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Alliances as Innovation Accelerators: The Case of NTT-DoCoMo's i-mode and 3G Mobile Telecommunications

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The emergence of a new, third, generation of cellular phones (3G), has led to unprecedented levels of collaboration within the global mobile industry, transcending both international borders and traditional industry boundaries. A particularly notable feature of this wave of collaboration has been the use of alliances to accelerate the pace at which new 3G businesses can be built and to improve their chances of success on a global scale in a highly uncertain environment. NTT DoCoMo, the mobile arm of Japan's telecommunication's giant NTT (Nippon Telegraph and Telephone Corporation), has been on the forefront of attempts to use alliances in this way, both to build its successful i-mode service and to leverage this platform internationally.

In a recent paper, Doz and Williamson (2002) proposed a conceptual framework to explain how strategic alliances can act as innovation accelerators and to analyse the potential opportunities and pitfalls of using alliances in this way. Their main propositions included:

- The need for different types of partners and alliance management processes at each stage of the "entrepreneurial lifecycle" – from the inception of the idea, through experiments and testing, establishing an actual venture in the market, to a final stage of business growth and scale-up.
- The need to shift from co-discovery at the early stages, through co-learning, co-option, and ultimately co-specialisation as the business developed and matured.
- The resulting requirement for sophisticated, dynamic management of the alliance network through this life cycle, in order to manage the exit of some partners, infusion of new ones, and/or re-contracting, as well as the need for changing levels of commitment between partners through the cycle.
- That the structure of the alliance network needs to shift between a broad, loose "club" and close-knit "clan" at different stages.

Building on this work, in this paper we extend and test the conceptual framework and propositions about how alliances can act as innovation accelerators, using detailed case-study research into the extensive and changing alliance network built by NTT DoCoMo in the course of developing its 3G mobile business.

In the next section we briefly summarise the framework advanced by Doz and Williamson op. cit., in the context of corporate entrepreneurship and innovation. We then examine the evidence on NTT DoCoMo's use of alliances to develop its i-mode business and its subsequent third and fourth generation innovations in Japan in the light of these propositions. In the subsequent section, we use the experience of NTT DoCoMo's attempts to use alliances to leverage its successful i-mode innovation internationally and as a platform for next-generation 3G mobile telecommunications services, to refine and develop the theory of alliances as innovation accelerators. Finally we summarise our conclusions and new propositions.

Corporate Entrepreneurship, Innovation and the Entrepreneurial Lifecycle

The concept of corporate entrepreneurship, and its correlation with improved organisational performance, has been the subject of several research studies, since the late 1980s, (Guth & Ginsberg, 1990; Barrett & Weinstein, 1998; Thomson & McNamara, 2001). This work has highlighted the fact that development of a new venture within a large existing firm faces significant obstacles, many of which parallel the challenges faced by smaller entrepreneurial companies. Based on these findings, Doz and Williamson op. cit. argue that the process of initiating and developing an innovative new business inside a large corporation can be described in terms of four key stages: inception of the idea, experiments and testing, establishing an actual venture in the market and finally, business growth and scale-up -- which they term "the Entrepreneurial Lifecycle", (Figure 1). Within this cycle they contend that alliances can play a fundamental role in improving and accelerating the development of an innovation through each of its stages. These contentions are consistent with the findings of Wissema & Euser (1991) who concluded in their study of technological renewal for the 1990s that the degree and tempo with which technological innovations would be implemented was increasingly dependent upon the way in which companies worked together; and, in turn, the success of these collaborations would depend, largely, on the extent to which both parties would be able to generate mutual advantages.

< Insert Figure 1>

The role of alliances at each stage of the Doz-Williamson framework can be summarised as follows:

Idea Generation; Co-Discovery

Doz and Williamson, op. cit., argue that at the stage of idea generation the primary potential contribution of alliances is to promote co-discovery. It is well documented that the creative interchange between people from different backgrounds and disciplines can identify novel combinations of a firm's existing resources, and potential alternatives for future development, (Amabile, 1996, 1997; Thomson & McNamara, 2001). This is particularly important where innovations are being sought at the point where industries are converging, so that the value chain of any new business is likely to cut across the diverse knowledge bases located in different firms (Reid et al, 2001). Strategic alliances can act as efficient vehicles facilitating the exchange and recombination of these ideas and insights to shape innovative business models when partners work in the mode of co-discovery.

Experimentation; Co-Learning

At the stage of experimentation, Doz and Williamson, op.cit., argue that alliances can promote efficient co-learning. Experimentation has been identified as one of the core constituents of corporate entrepreneurship, (Baden-Fuller & Stopford, 1994), and a primary enabler of organisational learning, (Huber, 1991; Inkpen, 2000). In an uncertain environment, for example, experimentation provides a valuable means to assess market response to an innovative product offering. It is not possible, however, to conduct market experiments without an appropriate level of complementary, "slack"

resources that can be recombined, (Thomson & McNamara, 2001; Nohria & Gulati, 1996). Such resources might include, for example, a prototyping plant or a distribution outlet through which to test a new product. Alliances can facilitate efficient experimentation by providing access to expensive or complex infrastructure, resources and knowledge-based assets, which would otherwise be extremely costly or time-consuming, for the innovating company to acquire.

Venture Launch; Co-Option

As an innovation migrates from experimentation to formal launch as a new venture, Doz and Williamson, op.cit. argue that the primary contribution of alliances is to effect the co-option of partners who are willing to commit the necessary complementary resources and capabilities to get the new business model off the ground. These resources and capabilities might include ready access to launch customers, reputation and credibility, and mobilisation of key players such as suppliers or distributors in support of the launch of a new product or service.

Scale-up, Business Growth; Co-Specialisation

At this final stage, when a venture needs to be scaled up and grown so it can make a measurable impact on the total profits of a large, parent corporation, Doz and Williamson, op. cit, argue that alliances can play an important role in facilitating increased efficiency and quality through co-specialisation by partners with different strengths and capabilities.

Despite these theoretical arguments for the potential contribution of alliances to the processes of innovation and corporate entrepreneurship, in practice the risks may be high. Management literature is replete with case studies and anecdotes of failed attempts to reap the benefits of innovation and alliances independently (Inkpen and Beamish, 1997; Larson, 1991; Kaplan and Weisbach, 1992; Douma et. al., 2000; Dyer and Wilkins, 2001). Cynics might therefore suspect that corporate entrepreneurship based on a combination of the two might suffer a multiplicative decline in the probability of success!

Certainly the successful use of alliances to help shepherd a potential innovation through the entrepreneurial lifecycle must overcome a veritable mine-field of risks associated with the right choice of partners at each stage, choosing appropriate structures and management processes to facilitate co-discovery, co-learning, co-option and co-specialisation, and smoothly managing the dynamics of a sequence of alliance relationships, potentially with different partners.

In the next section, we examine what can be learned about the validity and implementation of the "alliances as entrepreneurship accelerators" model by examining the experience of NTT DoCoMo in two successive innovations: its innovative second-generation service, i-mode, and its third-generation FOMA (Freedom of Multi-media Access) offering, along with its early development of fourth-generation services. These cases provide a particularly fertile ground to test and refine the model since NTT-DoCoMo has used a wide variety of different partnerships to support these innovations, spanning all of the stages of the entrepreneurial lifecycle outlined above.

Innovation and Corporate Entrepreneurship at NTT-Do-Co-Mo

In October 2001, NTT DoCoMo was the first company in the world to launch a commercial third generation service– FOMA. Internationally renowned for its developments in mobile data services and applications, perhaps the company's greatest innovation was the earlier creation of i-mode, a second-generation (2G) service, which provided continuous connection to the internet and redefined the world of mobile communications. Within two years of its launch, in February 1999, the number of subscribers to i-mode exceeded 20m. By contrast, the introduction of WAP (Wireless Application Protocol), the rival format for providing internet content over mobile phones, had relatively poor reception in Europe, the US and other parts of Asia. Equally remarkable was the speed with which NTT-DoCoMo was able to take these innovations from concept through to venture and, in the case of i-mode, large scale business. In less than three years, DoCoMo, had launched two of the most innovative mobile communication services available, anywhere in the world and grown one of these into a significant profit generator.

Given its success, it is easy to ignore the fact that i-mode originally faced strong internal opposition within the huge NTT Group; DoCoMo was facing an uncertain future and its proposed mobile data venture was perceived, by the Parent company, as too high-risk. Providing internet access over mobile phones was far removed from the company's traditional voice and messaging services. The deep sense of uncertainty and widespread scepticism served to nurture an entrepreneurial spirit and drive within the i-mode team.

Rather than forming strategic alliances at the outset, the first step in developing i-mode was to recruit externally, to bring fresh and disparate ideas and insights to the new project. However, it soon became apparent that recruiting individuals would not provide rapid access to the depth and range of capabilities, processes and infrastructure necessary to develop the concept into a profitable business. NTT-DoCoMo then turned to alliances to fill this gap. In its more recent innovations (the 3G FOMA and planning for fourth generation services) NTT-DoCoMo has used alliances from the outset. Figure 2 summarises the series of alliances that evolved to support these innovations at each stage of the entrepreneurial lifecycle.

< Insert Figure 2>

Alliances for Co-discovery

As new technologies are developed and launched in the mobile communications arena, the focus of discovery for the innovative company is split between developing new content and applications for that platform, and exploring new technologies to complement or supersede existing services. DoCoMo perceived that the phenomenal success of i-mode would lead to even greater possibilities for mobile data services. Alliances at the first stage of the entrepreneurship cycle were, therefore, centred on more radical innovations to meet future customer expectations.

To keep abreast of R&D breakthroughs in Japan, and worldwide, DoCoMo set about establishing a global technology-monitoring network at the end of 1999, through joint establishment of venture capital companies in Japan and the US. These were complemented by a similar fund with Sun Microsystems in Asia.

In parallel, DoCoMo engaged in a series of research studies with major global technology players. In December 2000, it concluded a joint research agreement on multimedia transmission technology for third and future-generation services with IBM Japan. By September 2001, the two companies announced that they had realised technologies for video streaming, and planned to introduce their new technologies to the international business world as new standards for the internet. Two months later, DoCoMo announced a separate alliance with IBM Lotus Software to conduct joint feasibility studies for global business solutions. This followed a similar arrangement with SAP Japan and SAP AG, in April 2001, to collaborate on a series of feasibility studies on mobile business solutions.

Also in December 2000, DoCoMo and Hewlett Packard announced a three-year joint research effort to improve multimedia delivery over 4G networks, and 'explore new mobile service concepts in which people places and things would be able to interact, bridging the real and cyber worlds'. This was in keeping with the mobile giant's 'ubiquity strategy', which aimed to extend its services from 'person-to-person', to 'person to machine' and machine-to-machine' communications. While human applications represented the most obvious market, DoCoMo considered many mobile communications could potentially serve 'almost anything that moves', including cars, bicycles, notebook PCs, PDAs, vending machines and even pets. To this end it sought partners in each of these areas, to begin to explore a range of undeveloped markets. In February 2002, for example, it announced a joint study with Nissan to develop 'telematic' services, i.e. car multimedia services, planned for launch in 2003. The two companies also planned a variety of applied services in co-operation with other companies in various industries, by 2004. Toyota, the largest car manufacturer in Japan was also planning to provide telematics services in co-operation with KDDI, the second largest mobile operator in Japan.

Finally, DoCoMo formed a new company – Location Agent Inc.-- together with Mitsui and NEC Corp, to spawn an entirely new market in the sale of positioning data. The business models under development incorporated car navigation devices, such as those explored with Nissan, and systems to manage the deployment of vehicles, such as delivery trucks.

NTT DoCoMo's strategy, and its success in coming up with new ideas both to enhance the consumer experience for current platforms and to pave the way for next-generation technologies, confirms the potential role of alliances in co-discovery. The evidence suggests that a key role of alliances at this stage in the entrepreneurial cycle is to provide access to a more diverse range of knowledge bases which, in turn, spawns new avenues of development as well as novel combinations of existing current resources, (Thomson and McNamara, 2001).

Maximising diversity suggests a range of similar, "competing" alliances at the stage of co-discovery, before making a more committed arrangement, as was the case of NTT DoCoMo's feasibility studies with IBM and SAP. Given high levels of uncertainty

both as to the outcome of the alliance and the future fit between partners, we would expect alliances at the co-discovery phase are structured as relatively loose arrangements, so that partners are not bound by irreversible commitments. This parallels the results of theoretical work by researchers examining R&D collaboration where non-equity agreements have been identified as a superior mechanism to undertake technology development in high-tech sectors (Hagedoorn & Narula , 1996, 1998). NTT DoCoMo successfully used a number of types of such loose structures, including joint feasibility studies and research agreements to promote co-discovery.

On the other hand, for some types of idea generation (as in the area of positioning data), NTT DoCoMo chose an equity alliance. This would appear to reflect the desire to "lock in" partners to the joint pursuit of a new industry standard, where credibility and reliable access to potential network economies is key. In this scenario, choosing a binding agreement even in the earliest stage of the innovation lifecycle is deemed critical for success.

Alliances for Co-learning

The majority of DoCoMo's research and "co-discovery" alliances were migrated swiftly to experimentation and testing. Interestingly, however, many of the alliances for co-learning and experimentation were with new or alternative partners to those involved at the co-discovery phase. This underlines the possible need to introduce partners with different knowledge and resources than were required in the co-discovery phase.

During 2000, NTT DoCoMo and Sun Microsystems began working on joint-prototyping of a new i-mode terminal, based on an MOU to co-develop the handset using Sun's Java software. Java technology promised to make i-mode services more compelling because it provided enhanced security for online banking and trading, and game downloading. Based on these experiments, DoCoMo was the world's first wireless company to launch a Java-based service, which it named 'i-appli'.

In March 2001, DoCoMo entered into a strategic alliance with Coca-Cola (Japan) and Itochu Corp, one of Japan's leading trading companies, to jointly test a new consumer service – 'Cmode' - that links vending machines with i-mode phones. A nationwide launch followed in April 2002, when results of the trial revealed high levels of consumer acceptance and significant new business opportunities. The results also indicated significant business opportunities with various content providers, prompting a series of subsequent partnerships.

These alliances at the co-learning phase were specifically designed to improve the efficiency and speed of experimentation. In some cases, like Coca-Cola, the partner not only provided a ready test market for a particular initiative, but also allowed the Japanese company to conduct important testing of the generic issues presented by person-to-machine based services, in keeping with longer-term plans for ubiquitous network operation. For this purpose, NTT DoCoMo concluded that a single alliance was sufficient. Interestingly, its partner, with a different set of learning objectives – in Coca-Cola's case to understand which technologies would be most effective in growing sales of its drinks -- chose to establish similar experiments with several other

international operators, including in Asia-Pacific, SingTel and Telstra. The optimal structure was therefore asymmetric between partners.

On the other hand, some partnerships were maintained from the co-discovery, into the co-learning phases. Applying resources to test the ideas and insights generated at the co-discovery phase can lead to expansion of the original concept for both partners, as in the case of DoCoMo's plans to upgrade Cmode content. In this instance, the original three-partner structure was maintained, since results of the experiment had forecast significant growth opportunities for all three companies; for DoCoMo, through increased i-mode usage; for Coca-Cola, through new opportunities in the vending machine business; and Itochu Corp., through expansion of its content business.

Tensions, however, can arise if the longer term plans of partners do not coincide. Choosing a partner, not merely with the right knowledge and capabilities but also appropriate commitment to the experiment, whether assessed through financial investment, or a determination to persevere and 'see things through', is critical (Faulkner & De Rond, 2000). In general, where a specific experiment is a higher priority for both companies, it can be concluded in a much shorter time scale and both the alliance and business initiative can be migrated more speedily to the next stage of development if appropriate. Experiments also help alliance managers to begin to assess the dynamics of fit between respective partners, (Douma et al, 2000; Ring & Van de Ven, 1992), paving the way for better partnering decisions at the co-option and co-specialisation stages.

Alliances for Co-option

Internationally, the success of i-mode arguably made DoCoMo the world's most desired mobile partner and paved the way for a myriad of strategic alliances and opportunities. The Japanese company could afford to be extremely selective in its choice of partner and chose initially to establish joint ventures with a number of leading international brands, (Figure 2).

<Insert Figure 2>

Following the initial launch of i-mode, DoCoMo sought to evolve its services in a number of key areas, including personal, entertainment, business and home applications. However, even the most obvious developments were beyond the capabilities of the i-mode team. The lucrative corporate sector, for example, would, at very least, require detailed knowledge of business customer's computer systems. Instead of entering into the business of system integration, a clear alternative was to form partnerships with systems integrators and software firms, (Standage, 2001).

Just one month after the launch of i-mode, DoCoMo entered into a strategic alliance with Microsoft, which culminated just seven months later with the launch of a joint-venture, MobiMagic. Over the next eighteen months, DoCoMo created further collaborative arrangements in the field of corporate mobile solutions with several competing organisations, including SAP, Oracle, and IBM; and further joint ventures in a number of other content domains, including music distribution (with Matsushita

Communication), advertising (with Dentsu Inc.) and e-commerce (with leading Japanese banking and corporate consortiums).

In March 2000, DoCoMo received a request from PlayStation.com (Japan) Inc., a newly launched company operating a sales portal website for PlayStation-related hardware and software, to accept an allotment of shares as part of a private placement of new shares. Having agreed to this investment, DoCoMo signed an MOU with Sony Computer Entertainment Ltd, in August 2000, to jointly develop a new service combining i-mode and PlayStation. In December 2000, the mobile company also joined an eleven-partner e-payment joint venture established by Sony Corporation (47%), with The Sakura Bank and DoCoMo holding the next greatest stakes, at 15% each. This followed investment in similar e-payment consortiums earlier that year.

The use of equity joint ventures to move beyond experimentation is consistent with the hypothesis that "co-option" of the right partners, involving significant and sustained commitment of resources and capabilities is key to successful launch of an innovation. It underlines importance of matching organisational structure with the unique needs of the innovation as these vary at different stages of the entrepreneurial lifecycle. This insight highlights the fact that a single structure will not always be optimal to achieve differing objectives, such as those encountered from co-discovery through to co-option. The implication is clearly that the alliance structure may have to change over time, even if the partners remain the same.

In some cases it will be possible to go to "high commitment" structures, like equity joint ventures from the outset. In NTT DoCoMo's case, we observed this pattern where the initial idea was well specified and the desired results from experimentation were focused more on determining the critical preconditions of a full-scale launch, than conducting a fundamental assessment of whether or not to proceed with development of the innovation. Under these conditions a single, stable structure, enabled a speedy migration through the first stages of the entrepreneurial lifecycle and avoided the need for re-contracting between experimentation and launch, (Figure 3).

<Insert Figure 3>

In innovations perceived as having high risk, but vital to future business growth, such as ventures in new business domains and unproven business models, any form of bilateral alliance may be suboptimal. In the area of payment systems, for example, NTT DoCoMo decided to participate instead in the multi-partner initiative, ceding leadership to another member. It joined the Sakura Bank ePayment consortium (Figure 4) -- in an alliance network which also involved its leading domestic rival, KDDI. An important reason was the high risks of failed market response to mobile commerce: wireless brands may not extend far enough to convince customers to bank with them, or, psychologically, consumers may have difficulty using their mobile phone as an alternative to, or substitute for, their existing range of credit cards (Rosingh, 2002).

Multi-partner alliances to accelerate innovation, however, can create their own problems. If one partner's interest in the innovation is less than another, imbalances can occur, which will delay critical decision-making and development, (Wissema & Euser, 1991). At the same time, because multi-partner alliances (like the Sakura Bank ePayment Consortium) allow competitors to ascertain developments by the other in the

field of e-payment systems, they can create a positive 'race for learning' (Doz & Hamel, 1998), and 'competitive learning' (Child & Faulkner, 1998), while reducing the risks for an individual party.

Finally, the evidence of NTTDoCoMo indicated that while co-option is important to take an innovation beyond discovery and experimentation to launch in the market, it does not necessarily imply future exclusivity. Six months after its PlayStation alliance with Sony, NTT DoCoMo forged a similar arrangement with SEGA Corporation, one of Sony's key competitors, to combine i-mode with SEGA video arcade games. Key to this decision was probably the need to maximise market access, and therefore potential volume, when moving beyond the "venture" stage to a fully-fledged business.

Alliances for Co-specialisation

To maximise its growth potential, both at home and abroad, NTT DoCoMo sought to diversify its business model and consolidate its position in the mobile internet value chain in Japan, and also to leverage its i-mode innovation into a global 3G business, (Figure 4).

< Insert Figure 4>

Diversifying the Business Model

Following trends in the internet industry, DoCoMo perceived that revenues from advertising and e-business settlement services could provide new sources of earnings from the i-mode platform. Establishment of a joint venture with the world's largest advertising agency, Dentsu Inc., led to a speedy realisation of the first element of this strategy. However, payment systems brought greater risks, as discussed earlier, and had not been scaled up significantly by end 2001.

As rival technologies appeared in the international market, DoCoMo also sought to consolidate its position in the mobile internet value chain, firstly in Japan, and subsequently, worldwide. In pursuit of its strategy of fixed-mobile convergence (FMC), it needed to raise its profile in the international internet industry, to demonstrate capability on both sides of the mobile-internet equation. The network of the innovator and its status in the industry are key to an innovation becoming a technological success; mere announcement of the alliance can have a reputational effect (Podolny & Stuart, 1995; Abrahamson & Rosenkopf, 1997), particularly in a new or converging industry.

A strategic alliance with AOL in September 2000 assured instant credibility in the internet world, and compounded the view that major fixed-line web players were studying Tokyo, and DoCoMo in particular, to glimpse the future wireless data market. In the Japanese market, the mobile company's reputation was further enhanced when, just two months after its stake in AOL Japan was announced, the name of that venture was changed to DoCoMo AOL. While this alliance was of immense benefit to AOL in Japan, it represented a truly win-win relationship; the two companies planned to

collaborate in a series of other countries, where NTT DoCoMo would benefit from the AOL name.

International Expansion

DoCoMo's early internationalisation strategy was focused on providing the ultimate service to its domestic customers both inside Japan and abroad. Despite access to the world's most innovative mobile services in their home market, one of the Japanese company's biggest concerns was that its users could not access their handsets when they travelled overseas. DoCoMo's second-generation network was not compatible with international competitors and represented a major stumbling block in the provision of services to domestic customers; to bridge this increasingly significant gap, the company sought to standardise its third generation (3G) technology in as many countries as possible. In 1998, DoCoMo invited nearly twenty international wireless providers and research organisations to participate in a series of 'open experiments' to test its W-CDMA 3G technology in their home countries. By inviting leading global players to join in this early phase of W-CDMA development, DoCoMo hoped to 'lock' them in to its 3G technology system, (Chan-Olmsted & Jamison, 2001), and ultimately establish W-CDMA as the de facto standard, worldwide.

The strategic alternatives that a firm might adopt in order to establish its technology as a standard included licensing, entering into strategic alliances, adopting an appropriate positioning strategy, and diversifying into the production of complementary products, (Hill, 1997). Collaboration in setting standards is an old practice with global telecommunications companies (Wissema & Euser, 1991), yet the process of defining the standard is extremely complex. Research studies have revealed that multi-partner alliances have proven successful for setting standards in fast moving industries, and that the market tends to prefer co-operative tie-ups to strategic mergers and acquisitions, (Ernst & Halevy, 2000).

The phenomenal success of i-mode prompted launch of this service in other major world markets, yet DoCoMo had no experience of growing and developing an international customer base. Between December 1999 and January 2001, it established strategic alliances with six international mobile operators; AT&T Wireless Group (AWE), Hutchison Telephone Company Limited (HTCL), Hutchison 3G UK Ltd, KG Telecommunications Co., Ltd, KPN Mobile N.V. and Telecom Italia Mobile (TIM), (Figure 4).

Previous studies have identified and tested a broad range of variables impacting the mode of entry into overseas markets, including R& D intensity, the degree of diversification, the level of foreign experience, cultural distance, the size of the FDI in comparison to the size of the investing company, and the time of entry, (Harzing, 2002). For NTT DoCoMo, the lack of foreign experience and cultural factors were key determinants of its decision to pursue internationalisation through a series of minority stakes in wireless operators, in each country that it entered.

Within the mobile industry, much debate surrounded the i-mode service, and whether its success was reflective of emerging global usage trends or rooted in the idiosyncrasies of Japanese society. Globalisation, moreover, is a strategy that no

Japanese service company has ever convincingly achieved; cultural differences, including language barriers, diverse social attitudes, and unfamiliar business methods have represented some of the most significant hurdles. DoCoMo sought to maximise the reputation, credibility and experience of each international partner in its own domestic market. Minority investments offered a viable means to achieve this strategy, and to overcome the difficulty of transferring brand capital, and sales and marketing systems, from one country to another, (Anand & Delios, 2002).

Despite a dominant domestic position, excess cash flow and international acclaim for its technology and service innovations, DoCoMo's expansion strategy was in stark contrast to its leading international rival, Vodafone, which sought a controlling stake and lead market position in each country that it entered. Arriving late to an overcrowded game, the Japanese company became a somewhat victim of its own success when the publicity and hype surrounding developments in mobile data services and 3G technologies inflated wireless stocks worldwide. Refusing to pay higher premiums it shunned opportunities to buy VoiceStream of the US and Orange PLC in Europe, in 2000. DoCoMo believed that any risks associated with its decision to acquire minority, rather than controlling positions, would be offset by the scale of potential rewards from its partners growth; including increased revenues from joint ventures and royalty returns, and inflated capital valuations, through increased earnings from mobile data services. Furthermore smaller stakes would also be sufficient to support its central internationalisation strategy of securing W-CDMA as the de facto 3G standard, worldwide.

Choice of International Partner: Bigger or Better?

Having determined the mode of entry, the choice of partner in each country raised a number of further considerations for NTT DoCoMo, concerning the trade-off between maintaining full control of its operations and technologies versus shared learning and resources with more dominant and reputable overseas players. The Japanese company had already forged relations with a number of international operators through it W-CDMA standard network, yet most of its subsequent capital alliances were established with new partners, (Figure 5). The ultimate aim of the standardisation exercise was to diffuse the W-CDMA technology in as many countries as possible; new partners represented a preferable approach.

< Insert Figure 5>

DoCoMo had chosen to work with the largest and leading global brands for its application alliances, however this was not the case with its international partners, which included just two market leaders, in relatively minor geographic markets; KPN Mobile in the Netherlands and Hutchison in Hong Kong. All of its other partners were second- and even third-tier players, trailing larger operators in market position, subscriber numbers to mobile data services, data application portfolios and network build. The depth of insight and breadth of resources might have been greater with these larger players. Furthermore, even before DoCoMo could test the international mobile data market, problems emerged. At end 2001, having already delayed the launch of i-mode in Europe, earlier that year, the Japanese company announced that first half net income had fallen by more than 50% on 2000, through steep losses from its overseas investments. The company attributed the drop in income, largely, to its

investment in KPN, with whom it had established a number of independent and joint collaborative agreements, (Figure 5). At the same time, DoCoMo also reported that it was monitoring its investment in AT& T Wireless, in the US.

Aspirations from collaboration can also be hampered by changes in the shareholding structure of either partner. DoCoMo resorted to licensing its i-mode technology to KPN, at end 2001, when the original plans for a joint venture were blocked by the shareholder structure at E-Plus (KPN's German mobile unit) which was 22.5% owned by Bell South of the US. At end 2001, Bell South planned to withdraw from Europe and had an option to convert its stake to either KPN or KPN Mobile shares, which could dilute DoCoMo's stake in the Dutch company.

By Spring 2002, the Japanese company had amended its international strategy to focus on non-capital alliances and licensing agreements, such as that pursued with French Telecoms group Bouygues SA. Minority investments provided assurance of support for the W-CDMA standard, however, they could not control the timetable of each partner in launching i-mode, or rolling out 3G networks, in their home markets. At the same time, the standardisation process was unresolved, and was proving integral to competitive struggles between leading international operators, both as individual firms and major regions of the world economy, (Glimstedt, 2001). Continued deferral of plans to launch W-CDMA networks strengthened the case of alternative technology standards.

Structuring the Alliance Network: Club, Clan and Caravan

One of the issues clearly emerging from the application of the Doz-Williamson model to NTTDoCoMo's network of alliances is the question of how to maintain a dynamic match between alliance structure and strategy throughout the entrepreneurial lifecycle.

Rather than choosing a stable, but compromised structure, an alternative is to evolve the structure over time. At the co-discovery and co-learning phases, loose structures with significant numbers of players are often optimal. By contrast, at the co-option and co-specialisation stages, a coherent, fast moving, small groups of partners, sharing a similar intensity of commitment and working closely together is likely to be more appropriate. Thus at the early stages a structure analogous to a "Club" may be optimal, where in the later stages a small, tight-knit "Clan" is likely to be more effective.

It is also possible, at that stage to select from the idea and experiment partners those who may have a long lasting valuable contribution to make and to make them members of the clan. The early club may transform into a smaller clan by picking the "best" members. Yet, in particular for businesses where critical mass and network externalities shape competition, and first-mover advantages become key, a club of early sponsors and adopters who converge on the standard put forward by the venture and ensure its diffusion may be key. Hence, the venture may well need a clan but within a club.

Finally, at the scale up stage, relationships may either dissolve, the "caravan" model (where traders band together to cross the desert and then compete to sell their goods in

the bazaar) or deepen and stabilize into a stable clan built on mutual dependence and co-specialization among partners, (Figure 6).

< Insert Figure 6>

Whether the caravan model or the clan model prevails may depend on market growth, competition intensity and environmental munificence (Eisenhardt & Schoonhoven, 1996). It also obviously depends upon whether, with a more mature better-understood business, arm's length market contracts can replace alliances. Perhaps the end point of a clan is a merger (as exemplified by Airbus today) unless regulatory and market conditions prevent it (witness the costly and ultimately unsuccessful contortions of Swissair trying to gain the benefits of a merger from the group of weaker alliance partners it had assembled in Europe).

The purpose of DoCoMo's earlier alliances with international operators was to enable construction of a global 3G network, in the longer term. Further along the cycle of business development, DoCoMo was extremely select in its choice of partner to launch i-mode overseas, yet it maintained its much broader network of partners to ensure acceptance of W-CDMA as the de-facto standard worldwide. The small group of international alliances represented a subset of this wider technology support group. Even within the group of six key alliance partners, DoCoMo formed further exclusive relations with subsets of two partners, as was the case with its co-operative arrangement with KPN and Hutchison Whampoa, and further, with KPN and TIM, (Figure 5). Within a growing innovation network, smaller numbers of firms can work to a tighter schedule than multi-partner arrangements, and can share their experience to benefit other organisations in the broader alliance structure.

Others companies can chose to break away from the existing network to pursue a substitute or alternative development, as was the case of SK Telecom & 3G technology.
DoCoMo faced one of the greatest challenges from allying with an international firm in the same industry when one of its partners developed a technology that provided a substitute to its own. In January 2002, the Japanese company aborted two-year talks to make a minority acquisition (14.5% stake) in SK Telecom of Korea, one of its most advanced 3G testing partners. At the start of the negotiation process, SK Telecom had planned a full commercial launch of W-CDMA services in May 2002. In the meantime however, it had diverted further from the W-CDMA camp, launching a new network (cdma 1x), in October 2000, which surpassed even its own expectations and rivalled DoCoMo's 3G service. DoCoMo continued negotiations until SK Telecom's W-CDMA launch date was pushed back to 2003, or even 2004, to increase the return, and recoup costs, from its new 1X technology, before migrating to a subsequent 3G network. Nevertheless, SK Telecom had acquired a W-CDMA license and remained loosely connected to DoCoMo's growing international network. The Japanese company could derive much benefit from expansion in the South Korean market, however its aspirations for stronger relations with SK Telecom had been dashed, at least in the short-to-medium term.

Managing a Dynamic Alliance Network Over the Cycle

The experience of NTT DoCoMo highlighted two key possibilities for managing the alliance network over the entrepreneurial life cycle:

- *Partner Turnover*: Introducing new partners and/or severing ties with existing ones as the cycle progresses
- *Partner Evolution*: Successive alliances with the same partner, but with different purposes so that the relationship evolves over time.

Partner Turnover

By 2002, DoCoMo was managing strategic alliances spanning three generations of innovative mobile phone services – 2G (i-mode), 3G (FOMA) and 4G (in development)- and various types of engagement. In just a few years the company had created a growing network of partners, of which it represented the strategic centre, (Lorenzoni & Baden-Fuller, 1995); the usefulness of a network, for an individual customer, expands with an increase in the number of products and services offered, (Arthur, 1996). In turn, it had chosen to partner with several organisations that represented the strategic centre of their own web of alliances. Some of its earliest partners, such as Sun Microsystems and Microsoft, themselves demonstrated that, despite the complexity that comes with the need to manage a variety of alliances, it can be done successfully, (Lorenzoni & Baden-Fuller, 1995; Roberts & Lui, 2001). The scope for direct and indirect ties between these innovative networks was immense, as was the scope of potential learning from the alliance management experiences of major partners.

On the other hand, DoCoMo's success also enabled it to either choose between leading competitors in a given industry, or to maintain strategic relations with existing competitors. Increasingly, the company found itself managing strategic alliances with separate groups of industry competitors, such as IBM, Oracle, SAP and Microsoft in mobile enterprise solutions, and Sony and Sega in computer games entertainment. Despite Microsoft's competitive '.Net' strategy, and its considerable and successful existing relations with NTT DoCoMo, the mobile giant partnered with one of Microsoft's greatest rivals- AOL- to realise its own vision of fixed-mobile converged services. One year later, DoCoMo joined the multipartner alliance- the Liberty Alliance Project[1]- established by Sun Microsystems, and predicted to compete with Microsoft's high-profile Passport system. Several of DoCoMo's existing alliance partners, and direct competitors of Microsoft, also joined the Liberty Alliance, including IBM, Sony and AOL.
In the past decade, the distinction between ally and competitor in external alliance networks has become increasingly blurred, (Eisenhardt, 2001). Particularly in converging industries, traditional competitors can find themselves in separate alliances with the same innovative firm. Noting that the principle dimension of competition is between value chains and networks, Lorenzoni & Baden-Fuller (1995) argued that

[1] The Liberty Alliance Project was formed to set technical ground rules that could allow users of personal computers, cellphones and other products to get access to Internet resources by logging on just once.

positive rivalry among firms in a network should be encouraged. The issue of trust, however, is critical in this instance.

Levels of trust in later stages of the entrepreneurial lifecycle ensure effective management of parallel alliances with competing firms. As discussed earlier, the concept of trust is fundamental to the successful collaboration of entrepreneurial teams, (Nonaka et al, 2000), and organisations, (Larson, 1991) and results from the common vision, objectives and standards that respective firms have for the alliance, (Barney & Hansen, 1994).

At earlier stages in the entrepreneurship cycle, however, more loosely bound collaborative ties may be abandoned or weakened, at the cost of new partner relations. Within DoCoMo's international operating network, later partnerships distorted some existing relations, while strengthening others. Its investment in Hutchison Whampoa, for example, which had acquired a 3G license in the Australia, changed the terms of access to the Japanese giant previously enjoyed by Telstra. Telstra had been one of the several partners that had participated in W-CDMA field trials with NTT DoCoMo in 1998; DoCoMo had not closed the door on this arrangement – it wanted to maintain all members of its W-CDMA standard network - but the nature of the relationship had clearly changed with its subsequent acquisition.

Problems can also arise when the innovating company feels ready to abandon one project in favour of a better development; not all of its partners may be ready to migrate to the next level and specific alliances may be abandoned, in favour of fresh opportunities.
In, for example, instances where cross-border alliances are established to access new markets, the motives for collaboration, while based on the same end-goal, can conflict at various stages. NTT DoCoMo may try to accelerate the introduction of its 3G technology, while the partner company may want to prolong the lifecycle of the i-mode service, either to recoup costs from related investment, or to bring customers or employees up to speed, before exposing them to the more complex and costly successor. While almost all i-mode alliances were formed with the intention of migrating services to the third generation platform, separate alliances, with for example Nissan and Oracle, were initiated solely for 3G services, following the launch of FOMA, at end 2001. Since backward compatibility was not an option, continued delays in the roll-back of 3G networks in international countries would have a knock-on effect to third-generation application providers.

Partner Evolution

In general, shared vision and understanding between partners in later stages of the entrepreneurial lifecycle can lead to multiple collaborative projects with the same firm(s), and new alliances with partners' partners. DoCoMo enjoyed evolutionary relationships with a number of its alliance partners, including the venture fund and liberty alliance project with Sun Microsystems, and participation in e-payment alliances with Sony, and Microsoft. As firms become more familiar with a given organisation, the risk that a partner will be dishonest declines with every subsequent agreement, (Narula & Hagedoorn, 1998). Since effective alliance relations can be

time-consuming to develop, an organisation can benefit from repeated relations with existing partners.

In a similar vein, international partners at the business growth stage, (Figure 4), can provide the opportunity to replicate innovative services and applications in a range of cultures and markets. In general, DoCoMo's application alliances were managed as distinct and separate experiments and ventures. However, just as the Japanese company could derive innovative opportunities from partners' partners within a broader network, as was the case with developments in epayment systems, so too it could provide a range of fresh opportunities to its own partners through its overseas operating alliances. Immediately following establishment of its key global alliance partners, for example, DoCoMo and Sony signed further separate MOUs with DoCoMo's six international alliance partners to promote its imode/Playstation entertainment network in their respective markets-Europe, North America and Asia.

Conclusions

The experience of NTT DoCoMo provides clear evidence of the potentially powerful role alliances can play in accelerating innovation. A common thread is the use of alliances to provide access to a more diverse pool of capabilities, knowledge and resources that exists in any individual firm, thus providing an enhanced vector of inputs to the innovation process. The NTT DoCoMo experience suggests that this role is potentially much more significant than traditional risk-spreading arguments for alliances in the context of innovation.

But our analysis also highlights the sharp differences in alliance contribution between different stages of the innovation/entrepreneurial lifecycle from co-discovery, through co-learning, co-option and co-specialisation. These differences imply the need for different levels of commitment, different alliance structures, and even a different set of partners as the innovation evolves from an idea to a full-scale business. The use of alliances to accelerate innovation therefore creates a complex dynamic optimisation problem of how to maintain strategic and structural fit as an innovation evolves through its lifecycle.

Analysis of the NTT DoCoMo experience allowed us to identify some of the key issues that must be addressed in tackling this dynamic optimisation problem and to suggest some potential solutions. Specifically it suggests:

- The advantages of using multiple "competing" alliances at the co-discovery stage of innovation within the structure of a loose "club", in order to maximise diversity and open up a wider range of potential outcomes. The disadvantages of excessive focus and "lock-in" at this stage of the innovation cycle should cause us to question much of the conventional wisdom about the universal need for high levels of trust and commitment as pre-requisites for successful alliances.

- The prime role of access to proprietary infrastructure and knowledge to facilitate experimentation as the key criterion for choice of partner at the co-learning phase of the cycle. Here shared incentive between the partners for

rapid and decisive experimentation is key, rather than lock-in, trust and long-term commitment.

- That as we move into the stage of launching and innovation into the market, there is a growing need for close co-operation and integration between the partners. At this stage there are two main choices: either to form a "clan" by focusing on forming a close alliance that co-opts a small group of(maybe new) partners to a common goal and breaking ties with less-favoured partners; or to form a "clan within a club" as NTT DoCoMo did with WCDMA by dividing partners into a close-knit inner circle and an outer group of adopters who offer potential scale when the innovation has been proven, refined and codified.

- Interestingly, while at the co-option stage at which an innovation is launched into the market it is necessary for alliance partners to come close together and behave as a tightly integrated group, at the subsequent stage of scale-up and co-specialisation, they may in fact optimally diverge. This may take the form of each partner specialising on particular activities within an on-going partnership, or partners going their separate ways to become competitors (the "caravan" model). In making this transition, it is important either to define the specific role and clear interfaces between the partners, or to develop self-sufficiency by learning from the partner at the co-option stage so as to enable viable separation.

Our analysis suggests a number of avenues for fruitful future research. First and foremost, there is a need to specify more fully the different roles of alliances within the innovation cycle. Second, there is a need to model more completely the dynamic optimisation problem posed by the challenge of forming, structuring and evolving a partnership network that facilitates efficient and speedy innovation. Mobile telephony provides a highly fertile ground to explore these issues, given both high levels of market uncertainty, rapid pace of change and the fact that the playing field is global – a confluence of factors placing extreme demands on the ability of competitors to marshal large-scale, deep, diverse and complementary sets of knowledge, capabilities and resources at each stage of the innovation cycle.

References

Abrahamson, E. and Rosenkopf, L. (1997), "Social network effects on the extent of innovation diffusion: A computer simulation". Organization Science.

Amabile, T. (1996), Creativity in Context , Boulder: Westwiew Press.

Amabile, T. M., (1997), "Motivating creativity in organizations: On doing what you love and loving what you do", California Management Review, Fall, 40(1):39

Anand, J. and Delios, A., (2002), "Absolute and Relative Resources as Determinants of International Acquisitions", Strategic Management Journal, 23: 119-134

Baden-Fuller, C. and Stopford, J.M., (1994), "Creating Corporate Entrepreneurship", Strategic Management Journal, 15(7): 521-536

Barney, J. and Hansen, M.H., (1994), "Trustworthiness as a Source of Competitive Advantage", Strategic Management Journal, 7: 175-90.

Barrett, H. & Weinstein, A., (1998), "The effect of market orientation and organizational flexibility on corporate entrepreneurship", Entrepreneurship: Theory & Practice, Fall, 23(1):57-70

Bleeke, J. and Ernst, D., (1993), "Collaborating to Compete: Using Strategic Alliances and Acquisitions in the Global Marketplace", New York, Wiley.

Chan-Olmsted, S. and Jamison, M., (2001), "Rivalry through alliances: Competitive Strategy in the Global telecommunications Market", European Management Journal, 19(3): 317-331

Child, J. and Faulkner, D., (1998), "Strategies of Co-operation. Managing Alliances, Networks and Joint Ventures", New York, Oxford University Press.

Douma, M.U., Bilderbeek, J., Idenburg, P.J. and Looise, J.K., (2000), "Strategic Alliances. Managing the Dynamics of Fit", Long Range Planning, 33: 579-598

Doz, Y. and Williamson, P.J., (2002), "Alliances as Entrepreneur Accelerators", Paper presented at the Cooperative Strategies and Alliances Conference, IMD-Rutgers, Lausanne. (2001). Revised, 2002.

Eisenhardt, K. M. & Schoonhoven, C.B., (1996), "Resource-based View of Strategic Alliance Formation: Strategic and Social Effects in Entrepreneurial Firms", Organization Science, Mar/Apr, 7(2): 136-140

Ernst, D. and Halevy, T., (2000), "When to Think Alliance", McKinsey Quarterly, 4: 46-55

Faulkner & De Rond, (2000), "Cooperative Strategy", New York, Oxford University Press.

Guth, W. D. & Ginsberg, A., (1990), "Guest Editor's Introduction: Corporate Entrepreneurship", Strategic Management Journal, Index90, 11(4): 5-15

Hagedoorn, J. & Narula, R., (1996), "Choosing organizational modes of strategic technology partnering: International and sectoral...", Journal of International Business Studies, 27(2): 265-284

Harzing, A., (2002), "Acquisitions versus Geenfield Investmenst: International strategy and Management of Entry Modes, Strategic Management Journal, 23: 211-227

Hill, Charles, W.L. (1997), "Establishing a Standard: Competitive Strategy and Technological Standards in Winner-Take-All Industries, Academy of Management Executive, 11(2): 7-25

Huber, G., (1991), "Organisational learning: the contributing processes and the literatures", Organisational Science, 2(1): 88-115

Inkpen, A. C., (2000). "Learning Through Joint Ventures: A Framework Of Knowledge Acquisition", Journal of Management Studies, Nov, 37(7):1019-1034

Inkpen, A. and Beamish, P.W., (1997), "Knowledge, Bargaining Power and the Instability of Joint Ventures", Academy of management Review, 22(1): 177-202

Kaplan, S. and Weisbach, M., (1992), "The Success of Acquisitions. Evidence from Divestitures", Journal of Finance, 9(2): 107-138

Larson. A., (1991), "Partner Networks: Leveraging External Ties to Improve Entrepreneurial Performance" , Journal of Business Venturing, May, 6(3): 173-188

Lorenzoni, G. and Baden-Fuller, C. (1995), "Creating a Strategic Centre to Manage a Web of Partners", California Management Review, 37(3): 146-163

Martin, J. A. & Eisenhardt, K. M., (2001), "Exploring Cross-Border Synergies", Academy of Management Proceedings, pH1

Narula, R. & Hagedoorn, J., (1999), "Innovating through strategic alliances: Moving towards international partnerships and contractual...

Narula, R. and Hagedorn, J. (1998), "Innovating through Strategic Alliances: Moving towards International Partnerships and Contractual Agreements", Technovation, 19**:** 283-294.

Nohria, N. & Gulati, R., (1996), "Is slack good or bad for innovation?", Academy of Management Journal, Oct, 39(5):1245-1264

Nonaka, I., Toyama, R & Nagata, A., (2000), "A firm as a knowledge-creating entity: a new perspective on the theory of the firm", Industrial & Corporate Change, Mar., 9(1): 1-20

Nonaka, I. And Takeuchi, H., (1995), "The Knowledge Creating Company", Oxford, Oxford University Press.

Podolny, JM. and Stuart, TE (1995),. "A role-based ecology of technological change. American Journal of Sociology, 100 **(**5): 1224-1260

Powell, W.W., Kenneth W. Koput, B. and Smith-Doerr, L. (1996), "Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology", Administrative Science Quarterly, 41: 116-145.

Reid, D., Bussiere, D. and Greenaway, K., (2001), "Alliance Formation Issues for Knowledge-based Enterprises", International Journal of Management Reviews, 3(1): 79-100

Ring, P.S. and Van de Ven, A.H. (1992), "Structuring Co-operative Relationships between Organisations", Strategic Management Journal, (13)7: 483-498.

Ring, P.S. and Van de Ven, A.H. (1994), "Developmental Processes of Cooperative Interorganisational relationships", Academy of Management Review, 19: 90-118.

Standage, T., (2001), "The Internet untethered. A survey of the mobile Internet", The Economist, October 13: 20pp

Thomson, N. and McNamara, P., (2001), "Achieving Post-Acquisition Success: The Role of Corporate Entrepreneurship", Long Range Planning, 34: 669-697

Wirtz, B.W., (2001), "Reconfiguration of value Chains in Converging Media and Communications Markets", Long Range Planning, 34: 489-506

Wissema, J.G. and Euser, L., (1991), "Successful Innovation Through Inter-Company Networks", Long Range Planning, 24(6): 33-39

Figure 1: The Entrepreneurial Cycle

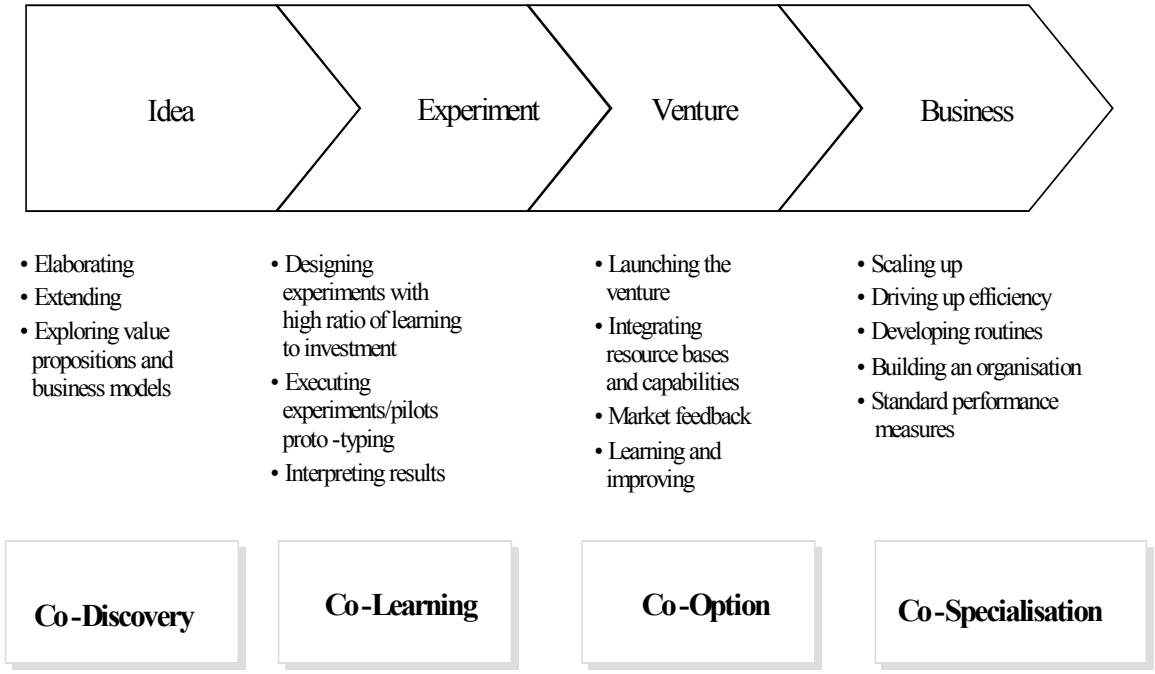

Figure 2: NTT DoCoMo Strategic Alliances

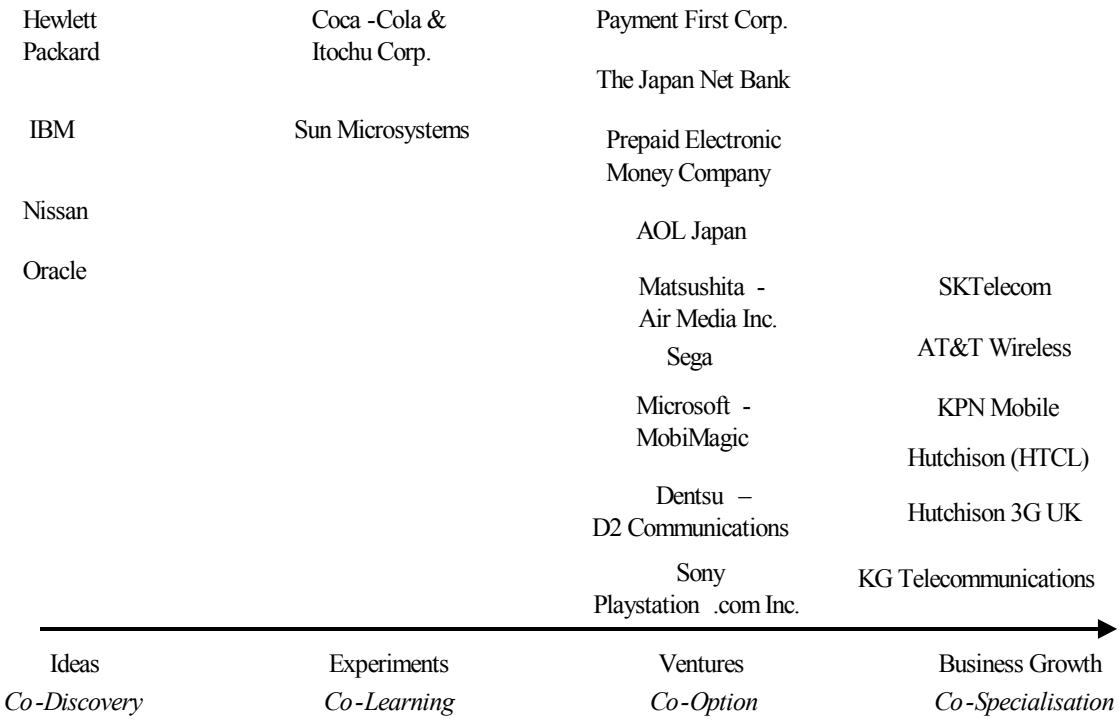

Figure 3: Dynamic Ventures with Global Standards

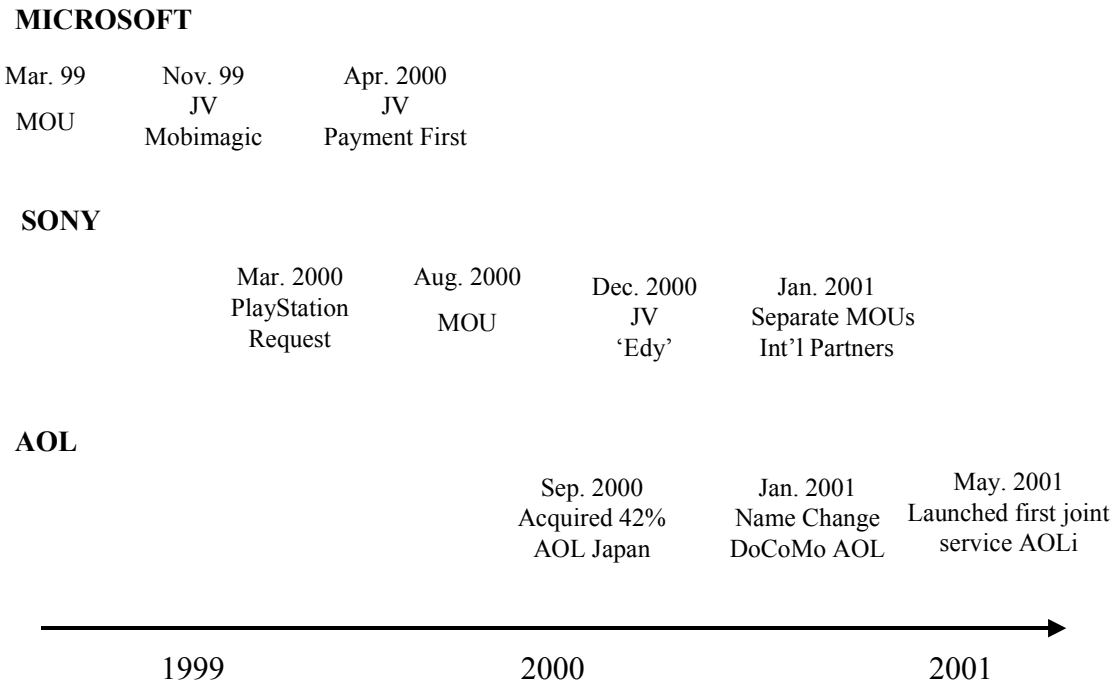

Figure 4: Strategic Alliances for Current and Planned Business Growth (2000 – 2002)

Growth Strategy	New Market /Revenue Stream	Alliance Structure	Partners	NTT DoCoMo Investment Stake
International Expansion	Hong Kong Netherlands UK US Taiwan	Equity Investment	Hutchison Telephone Co. Ltd KPN Mobile N.V Hutchison 3G UK Holdings Ltd AT&T Wireless KG Telecommunications	25% 15% 20% 16% 21%
	Italy France	Licensing Agreement	Telecom Italia Mobile Bouygues SA	- -
Diversifying the Business Model	Advertising	Joint Venture D2 Communications	Dentsu Inc. 49%	51%
	e-Payments	Joint Venture The Japan Net Bank Ltd	Sakura Bank 55% Sumitomo Bank 10% Fujitsu 10% Nippon Life Insurance 10% Tokyo Electric Power 5% Mitsui & Co 5%	5%
		Joint Venture Payment First Corporation	Oki Electric 40% NTT Data 30% NTT Communications 10% Microsoft 3% Fuji Bank 2% Others 5%	10%
		Joint Venture ‘edy’ Prepaid Electronic Money Service	Sony Group 47% Sakura Bank 15% Toyota Motor Corp 5% Denso Corp 5% KDDI Corp 5% Sanwa Bank 4% Bank of Tokyo-Mitsubishi 4%	15%
Pioneering New Markets	Fixed Mobile Convergence	AOL Japan/DoCoMo AOL	AOL 40.3% Mitsui & Co. 17.4% Nikkei	42.3%
	Ubiquitous Network Communications	Joint Venture Location Based Inc	Mitsui & Co - NEC Corp -	-

Figure 5: Evolving Relations in the W-CDMA Network

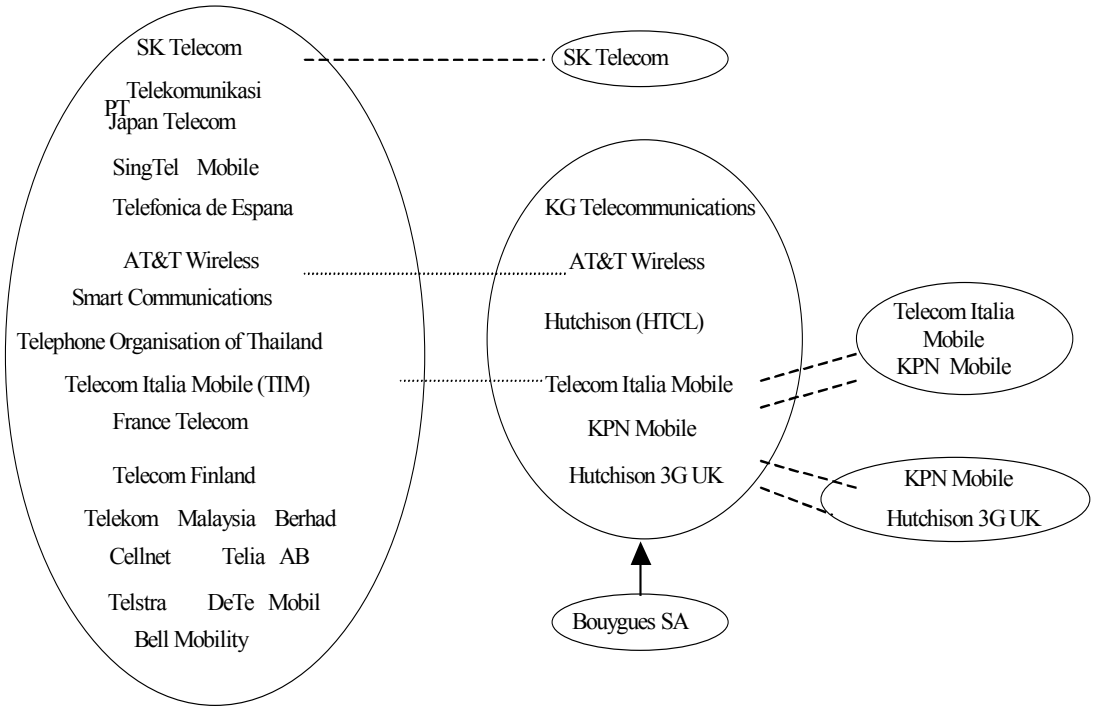

Figure 6: Collaboration Configuration – Club, Clan, Caravan