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Overcoming Barriers to Open Innovation at Apple, Nintendo and Nokia

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***Abstract*—** This is a conceptual paper on the application of open innovation in three case examples of Apple, Nintendo, and Nokia. Utilizing key concepts from research into managerial and organizational cognition, we describe how each company overcame barriers to utilizing open innovation strategy in R&D and commercialization projects. We identify three levels of barriers: cognitive, behavioral, and institutional, and describe the companies balanced between internal and external resources to launch products that were instrumental in companies reinventing themselves in mature markets.

***Keywords*—**managerial cognition, open innovation.

I. Introduction

IN recent years, many companies have been able to reinvent themselves with successful research and development (R&D) projects. Traditionally marketing researchers and practitioners have tended to focus on the outcome of these projects, i.e. the product, as the savior of the company's business. However, there is much more happening under the surface that lead to the product to emerge from a R&D project.

Commercializing innovation is not only about managing R&D projects, but relates to more fundamental issues in how managers organize and run their business. Firstly, the way companies think about their business and customers have changed. When companies are operating in mature markets and faced with diminishing profit margins coming up with merely a new product is not sufficient [34], [13], [8], [30. Business success requires understanding of the customer's needs [19], [20], [23], [9], [10] and what role our offering plays in the lives of the customer [26]. A common business school teaching is that competitive edge derives from providing customers with superior value. So its not just the product, but what people do with the products that makes the difference. So basically everything a company does is a service the customer – companies merely provide people with tools to produce the added value themselves in co-creation with the firm. [31], [32]

Secondly, there are many avenues to success in business. Companies have different strategies, capabilities and resources. These resources and capabilities can be combined in various ways when implementing strategy [4], [16]. This resource-based view of the firm also emphasizes the dynamic capabilities companies must have to match internal and external resources in rapidly changing environments, R&D being an example of process entailing such capabilities [12], [19], [27]. Naturally, the external environment and competitive dynamics of the industry have an impact on strategy. But how do managers come up with strategy for innovations and commercialization? How do they carry out this strategy in through R&D projects? The question is not to ask merely what companies do, but also how they do it.

Though innovations can be incremental or radical, most successful companies find new ways to do things – a new twist or take on things. More and more companies are acknowledging that they cannot do things alone. Companies need to integrate outside ideas, research projects, and concepts into their own offering, thus acting on an open innovation fashion.

There are two drivers to open innovation. First, the best ideas don't necessary come from the people you have hired. But you can hire people who are in touch or sense the market and integrate external know-how and input into R&D and commercialization internal processes. The traditional resource-based view into a firm doesn't necessarily apply in today business environment. It can actually harm and hinder innovativeness. Secondly, companies need to focus on what they are good at and outsource what they cannot or need not do themselves.

II. Turning Great Ideas into Big Business

This article studies three companies that were able to reinvent themselves and their business. We compare three product development and commercialization projects that the companies carried out. Our aim is to compare and contrast success factors and pitfalls from these case examples.

The three companies and products included in this study are Nokia n-series, Nintendo Wii, and Apple iPod. Each project is distinctive and presents unique characteristics. Nokia for the global geographic dimensions of its R&D project, Nintedo for a cultural or experience marketing approach to its offering, and Apple for the inspiring leadership in the firm. Each firm respectively is different in creating an organizational culture encouraging exploration and innovation, and freedom to be creative.

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The main issues we aim to uncover in our case analysis are:

1. How are R&D projects initiated and carried out?
2. How are innovations commercialized?
3. What kind of barriers to open innovation can be identified and how do managers aim to overcome them?

III. Theoretical framework

This study contributes to the academic research stream of open innovation [5]-[7]. In order to further understand and describe the phenomena, we draw from central concepts of managerial and organizational cognition [17], [33], [24], [28].

Managerial and Organizational Cognition

Managerial and organizational cognition refer to both the individual and organizational level processes in a firm regarding shared beliefs on what makes a business success [17], [33], [24], [28]. In this study we focus on the underlying managerial and organizational cognition in strategies and activities related to commercializing innovation.

The dominant managerial logic in a firm defines how tuned it to recognizing the potential of an innovation. Managers are always carry their own set of biases, beliefs, and assumptions based on their previous experience. This defines how we feel about trends in technology, the marketplace, and how our companies should compete. These biases, belief, and assumptions define each manager's managerial logic. It's a mental model that sets the frame within each person looks for information and approaches problem solving. Naturally there is much competition in firms between different managerial logics. Usually one dominant logic emerges successful. It can be based on the technology, systems, strategies, organizational structure, and culture of the firm. [1]

The dominant logic is increasingly prevailing within a firm the longer the management has been working for the company and in the industry, and the more successful it has been. People tend to look for data only in certain places and have developed filters for analyzing information. Current management strives to maintain the status quo. [1] A psychological pitfall based on human cognition and heuristics is to surround oneself with "yes-men" [15].

Unless companies have generic variety in their management, the dominant logic may one day lead to crisis, as the company may fail to notice critical issues for its business [14]. It's not a question about having the wrong strategy, but not being able to change that strategy. Strategy is fluid and flexible [11].

The Nature and Management of Innovation

According to innovation research [1], there are five main themes that underpin how innovations become successful. Firstly, any competitive advantage a firm may have is lost if companies don't innovate. That is why, especially now in poor economic times, companies should strive to reinvent themselves in the markets, not just cut expenses and wait for better times.

Secondly, innovation doesn't relate only to technology. Especially industries with strong engineering backgrounds, leaving comfort zones of high tech and trying to understand customers can make a big difference. This can act as the basis of business model and service innovation. Innovation isn't necessarily something grandiose – it can be found in focusing on doing things regularly, every day, focusing on the essential, and learning by doing.

Thirdly, innovations always deal with change. It cannot be viewed from only one process perspective focusing on technological or project management issues. Innovations are about people, organizations, and culture.

Fourthly, new knowledge has to be put together in new and novel ways. Finally, strategies and new products don't usually fail because of poor ideas, but poor execution on them. As it has been defined in previous research [1],

Innovation is the use of new technological and market knowledge to offer a new product or service that customers will want

Managers constantly struggle to make the best use of the limited resources they have at hand. These decisions must be made under uncertainty, trying to find grains of truth sifting through vast amounts of data available [15]. It is crucial to understand what capabilities are needed in the R&D, and commercialization, processes. These capabilities can be divided into three categories. Firstly, these skills can be at the core of the firm's know-how, distinctive to the advantages the company has over other players in the market. Secondly, they can be critical, vital to the successful completion of a R&D and commercialization project. Finally, they can be contextual, where certain capabilities are needed in the process, but this is an abundance of those specific skill available in the company or the markets. [7]. Companies must identify what are their core competencies and keep them in-house. Critical capabilities can be arranged through selective partnerships with leading industry actors. For contextual skills, it is enough to have a long list of partners who can easily jump into projects and provide services in a reliable and cost-efficient manner.

Innovations are challenging both from a technology and market perspective. In addition to clear risks and challenges in the process and technology aspects of developing new products, envisioning the potential customers are, their use of the product, and the benefits these customers could gain from the product, are extremely difficult. Especially in situations where unproven technology is applied in markets and customer segments that don't even exist yet, it can be very tricky to estimate market potential from a sales perspective [6], [7]. Recent management literature suggests that company should be more inclined to put their ideas and products out on the market and further develop them with customers and other partners. The early feedback that is generated in this kind of activity is used to further experiment, adapt and adjust the offering. [22]

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Barriers to Innovation and the Concept of Open Innovation

Traditionally, companies have adopted a policy of closed innovation. This refers to an understanding that successful innovation requires control. Innovation is seen as something that must be kept in-house and the intellectual property generated through R&D is a trade secret. It can already be considered harmful if the competition finds out what kind of R&D activities in engaged in. Contrarily, open innovation refers to a strategy and business philosophy where companies actively seek ideas not only from internal but also external sources. Furthermore, the same approach can apply to commercialization, where alternative internal and external paths are considered. [6], [7]

Previous research to open innovation has addressed the management of R&D projects over distances and managing the work or co-operation of groups of people [3], [21]. Open innovation networks can be geographically dispersed. Initially, tensions derive from autonomy and control issues between headquarters and overseas locations, may they be subsidiaries or external laboratories. However, research shows that challenges most prominently relate to information-sharing issues. [2]

People will make or break innovativeness in firms. So controls what kind of people they have working for them and what these people do. According to Afuah [1] there are five main roles that people play in the process for recognizing the potential and commercializing innovations: idea generators, gatekeepers and boundary spanners, champions, sponsors, and project managers.

Our research into previous innovation, management, and marketing literature, as well as empirical evidence in different contexts shows that barriers to open innovation can be divided into three main categories:

1. Cognitive,
2. Behavioral, and
3. Institutional barriers

On a cognitive level we can analyze why managers don't even notice the need for innovation, but rather continue to run their business as before. Managers may not even realize the benefits of new products or approaches. A common managerial wisdom is that companies don't fail because they have the wrong strategy, but because they continue to implement strategy that used to be right.

On a behavioral level our interest is in the actions of managers. Managers may realize the potential and need for innovation, but don't act on it. This causes inertia in the organization holding back new ideas until they just fade away.

The challenge may lie in institutional factors. Employees are full of ideas, and have high hopes of making an impact in the world through in their work. Companies may even strive to innovative, at least in their strategy, but in practice the processes, management, and incentives don't support it.

Firms comprise dynamic capabilities that define the ability of a firm to recognize potential in innovations and commercialize them. This sets the competitiveness of a firm and defines how well it can sustain that competitive edge. This is referred to as absorptive capacity in previous studies [35]:

Absorptive capacity is viewed as a dynamic capability embedded in a firm's routines and processes, making it possible to analyze the stocks and flows of a firm's knowledge and relate these variables to the creation and sustainability of competitive advantage

We argue that there is a hierarchy in the three barriers to open innovation. People can't behave with out cognition. Managers can't expect desired behavior from employees, if people have not internalized the required values and norms. Institutions must support the desired innovative behavior. Other people get frustrated and leave or become lone rangers within the organization.

IV. Case Studies into Open Innovation Practices

As this is a conceptual paper, the case studies were conducted based on secondary data. Each case company – Apple, Nintendo, and Nokia – were facing challenges in their business at the time of the R&D and commercialization projects for their respective products – the iPod portable media player, the N-series multimedia computers (phones), the Wii console game.

The companies operate in mature markets, where breakthrough can often be made only by reinventing yourself and doing things with a new twist. In our analysis, we focus on the mechanism behind linking cognition to action.

Apple

Apple is often quoted to be famous, and proud, for not conducting market research. They hire the smartest people, the best talent. If they produce something that they are passionate about – something they love, then they are sure that people will follow them and buy the products. Thus, in Apple's case the main success factor in the R&D project was unlocking the innovation and dreaming ability of the development teams.

However, Apple did not do the iPod project alone. They outsourced certain elements from external sources, which enabled them to focus on the user interface and commercial aspects of the product.

From a commercialization perspective, the iPod product was integrated with a proprietary platform for distributing digital media content (iTunes). This requires interfunctional coordination, where all departments such as business development, R&D, manufacturing, marketing, and sales co-operate to find shared vision and make the business run smoothly.

Nintendo

In Nintendo's case the goal was to provide a new kind of gaming experience. The company decided to position itself completely different from the competition. When Microsoft's Xbox and Sony's Playstation were competing on who had the

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most advanced graphics engines, Nintendo decided to go against the traditional industry wisdom, and

Questioned how people actually want to play. They were able to introduce a new, communal aspect into casual gaming. This unique approach had been already tested with the handheld DS Lite gaming device. The company was able to attract females and families in addition to the traditional hardcore gamer segments of teenage and young adult males. The Nintendo project focused on integrating that customer understanding into creating an offering that provides a unique gaming experience.

Nokia

Nokia's N-series is interesting due to the geographically dispersed R&D project. It may be only natural, since the headquarters are located in Finland. Due to the peripheral location of the country, the company needs to locate know-how globally and spread innovation work to many different regions. Nokia's main aim is controlling efficiency and effectiveness in its R&D project.

From a managerial perspective, Nokia must combine internally generated knowledge with knowledge from other sources. Overcoming the "Not invented here" syndrome is crucial when the company's own engineers partner with external organizations.

Based on the results, we recognize that the case companies each follow distinctive strategies and can be categorized according to the value disciplines model of [29]. Their generic approaches to generating value to customers are explained in the table of Appendix 1. According to this framework, companies must choose one of these value disciplines and act upon it consistently and vigorously in order to be successful in business. The disciplines are

1. Product leadership
2. Customer intimacy
3. Operational excellence

Product leadership is manifested in very strong innovation drive and brand marketing. Companies utilizing this strategy operate in dynamic markets, where technologies and customer preference evolve constantly. To survive in this business, the focus must be on continuous development and commercializing innovation – even if it means killing your own product. Branding is often in the design of the products, and R&D and manufacturing processes are geared to improve time-to-market. Products have high margins since profits have to be made in a short timeframe.

Customer intimacy puts the customer at the center of the firms strategy and every day operations. Companies utilizing this strategy must excel in customer attention and service. Products and services are tailored to individual customers and small segments. The focus of operations is on customer relationship management. Companies must deliver products and services on time and above customer expectations. Reliability gets you close to the customer. The information customers share to service-providers they trust is crucial in developing products that are constantly cutting edge and provide superior value.

Operational excellence refers to developing superb operations and smooth execution often by providing a reasonable quality at a very low price. The focus is on efficiency and streamlining operations in supply chain management. The firm's offering needs now frills as the only thing that counts is volume in manufacturing and sales.

V. Conclusion

Our finding through the three cases into open innovation is that essentially it requires balancing internal capabilities and external resources. This refers to having core competence in management, R&D and commercialization Just being in touch with the markets and its development won't take companies anywhere, since managers need to act on the opportunities they face. Too much information can also be confusing and just asking what customers want is not always a good idea. Managers must have their own vision and understanding of how they aim to create value to customers.

Open innovation requires managers to identify what their core capabilities are and focus on that. In this research we identify three levels of barriers to open innovation: cognitive, behavioral, and institutional.

In Apple's case the focus is on the cognitive level. It is intriguing how they could match customers' true needs and expectations without using market research on the iPod. Though open innovation refers to relying also on external sources, the best ideas don't have to come from outside. In Apple's case, the CEO Steve Jobs' mindset and vision of the future sets the direction of the firm's creativity. They have all the skills and creativity they need for great ideas. The firm just has to unlock the dreaming capability of its people. When you have an understanding of where you want to go, then its just about appropriately selecting the necessary resources from outside to build a full pack.

Nokia focuses on the behavioral level. The interesting issue in their case is how they could build such an extensive global innovation network when developing the first N-series phones. On a cognitive level there are no great challenges. Everyone can understand the need for open innovation, since the headquarters and main research labs are in Finland. The only way to tap into the best engineering minds was to do it through partnerships. From a managerial perspective the focus has to be on overcoming the "Not invented here" syndrome. Essentially Nokia's R&D and commercialization management is about developing competitive advantage through process leadership. Resources are gained through sourcing and then combined with internally generated knowledge.

Nintendo's development and launch of the Wii gaming console can be defined as a socio-cultural invention. Innovation in Japanese firms tends to traditionally rely on incremental development. The strength is in improving on existing product platforms based on customer feedback. This

is due to the fact that Japanese companies strive to understand their customers and keep them happy by providing superior quality. In the case of Wii, Nintendo used the in-depth customer information and understanding to create a completely new kind of gaming experience. Wii redefines how people interact with a gaming device and others while playing.

In summary, we find that open innovation is contextual. In the three case studies presented in this paper, the companies were common in being able to reinvent themselves in mature markets and gain market share by launching novel products. Each company was able to do things with a new twist, not just competing with the old rules of the industry.

APPENDIX I

OVERCOMING BARRIERS TO OPEN INNOVATION IN THREE CASE FIRMS

	Cognition capabilities	Behavioral capabilities	Institutional capabilities
Apple iPod	*Culture of constant innovation and product/service leadership manifested in charismatic CEO → unlock dreaming and innovation in employees (Product leadership)*	Supplementing international capabilities with external resources, Apple focusing on user interface	Commercializing product and related service iTunes into proprietary platform (interfunctional coordination)
Nokia N-series	Shared understanding within management: Small and peripheral home market setting context for strategy and implementation	*Efficient and effective project management global R&D network (Operational excellence)*	Combining internally generated knowledge from several sources, overcoming "not invented here" syndrome
Nintendo Wii	Desire to provide customers a unique gaming experience, their own vision of what gaming should be like	Reinvent how people interact with gaming devices	*Integrating customer understanding into gaming offering, providing an experience, not technology (Customer Intimacy)*

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