

Management of Outsourcing R&D in the Era of Open Innovation

CARPAY Frans

Center for Management of Science
and Technology,
National University of Singapore,
Singapore.
engfc@nus.edu.sg

HANG Chang Chieh

Center for Management of Science
and Technology,
National University of Singapore,
Singapore.
enghcc@nus.edu.sg

YU Dan

Center for Management of Science
and Technology,
National University of Singapore,
Singapore.
yudan@nus.edu.sg

Abstract

Outsourcing R&D, a new wave of open innovation, is a double-edged sword that can be either a threat or an opportunity to companies which have strong core competences. How far a company should go in outsourcing R&D has perplexed many practitioners, particularly those in the Consumer Electronics industry where key elements of core competences are core technologies. This study compares the statements in literature with practice. Through investigation of two representative cases, we have found that if technology leadership is the core competence, outsourcing R&D is viable only if it serves to fill the gaps of overall technology portfolio. Even if core competences lie in expertise of activities other than R&D, orchestrating the whole process of R&D is still strongly recommended.

Key Words

Outsourcing R&D, Open Innovation, Core Competence

INTRODUCTION

Insourcing and outsourcing of R&D is a new wave of open innovation in succession to outsourcing sales, technical support and manufacturing. A company like Procter and Gamble makes full use of “open innovation” concept in the area of R&D and garners considerable success. While there is also much R&D outsourcing in the Consumer Electronics industry, there is normally not as much as in the case of P&G. In the Consumer Electronics industry, the companies still mainly retain their key technologies, which are crucial in their core competences. According to C. K. Prahalad and Gary Hamel, core competences have to be nurtured within the company, and using outside research results makes a core competence non-core. In this paper, we will address the issue of how far a company should go in farming out its R&D based on the consideration of retaining core competences within the context of the Consumer Electronics Industry.

LITERATURE REVIEW

1. Core Competence

The term “Core competence” has been coined by C. K. Prahalad and Gary Hamel in 1990[1]. As they suggested, “The real sources of competitive advantage are to be found in management’s ability to consolidate corporate-wide technologies and production skills into competencies

that empower individual businesses to adapt to quickly changing opportunities.” The consolidated knowledge in its corporate-wide technologies, production skills and business processes are collectively the intellectual capital of its core business. Such competitive advantage is a result from the company’s “core competences”, i.e., from the intelligent use of its intellectual capital. Core competences should be identified, nurtured and refreshed whenever needed and they are integral to sustaining competitive advantage. A core competence is identified by three elements [1]:

- Customer Value: Significant contribution to perceived customer benefit.
- Competitor differentiation: difficult to imitate.
- Extensibility: potential access to a wide variety of markets.

Other literature also touches upon core competence. According to Robert Clark, corporations should concentrate on what they do best and hive off the less central processes to those who can do better than them and at lower costs. [2] Miller and Morris believed that defining any organization’s core competence is essential in successfully choosing how new instruments in learning should be focused, and in defining what knowledge should be developed internally and what could be obtained through relationships with other firms, customers, and universities [3].

2. Open Innovation

“Open innovation”, as defined by Henry Chesbrough, means getting the job done externally or internally, whatever is the best, for ideas, developments, manufacturing and market channels. The model describes the necessity of letting ideas both flow out of the corporation in order to find better sites for their exploitation, and flow into the corporation as new offerings and new business models. [4] The theory is a radical departure from the traditional model of closed, in-house innovation. In simple terms, “Closed Innovation” can be defined as innovation within the company, using only own ideas and own researchers, scientists and engineers. In contrast, “Open Innovation” uses external ideas, external R&D as well as internal ones. It goes even further to use external paths to market. In the field of research and development, this concept opens the boundaries of the company: R&D results enter the company from outside and internal R&D results may

leave the company.

All kinds of industries have recently set foot in the field of open innovation: Boeing Co is working with India's HCL Technologies to co-develop software for everything from the navigation systems and landing gear to the cockpit controls for its upcoming 7E7 Dreamliner jet; Pharmaceutical giants such as GlaxoSmithKline and Eli Lilly are teaming up with Asian Biotech research companies in a bid to cut the average \$500 million cost of bringing a new drug to market; P&G wants to have half of its new product ideas to be generated from outside by 2010, compared with 20% now [5]. According to Chesbrough, a shift towards "open" is vital for large international companies to survive. Open innovation is also an ideal vehicle for smaller companies to grow [6]. Open innovation can provide a new lease of life, real returns for a company's discarded ideas and access to new IP that could not be produced in-house.

3. Problem Setting

The downside of open innovation is getting the balance wrong; one extreme is going too far in outsourcing. To begin with, it causes the danger of fostering new competitors [7]. IBM's outsourcing of microprocessor design and operating system to Intel and Microsoft, respectively, contributed the dramatic growth of these suppliers in the 1990s. Motorola outsourced the manufacturing and design of mobile phones business to BenQ Corporation, a Taiwanese company. But in 2005, BenQ began selling phones in China under its own brand. The problem is that the brand-name companies will lose their capability to develop new technologies if they over-rely on suppliers to innovate or make improvements. Another risk is that they lose their key technologies to third parties through know-how leakages and brain drain. These factors have kept some companies off from outsourcing R&D. Furthermore, as ideas, technologies and process innovations become increasingly shared across organizations including universities and research institutes, difficulty of protection and management of intellectual property becomes another drawback of open innovation.

In the literature, there were few discussions on potential contradiction between core competence and open innovation. Core competences remain to be nurtured within the company to be competitive. Outsourcing R&D makes a core competence non-core. Then how can a company still keep its competitive advantages? As core competences seem to block the flexibility of the company to open up, it is thus important to study the following question: To what extent can "Open innovation" be exploited in R&D activities where lies the company's "core competence"?

4. Context of Consumer Electronic Industry

The Consumer Electronics business has already shown a notable tendency to embrace R&D outsourcing. According to a report from iSuppli Corp 2005, many CE products' designs have been outsourced: (1) Personal digital assistants (PDAs) and pocket PCs use many evolving technologies, so even big brands like Hewlett-Packard and PalmOne

collaborate with Asian suppliers on design. Therefore, the rate of designs outsourced is up to 70%; (2) Notebook PCs worldwide are mainly designed and manufactured by Taiwanese companies that also control many patents for industrial and mechanical design. Dell, HP, Sony and even Apple use designs by contract manufacturers. The outsourcing rate is 65%; (3) As for Digital Camera with outsourcing rate of 30%, top brands like Nikon and Canon design most of their own cameras but now begin to buy cheaper models from Taiwanese vendors to quickly get into the market. HP and Kodak collaborate closely on design with Asian manufacturers. (4) Mobile Phones by second-tier brands like Philips and Siemens and operators like T-Mobile and AT&T Wireless are based on designs by outside firms with 20% outsourcing rate. Motorola, Nokia, Sony-Ericsson and others farm out design of low-end models [8]. From another perspective, when looking at the Consumer Electronics business in the major MNCs, one may notice a considerable shift in their operations over the last decade. Manufacturing is outsourced in most cases; development is outsourced by some companies and partly outsourced by many firms; internal research is reduced by most companies. These MNCs are either deliberately or unknowingly changing their core competences. Lean-, JIT-, high-quality manufacturing used to be core competences to all until the 1990s. Strength in R&D was the main core competence after that. These two core competences together with company-specific competences constitute each company's core competences in the field of CE. The shift from in-house R&D strength to application of outside R&D is fully in line with Chesbrough's vision. However, unlike P&G that competes in commodities industry, the strategy may not be directly duplicated in the Consumer Electronics industry where major key elements of core competences are core technologies. In fact, the outsourcing wave underlying the hyper-growth of EMS and ODM providers has been much weaker in consumer electronics than in other electronic sectors. According to UBS Investment Research (2003) only an estimated 0-3% of Japanese consumer electronics OEM's production has been outsourced to EMS providers [9]. Hence, how far the company can go in outsourcing its R&D in the Consumer Electronics industry becomes the context for our research.

METHODOLOGY

Our research questions were designed to investigate why and how far companies are outsourcing their R&D and the research methodology adopted is case study.

In the following sections, we try to analyze outsourcing strategies of two companies in the Consumer Electronics industry, which are A and B. We want to investigate whether these two companies unwittingly outsource the key technologies that differentiate them, and eventually may lose their competitive advantage or they are able to take advantages of outsourcing R&D while retaining control and differentiation.

Basing its HQ in Singapore, A markets its products to the hotspots of Asia, India and the Middle East as a technology provider, system integrator and service

provider. In order to provide end-to-end solutions for customers, A has dedicated many efforts in collaboration with technological suppliers and so far has built solid partnership with 25 companies such as STMicroelectronics, NXP, Epson, to name a few. [10]

B is a giant in the Consumer Electronics which has strong in-house innovation augmented by contribution from outside R&D. The percentage of B's cooperation with NGO and universities has increased to approximately 55% in 2004[11]. In the second quarter of 2006, the Nett Operating Capital decreased to EUR 5 million compared with EUR 232 million in the same time of 2005. Part of the official explanation is the further progress with the outsourcing-driven asset reduction program. The agenda for future is to accelerate movement to become a simpler market oriented organization and outsource more R&D work of consumer electronics. [12]

CASE ONE: LARGE-SCALE R&D OUTSOURCING IN COMPANY A

There are currently three main businesses in Company A which are wireless local loops, PABX and energy meters. Figure 1 depicts the outsourcing level of Company A. The three bars at the bottom represent businesses of PABX, energy meters and wireless local loops, respectively. The section in shadow means tasks fulfilled in house.

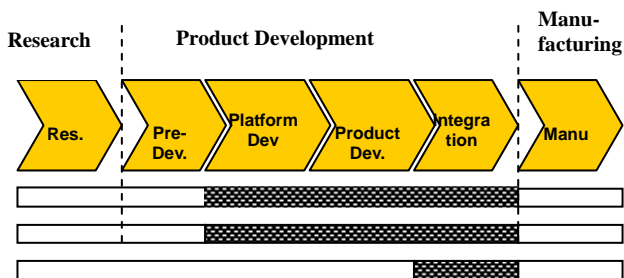


Figure 1 Outsourcing R&D in Company A

For PABX and energy meters, A farms out research and predevelopment and downstream manufacturing, while retaining platform development, product development and product integration in house. For wireless local loops, it only keeps integration inside because it lacks resources needed to do upstream R&D in the company.

Three major factors are taken into consideration when the top management team decides whether to outsource and how far they can go in outsourcing R&D. First of all, time to market. Due to shortening of life cycle of consumer electronics products, speed to the targeting market plays a key role in business success. In order to seize the transient opportunity in the market, they always directly jump to product integration based on customers' needs. As for research and the first few stages of development, they either license technologies or buy half-products from technological suppliers, after which their job is customization. In addition, research should generally be done by companies with deep

pockets. Companies like A which are relatively young and small cannot afford large amounts of resources to do research. Moreover, although they outsource even the key components, the whole product or services provided would still belong to A. Take energy meters as an example: The product design, framework and software are outsourced to a R&D company; IC chips, the core of energy meters are bought from suppliers. Thereafter, new features and functions are added to make up their own products, which are also the solutions to customers. Expertise lies in the solution to customers instead of technologies or components.

While taking considerable steps on the path of outsourcing R&D, A claims to have sufficient protection of their core competences, which rest with marketing and product integration. A good case is PABX. Panasonic and A are both major players in the market and the technical performances of their products are comparable. In order to compete against Panasonic with a better reputation, A tries to win the game based on their core competences. Panasonics sells PABX to a few of distributors who then sell PABX to end customers. Because the purchase is by installment, if some of the distributors disappear months later, Panasonics will lose their customers as well as money. Product design of PABX is purely done in house, where A integrates special software inside the product. Every month, the customers have to reconnect with A to obtain new passwords in order to keep the system running. As a result, there is no risk to lose customers and money. A also builds very close relationships with distributors. Hence, the competitive advantage is the full control of the design and distribution based on product integration and marketing. Even the technological supplier may take a step further into manufacturing, sales and marketing, A is quite confident with its marketing competence to win the competition.

The whole Philosophy in outsourcing activities of A can be comprehensively illustrated in the following figure.

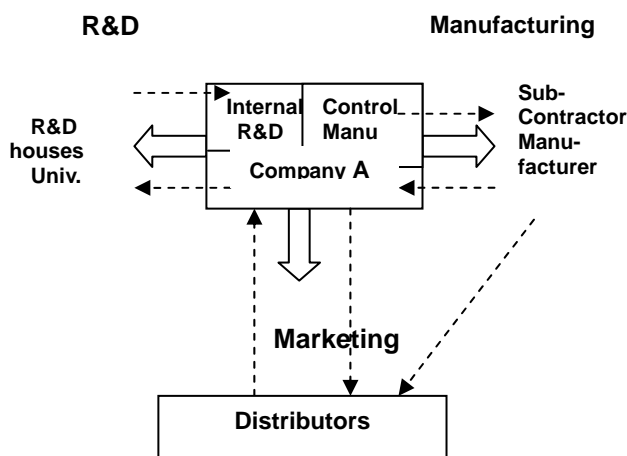


Figure 2 Philosophy of Outsourcing in Company A

As mentioned above, People of A have a good command of consumer needs in the CE market due to its long-term dedication to cultivation of marketing skills since establishment. Thus, they can detect the business opportunity and find the right R&D partner in a very prompt way. The internal R&D team is responsible for the product design and the final integration. They also guarantee the quality of components from suppliers. So does manufacturing. The key to maintain competitive advantages are marketing and high integration and control of R&D.

CASE TWO: SELECTIVE R&D OUTSOURCING IN COMPANY B

B is a multi-billion global leader in many leading areas including consumer electronics. Its CE sector covers various kinds of consumer electronics products such as DVD/DVD players, TV, audio equipments and some accessories like remote controllers. If we categorize all their CE products into the 4 types above, we can track their outsourcing activities in Figure 3. The four bars at the bottom represent TV, audio equipments, DVD/DVDR and accessories, respectively. The section in shadow means tasks fulfilled in house.

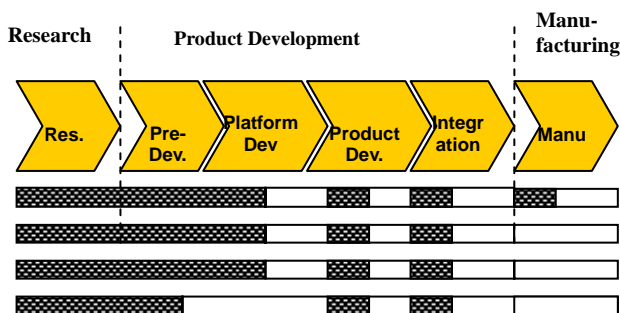


Figure 3 Outsourcing R&D in Company B

For all CE businesses, research is mainly done in house. For TV, predevelopment is carried out in house. Platform development, product platform, product integration and even manufacturing of Plasma TV with leading edge technologies involved are done completely within B. In contrast, CRT TV with mature and declining technologies is outsourced for these stages. The similar logic applies to audio equipments and DVD businesses. The non-core product such as clock radios and low end DVDs are outsourced from platform development onwards. For other core products, platform development, product development and integration are bound to do in house. For accessories, 20% of predevelopment are farmed out. In stages of platform development, product development and integration, some are done in house, some are purchased from suppliers.

Outsourcing R&D in B is based on the following reasons: To begin with, the vision and directional strategies constitute the foundation to answer the question of whether outsourcing R&D is a threat or an opportunity. In its future plan, B positions itself as a simpler market oriented organization and it also navigates from electronics towards healthcare and

life-style, thus further outsourcing of R&D becomes an inexorable trend. Furthermore, the selection of businesses and stages of R&D to farm out is a reflection of the product or technology life cycle. Take TV as an example. While CRT TV is out of date in most areas of US and Europe, it is still booming in some Asian market. On the contrary, Plasma TV is the high-end product that implies great potential in TV market all over the world. Hence, it's reasonable to outsource CRT to Asian TV companies but retain even manufacturing of Plasma in house.

Unlike A that builds its core competences partly on marketing, B's main core competences are focused on technology leadership. Therefore, they face tougher challenges in outsourcing R&D. They have been very careful to distinguish core from non-core technologies, and they only outsource mature and declining technologies while keep full control of emerging and promising technologies. But they do encounter the leakage of know-how and brain drain problems. Therefore, B developed a series of strategies to protect their core competences when outsourcing to or collaborating with others. Firstly, they carefully select the technological supplier which is either too small to compete with B or they choose to focus on what they are best without any intention to go further. Secondly, Non Disclosure Contracts (NDC) are required between B and suppliers. Thirdly, they make full use of branding. Hardly can any CE company owns a sound brand name like B. Fourthly, they try to break the whole R&D work down as much as possible, so that the supplier cannot foresee the whole picture. One piece of B's core technological competences cannot make impacting threats to B.

The overall plan for its High Tech Campus in B is shown in Figure 4. The main idea behind this open innovation model is to aggregate the strength of university research, research institutes and companies to create technological innovations for sustainability of B's core competences.

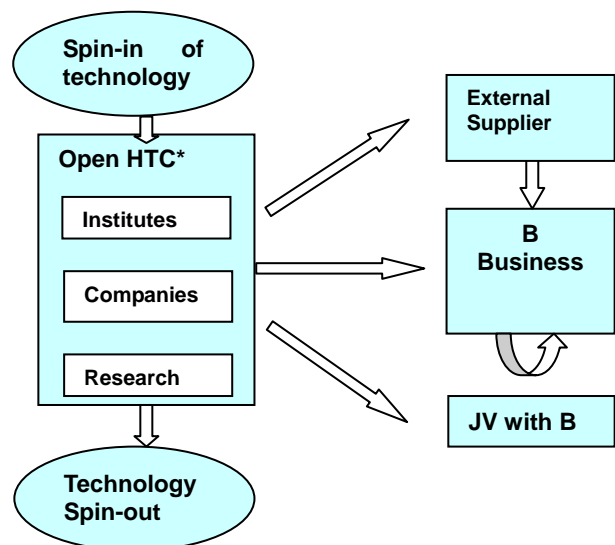


Figure 4 High Tech Campus (HTC) built by B

DISCUSSION

We have observed from the above cases: (1) They both outsource R&D activities but to different degrees. Company A outsources almost every stage in R&D except product integration because their core competences root in product integration instead of other stages. With technological strength as the key competence, B is very careful to draw the line between core and non-core technologies based on technology and product life cycle and outsource the latter to concentrate on R&D of the former. Hence, the extent of outsourcing R&D depends on their differential value proposition along the value chain, the nature and maturity of the technologies, and positioning of overall business direction. The fundamental knowledge structure and expertise of internal engineers also matter. (2) Outsourcing to different extent, they both firmly keep core competences in house and try every means to protect them by strategies such as selecting the right supplier, signing NDC, competing on brand names, decomposing R&D work into pieces, packaging outsourced parts as a black box to prevent reengineering and establishing exclusive B2B partnership. (3) They both agree nowadays, R&D is still valid as a competitive advantage in the CE industry and hence none of them outsources R&D up to 100%. However, marketing research and brand names are also integral parts of competitive advantages. (4) Comparison between local company A and global company B reveals that in terms of outsourcing R&D, B takes precedence over A in brand names and bargaining power with suppliers.

CONCLUSION

Management of outsourcing R&D is to facilitate the company to build its own distinctive capability for the future. If technologies leadership is the core competence, outsourcing R&D is viable only if it serves to fill the gaps of overall technologies portfolio. The key technologies should be done in house. In cases where other capabilities like marketing or branding are core

competences, outsourcing R&D is less risky. But companies still need to retain the core activities of product design and integration to take full control of R&D. With the above interpretation, there is no conflict between open innovation and core competence in outsourcing R&D. Future research is needed to further study how to manage outsourcing R&D if non-threatening technology suppliers are not freely available in the market.

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