting capability (I) • Quality management capability (I) • Internationalisation capability (T) • Product development capability (C) • Collaboration and networking capability (T) • External R&D capability (D) • M&A management capability (T) 	<ul style="list-style-type: none"> • Capability to sense business opportunity (D) • Manufacturing capability (I) • Diversification management capability (T) • Product development capability (C) • Marketing & sales capability (I) • Internal R&D capability (C) • Mobile hardware development capability (C) • Strategic management capability (I) • Quality management capability (I) • Logistics management capability (I)
Take-Off	<ul style="list-style-type: none"> • Customer innovation capability (D) • External R&D capability (D) • M&A management capability (D) • Free service management capability (T) 	<ul style="list-style-type: none"> • Hardware development capability (C) • Exploration new business areas capability (D) • External Internet service development capability (D) • M&A management capability (T) • External Internet service management capability (T) • Capability to manage legal and corporate affairs (I) 	<ul style="list-style-type: none"> • Wireless system development capability (D) • Mobile Internet application development capability (T) • LBS development capability (T) 	<ul style="list-style-type: none"> • Supply chain management capability (T) • Exploration new business areas capability (D) • Sustainability capability (C) • Branding capability (T) • External R&D capability (D) • Collaboration and networking capability (T)
Growth	<ul style="list-style-type: none"> • Strategic management & diversification capability (I) • Mobile software development capability (C) • LBS development capability (D) • Exploiting new emerging technologies capabilities (T) 	<ul style="list-style-type: none"> • Mobile software development capability (D) • Online advertisement sales capability (T) • LBS capability (T) • Search engine management capability (T) • Partner ecosystem building capability (T) 	<ul style="list-style-type: none"> • Multimedia service development capability (D) • Exploration of new business areas capability (D) 	<ul style="list-style-type: none"> • M&A management capability (T) • Wireless network management capability (T) • Internet service management capability (T) • LBS development capability (T)

Note: T – transformative, I – intrinsic, D – directions, C – combinative capability

Source: Authors' compilation