

A New Perspective on the Innovator's Dilemma

– Exploring the role of Entrepreneurial Incentives

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Abstract

Why do entrant firms sometimes gain the upper hand under conditions of discontinuous technological change? Previous research on this topic has either looked at the role of established competencies and/or firm incentives to invest in a new technology. In this paper we explore an alternative explanation. Drawing upon evidence from the ongoing transition from CCTV to digital, IP based video surveillance, we argue that entrant firms may be more prone to act entrepreneurially, i.e. more inclined to proactively create or transform markets and build ecosystems. As new technologies frequently require altered behaviour among customers and stakeholders, this capability is sometimes critical in order to succeed in a technological transition. Our contribution therefore lies in pointing out that not only may incentives to allocate R&D resources differ among entrants and incumbents, firms might also have different incentives to engage in entrepreneurial activities of creating or transforming markets.

Keywords: Disruptive Innovation; Entrepreneurship; Incentives; Technological Discontinuities; business model, ecosystem.

1 Introduction

A large body of research has addressed how and why incumbent firms are displaced by entrants under conditions of discontinuous technological change (e.g. Cooper and Schendel, 1976; Sandström, 2013). The recent bankruptcy of Eastman Kodak is by and large related to the transition to digital photography. Likewise, Nokia's decline as the dominant cell phone manufacturer is related to the transition to smartphones, and the related emergence of mobile phones as platforms with a surrounding ecosystem of software. The rise of ride-sharing services such as Uber has had similarly disruptive effects for the established taxi industry (Laurell and Sandström, 2016).

Broadly speaking, this literature boils down to two overarching categories of barriers that explain why incumbents often fail to allocate resources to innovative projects: internal factors, e.g. hard to change routines and competencies (Tushman and Anderson, 1986); and linkages to markets, e.g. dependence on customers (Christensen and Rosenbloom, 1995).

These explanations tell a strategic management story of top managers whose job it is to predict the revenue potential of new technologies and make resource allocation decisions accordingly. The gist of the story is that various factors internal and external to the firm combine to produce very different incentives, among entrants and incumbents, to make such allocation decisions.

While insightful and useful, we argue that this story is incomplete and that it is also instructive to analyze incumbents' reactions to radically new technologies in terms of their incentives to transform markets and build ecosystems. Specifically, a more complete story --- one that hints at alternative ways to lift the curse and resolve the dilemma --- must not only focus on incentives to allocate resources; it must also consider how and why firms act entrepreneurially. Entrepreneurship is here defined as the pursuit of creating or transforming markets (Dew et al. 2008).

The purpose of this paper is therefore to explore how entrants and incumbents differ in their ability to transform markets. In order to do so, we address the following research question: are entrant firms more capable of acting entrepreneurially under conditions of technological change, and if so, how can this be explained? We approach this research question through an in-depth case study of an entrant firm in the video surveillance (CCTV) industry. In the ongoing shift from analog CCTV to digital Internet (IP) based surveillance, this entrant has grown significantly and toppled incumbent firms. While this firm arguably possessed different competencies and had different incentives to invest in R&D, the case study also illustrates that IP video has imposed significant changes to the use of surveillance products. The studied firm has had an instrumental role in proactively transforming the market and as a consequence, competitive dynamics have been altered to its favor. The creation of an ecosystem of both software developers and integrators has been pivotal in altering the logic of the CCTV industry.

To foreshadow our conclusions, we find that the same factors that influence resource allocation decisions also affect a firm's incentives to create and transform markets, albeit in different ways. For example, new technologies often require altered behavior on behalf of customers, end-users and other critical stakeholders in order to be adopted. Here entrants might be at an advantage since their capacity to act, both on a firm strategic and interpersonal level, is less embedded and less constrained by existing relations and thus, they seem to have

more incentives to redefine markets and build ecosystems. Through these efforts, they can change the competitive logic of an industry and thereby leapfrog dominant incumbent firms.

The paper is organized as follows. The next section reviews existing literature on incumbent failure and discontinuous technological change. Subsequently, the employed method is described. The following sections contain a case description, along with an analysis and discussion. Eventually, a conclusion is provided.

2 Explanations of incumbent response to technological change

There is abundant research on how and why entrants displace incumbents when an industry undergoes discontinuous technological change. This literature can be divided into two broad categories. The first concerns firm-internal factors such as routines and competencies. The other, which is currently more in focus, highlights linkages to external resource providers.

Hard to change internal competencies

Starting with literature on firm-internal factors, much attention has been devoted to the role of competencies and whether those retain their value under technological discontinuities. The resource based view of strategic management emphasizes the development of hard to imitate resources and capabilities as central to sustainable competitive advantage (Grant 1991, Hamel and Prahalad, 1990). However, if the knowledge and mindset required to develop and exploit a new technology differs significantly from those needed to benefit from the previously dominant one, entrant firms are often better positioned to benefit from a technological discontinuity (Tushman and Anderson, 1986). Under such conditions, historically valuable competencies and assets (Leonard-Barton, 1992; Tripsas, 1997) and a strong organizational identity (Tripsas, 2008, Kaplan and Tripsas, 2008) can quickly become liabilities precisely because they have been optimized for the wrong task.

Dependence on external resource providers

Another stream of research has explored how external resource providers affect firm behavior. Grounded in the open systems view of the resource dependency theory (Pfeffer and Salancik, 1978), this tradition argues that competence destruction is not the most important determinant of whether entrants succeed or not. Instead, an established firm's decisions to allocate resources to innovative initiatives are critically influenced by those external actors supplying it with necessary resources to survive. Specifically, an incumbent is dependent on existing profitable market segments (Christensen and Bower, 1995). Hence, an asymmetry of incentives might occur where it is irrational for incumbents to invest in a new technology as they face higher opportunity cost (Christensen, 1997).

While this stream of literature has become increasingly popular, it has maintained a somewhat static perspective on markets. The market is assumed to be comprised of a set of segments of users (low-end, high-end or a new market) with a set of predefined preferences (Sandström et al., 2014). Entrants and incumbents then act as servants to these different needs and depending on their incentives, they address different markets. Several of the original empirical descriptions used to build this argument were cases of rather unambiguous technologies with regard to performance and usage (e.g. disk drives and steel mini-mills). Other technologies might for their successful adoption require new constellations of actors, new value propositions and altered customer behavior.

Building on previous work on disruptive innovation, some scholars have pointed at other explanations of the competitive outcome under conditions of discontinuous technological change. Similar, albeit not identical terms have been used by many researchers in order to underline the importance of how firms relate to the market. These include customer competence (Danneels, 2004), transformational experience (King and Tucci, 2002) and expeditionary marketing (Kassiech et al., 2004). This line of reasoning was further nuanced by Dew et al (2008), who argued that the key differentiating property and determinant of entrant or incumbent success is related to a firm's ability to act entrepreneurially, i.e. to create new markets or transform existing ones. According to the authors, the main challenge is therefore not a matter of resource allocation or timing of entry, but of ability to create and transform markets. As new technologies frequently drift into a socio-economic context through mutual adaptation of market and technology (Ciborra, 1997; Holmström and Stalder, 2000), the incentives and abilities to drive such processes can be expected to influence the competitive dynamics between entrants and incumbents. More recent work has provided empirical illustrations of this pattern, for instance in the case of fashion journalism (Laurell and Sandström, 2014), ride sharing services (Laurell and Sandström, 2016) and in financial exchanges (Ernkvist, 2015). Still, a better theoretical understanding of the underlying causal mechanisms is needed.

In sum, much research has been devoted to how internal competencies and external resource providers influence a firm's resource allocation processes. Less attention has, however, been given to how incumbents and entrants differ in their abilities to proactively transform the environment. Some authors argue that the way incumbents and entrants relate to markets is central, with some explicitly drawing on entrepreneurship theory to discuss abilities to create and transform markets. While an interesting perspective, further theoretical and empirical insight into how entrants and incumbents relate to the environment is still needed.

3 Method

In order to explore the topic explicated above, a single case study approach was chosen. When trying to build new theory rather than testing established hypotheses, case studies are often used, since they enable a detailed description of causal mechanisms not dealt with previously (Eisenhardt, 1989).

The studied firm and the video surveillance industry were targeted for a number of reasons. First, it is currently undergoing a technological discontinuity where analog CCTV is being replaced by digital video cameras (IP video) that are connected over the internet. While analog technology still holds considerable market share, IP video has grown at an average rate of more than 25 percent since the mid 2000s. By 2015, IP cameras made up some 70 percent of total revenue. During the studied time period, analog manufacturers were shifting to IP, but interestingly, the technology shift has primarily been driven by entrants such as the studied firm Axis Communications.

Axis is particularly interesting as it pioneered IP video, launching the world's first camera in 1996. It was the undisputed market leader in IP video during the studied time period and became the largest video surveillance camera manufacturer in 2011, toppling analog incumbents such as Pelco and Bosch. Founded in 1984, Axis has a background in the IT industry and has historically developed print servers and other IT products related to network connectivity prior to entering the video surveillance industry. The case is of special interest also as the company has met a lot of resistance and has actively tried to change the market since IP video requires significantly altered user behavior. After more than a decade of double digit growth and gaining dominance in the security industry, Axis was acquired by Canon in 2015.

In order to gather information about the firm and the industry, several sources of data were collected. Semi-structured interviews were conducted with nine key employees who have been working with business development and R&D for a long time. The questions concerned challenges the firm has encountered when introducing IP video and how it has gone about when transforming the industry. Each interview lasted for about 90 minutes. Notes were taken by the researcher and the interviews were also recorded in order to allow for subsequent validation of the notes. Several interviewees have read the interview documentation and been asked to confirm the interpretation of the data.

In addition to field interviews, extensive secondary data has been gathered and reviewed. These include annual reports, white papers, books about IP video and market research concerning the industry. While the authors have no formal ties to the studied firm, a close contact with parts of senior management has been maintained over the past years, primarily resulting in knowledge exchange. Through frequent exchange of emails, MSc thesis work at the company and regular meetings, a broader contextual knowledge has also been obtained. The case description below emerged when all these sources of data had been combined. Through follow-up emails and conversations, the empirical description could be validated.

4 Case Description

The video surveillance industry is currently experiencing a shift from analogue CCTV to digital, IP-based cameras connected over the internet. For a long time, IP video offered lower image quality, but lately it has surpassed analogue technology along this dimension with the rise of megapixel cameras and HDTV quality in 2007-2008. At the same time, the technology has brought several new performance dimensions to the market. For instance, IP video is easier to integrate with other information systems, it is much easier to expand the system, and images can be viewed from any place that has access to an Internet connection.

The first IP-based video camera was developed at Axis Communications in 1996 by two engineers, Carl-Axel Alm and Martin Gren. Unlike webcams for consumers, an IP camera has its own web server and does not need to be connected to a computer. In the beginning, IP video cameras were often simply referred to as 'Axis cameras' since Axis was the only significant provider of such products. In the years 2000-2007, IP video grew about 40-50 percent annually, albeit from very low levels and had captured 15 percent of the surveillance market

in 2007. In 2012, 40 percent of the market had shifted to IP and this figure continued to grow in the following years. Up until the shift to IP video, the CCTV industry had remained stable for several decades. CCTV is a standard that comes from the 1950s and the industry had been dominated by such firms as Panasonic, Pelco and Bosch.

As demonstrated in Table 1, incumbent firms have failed to dominate the new technology in the same way as they did with CCTV. Clearly, some incumbents have successfully grabbed market share in IP video, but Axis has remained the undisputed leader with a market share around 30 percent in 2006-2011 whereas number two (Sony) only had about 15 percent for several years. Outside the top five list in the IP video category there are several entrant firms such as Acti, DVTEL and Vivotek.

Market share	2006	2007	2008	2009	2010	2011
1	Axis	Axis	Axis	Axis	Axis	Axis
2	Sony	Sony	Sony	Panasonic	Panasonic	Panasonic
3	Panasonic	Panasonic	Panasonic	Sony	Sony	Sony
4	Mobotix	Mobotix	Mobotix	Mobotix	Mobotix	Hikvision
5	D-Link	Panasonic	Panasonic	Panasonic	Bosch	Mobotix

Table 1 contains the top five vendors of IP-based cameras 2006-2011.

As can be seen in Table 2, the shift to IP has also implied changes in industrial leadership. Most notably, Axis has climbed from number 8 in 2005 to being the largest supplier of video surveillance cameras in 2011. At the same time, some analogue incumbents such as Panasonic have thus far sustained a strong position while others like Pelco and Bosch have clearly lost market share to entrant firms.

Market share	2005	2006	2007	2008	2009	2010	2011
1	Panasonic	Panasonic	Panasonic	Panasonic	Panasonic	Panasonic	Axis
2	Pelco	Pelco	Pelco	Pelco	Axis	Samsung	Panasonic
3	Bosch	Bosch	Axis	Axis	Pelco	Axis	Samsung
4	Sony	Axis	Bosch	Bosch	Bosch	Bosch	Hikvision
5	Honeywell	Sony	Sony	Sony	Samsung	Pelco	Pelco

Table 2 provides the top five vendors of video surveillance cameras (both analog and IP) 2005-2011.

4.1 The shift to IP video and Axis Communications

From the launch of the first IP video camera, Axis Communications has dominated this technology and remained the number one supplier of network cameras. As can be seen in Figure 1, revenues and profits have increased significantly over the last decade. The number of employees has risen from 421 in the year 2000 to 1403 by the end of 2012. In the late 1990s, Axis invested extensively in bluetooth technology and explored several business areas, one being video surveillance. As the promises of bluetooth failed to materialize the firm suffered financial losses, had to emit new stocks and become a publicly listed company in order to survive. As video sales started to take off in 2002-2003, the company made a deliberate strategic decision to focus on video surveillance.

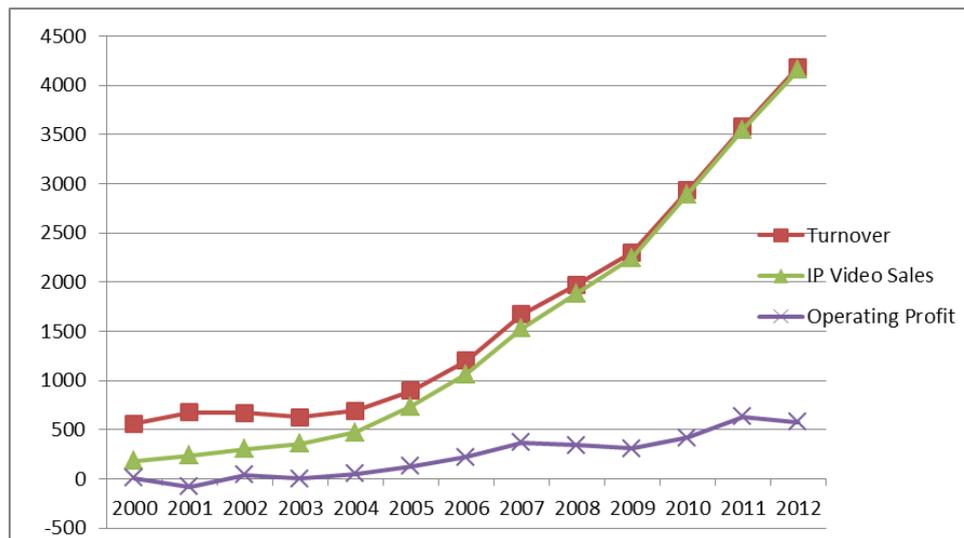


Figure 1 illustrates turnover growth, IP video sales and operating profit for Axis Communications 2000-2012.

Founded in 1984, Axis had a background developing print servers and other products aimed for increased connectivity. Regardless of product area, its business model has remained the same over the years and is based upon a couple of common denominators. Axis doesn't sell directly to end users and works together with many different partners, who integrate systems, act as distributors, develop software and sell various services. The business model seems to be very flexible – the firm makes money primarily on hardware but also to some extent on video management systems. The partners in its network are free to develop their own ways of making money using both the company's products and its competitors'.

Throughout the shift to IP, Axis has often used standards and notions from the consumer electronics industry, partly in order to increase familiarity and gain legitimacy for the new technology. As the image quality of IP cameras improved over time, Axis has sought to communicate those benefits by introducing megapixel quality and subsequently HD quality, standards that are widely known. The introduction of HD quality in 2008 eventually forced analogue incumbents to form an industry group around HDCCTV where they tried to imitate digital technology and state that analogue surveillance could also offer HD quality.

While IP video and Axis has grown exponentially over the last decade, the technology has met a lot of resistance, for a couple of reasons. When installing an IP-based system, surveillance becomes more of an IT issue than a traditional security concern. Historically, the security industry has been characterized by a business logic that is very different from the logic in the IT industry. The security industry used to have limited price transparency throughout the supply chain and people who worked in the industry often had a background in the military or in the police. These actors had been used to doing business based upon strong relations. Integrators and distributors of IT products, on the other hand, are used to higher price transparency and weaker ties between actors. Additionally, integrators of CCTV had a particular set of skills, primarily related to using co-axial wires and other analogues equipment. They did not command IP as the competence related to installing and maintaining such a system is significantly different. Another problematic issue has been the fact that security managers lose power vis-à-vis IT managers inside the customer organizations and therefore they have been reluctant to adopt the new technology.

4.2 Driving the shift to IP video

The introduction of IP video thus had far reaching implications for most actors in the security industry and it has for a long time been regarded as controversial. In order to drive the shift from CCTV to IP video, Axis thus had to transform the industry towards more of an IT logic. The firm has sought to do so in a couple of different ways.

Firstly, it is interesting to note that increased competition was for many years not primarily thought of as a threat but rather a way to obtain more legitimacy for IP video. In 2006, CEO Ray Mauritsson stated in Axis' annual report that *"increased competition is generally a positive development as more actors are now driving the shift from analog to digital technology"*.

Axis has also sought to mobilize partners in order to drive the shift towards IP. Its Application Development Partner program (ADP) was launched in 2000 and aimed to build relations to software developers who could

make applications to be used in the digital cameras. Two years later, a Channel Partner program was initiated where distributors, integrators and consultants could sign up to become a Partner. Table 3 shows that the amount of partners has grown significantly since 2004, fuelling Axis' growth and market coverage.

	Number of Application Development Partners	Number of Channel Partners
2004	200	2000
2005	280	6000
2006	400	10000
2007	450	14000
2008	650	24000
2009	750	30000
2010	800	35000
2011	900	45000

Table 3 shows the amount of Application Development Partners (ADPs) and Channel Partners for Axis Communications 2004-2011.

A channel partner can buy Axis cameras at discount prices and receive support, both technically and when it comes to sales related to larger installations. There are three different categories of partnership: Authorized, Silver and Gold. In order to become a Silver Partner, you need to complete the first level of training at Axis Academy and to become a Gold Partner, you need to have done the second level as well, while also having showed strong business results. Axis Academy was started in 2005 and aims to educate integrators and other partners about the usage of IP video. Axis does not primarily regard this as a source of profit, but rather as a way to drive the shift to IP as competencies need to be renewed in the security industry. *“They won't know everything about IP surveillance from a one-day session, but they know much more and can learn more”*, a company representative comments. By 2012, more than 30 000 people had taken part in these training sessions.

Initially, the studied firm sought to handle the aforementioned conflict between IT and traditional security by building separate channels according to the logic described above. They even sought to communicate the different logic by selling black products in the security channel and white or light grey products in the IT channel, as these colors are usually associated with the different industries. But at that point (1999-2001) the technology was still inferior in many respects, and hence the security industry saw little benefit in adopting the new technology.

The IT industry, on the other hand, had been hit by the dotcom-bubble in 2001-2002 and there were plenty of skilled persons looking for jobs. The studied firm has therefore chosen to focus on an IT channel approach, and has grown significantly by doing so. As the technology has evolved, the traditional security industry has become more interested in IP video and come back to the firm. But when doing so, they had to follow the IT logic, based upon weak ties and price transparency.

The power and knowledge of security managers has continued to be a challenge for the studied firm. Axis has undertaken a couple of measures in order to deal with this issue. For instance, it initially targeted IT managers. One company representative said: *“It was easier to find an IT manager with an increased need of security than a security manager with an increasing need of IT”*. Additionally, the firm has sought to create a broader interest for IP video inside the customers' organizations by being involved in many different marketing activities. It has put advertisements in the security industry press, released white papers comparing IP video and CCTV, published books on IP video and released more than 500 small customer case studies where the benefits of the technology are communicated. The studied firm does not normally know exactly how and where decisions are taken inside the customer organizations, and has therefore chosen to target a wider set of actors, thereby hopefully creating an internal pressure to go for an IP-based system. It often tries to get the IT and security managers to attend the same meeting and reach an agreement.

According to respondents at the studied firm, one reason why the incumbents have so far lagged behind in IP video appears to be that they do not know how to approach customers with it. The logic of selling to IT departments is new to the industry and the analogue players are not used to doing so.

5 Analysis

The empirical data above shows how an entrant firm, Axis Communications, has both pioneered IP video surveillance and become the market leader for video surveillance, toppling incumbent firms like Panasonic, Bosch and Pelco. There are several different factors that together explain why this has happened, some of which are well documented in previous literature. Competence destruction (Tushman and Anderson, 1986) is arguably one such factor. With the shift to IP, the capabilities needed in order to develop a camera have changed. Knowledge about IP protocols and networks, image sensors and other digital technologies has to an extent replaced the knowledge required to create an analogue CCTV camera. With a background in print servers and IP network connectivity more generally, Axis probably had capabilities that were better suited for developing IP cameras than an established firm like Pelco.

Axis was probably also in a favorable position as it had other incentives to invest in IP video than analogue incumbents. Despite being threatened by IP video, the market for analogue CCTV has grown significantly over the last decade, primarily due to 9/11 2001 and an increased security awareness in the Western world. Hence, analogue incumbents were enjoying increasing revenues from its core business and therefore had little incentives to make significant investments in IP video. Having been hit by the dotcom-bubble and invested too much in Bluetooth, Axis was by the early 2000s trying to divest unprofitable business areas, focus its efforts and return to profitability. In the year 2000, Axis was one out of very few firms offering IP surveillance cameras and this business had a turnover of 181 MSEK, up 270 percent from the previous year. Hence, there seems to have been an asymmetry of incentives making it more rational for Axis to focus its efforts on IP video. Being relatively small and financially wounded, the firm had strong incentives to develop IP cameras whereas analogue incumbents already had a large, established and growing market making it seemingly irrational for them to bother about IP video.

The empirical description is therefore consistent with two important explanations of incumbent failure and entrant success. The shift to IP video was arguably competence destroying (Tushman and Anderson, 1986) and also disruptive (Christensen, 1997) in the sense that incumbents had little reason to invest in IP as they were captivated by their existing market which was still growing. Important as these two explanations are, they do not tell the full story about Axis rise to industrial leadership. While not denying the importance of factors such as competencies and incentive asymmetries with regard to R&D investments, the empirical description suggests that those theories can only partially explain the success of Axis and the failure of incumbents. Axis did not only possess different competencies and incentives than incumbents, the company has also transformed the video surveillance industry and seems to have obtained a competitive advantage from doing so. Below, we point out a complementary explanation of entrant success by arguing that Axis also had entrepreneurial incentives, i.e. incentives to transform the market.

5.1 Entrepreneurial action and technological change

The data above shows that IP video was largely incompatible with competencies and behaviors in the established security industry and that Axis had to proactively change the industry in order to successfully diffuse the technology and obtain a leading position. IP cameras were sold through new channels, with full price transparency, their installation required different competencies and they distorted the power balance between IT and Security managers in the end customer's organization.

As demonstrated in Table 3, the firm has built an extensive ecosystem of both software developers and integrators to transform the industry. Some of these firms had a background in the IT industry and gradually, more firms from the traditional security channel have become partners. The educational program, Axis Academy has also played an important role in mobilizing partners and changing established practices in the security industry. Moreover, it is interesting to note that Axis' CEO did for many years not primarily regard increased competition as a threat, but as a way to gain increased legitimacy for IP video. The main objective in these years seems to have been to transform the industry.

It is clear from the description above that Axis acted entrepreneurially in the security industry. Rather than aligning itself with existing norms and practices, the firm has transformed the market to its own favor, for instance by using standards from the consumer electronics industry and by educating the market. In doing so, Axis has leapfrogged analogue competitors who now have to compete in a different setting. As incumbents are used to acting according to the previous market logic they are now trying to catch up and compete under circumstances they are poorly adapted to. Why has an entrant firm like Axis enacted those changes? We expand upon this issue in the next section.

6. Discussion

The dominant explanations of why entrants displace incumbents when an industry undergoes discontinuous technological change have focused on hard to change internal capabilities and dependence on external resource providers. While embeddedness in value networks is sometimes mentioned (e.g. Christensen 1997), this perspective has never achieved similar status among scholars. However, the case of Axis and the transformation of the video surveillance industry clearly shows the value of affording the role of network embeddedness central explanatory status. This is especially true when examining the innovator's dilemma through the lens of entrepreneurial action (Dew et al. 2008). In what follows we will therefore discuss how internal capabilities, external resource dependencies, and network embeddedness combine to produce very different incentives in entrants and incumbents with regard to entrepreneurial action.

Entrepreneurship is commonly defined as the pursuit of opportunities that are deemed desirable and feasible without regard to the resources and capabilities that are currently controlled (Stevenson and Jarillo 1990). New entrants have few resources and capabilities that induce inertia, or if they come from another industry they have a different set of skills. Consequently, entrants are freer to pursue visions and engage in entrepreneurial experimentation.

Being independent of a dominant customer segment, entrants are also more inclined to interact with multiple potential customers. Indeed, the lack of (and search for) an existing revenue generating customer base is a central activity of entrepreneurial firms, which implies that entrants are more likely to engage in rapid and broad experimentation with their business models—including offering, customer segment, revenue model, distribution etc.—in order to find paying customers before running out of cash. As a result, the resource dependencies of entrants compared to incumbents also provide a clear difference in entrepreneurial incentives.

Another explanation of the incentive asymmetry is arguably related to how firms depend on relationships with actors in their environment for critical resources. However, in addition to customers and financiers, incumbents are embedded in a broader network of external actors—e.g. suppliers, distributors, and strategic partners, as well as unions and regulators—with which they have cultivated relationships that allow them to sustain their business model (Christensen 1997). Since such external actors are beyond the formal control of the firm, they are inherently unreliable. To increase the predictability of such relations, firms often establish close and interdependent ties that effectively constrain the autonomy of both (Dubois, 1998). Consequently, an incumbent that wishes to actively pursue a new technology by developing a new business model that alters the established system, is likely to be opposed by one or more actors (Berglund and Sandström, 2013).

While incumbents are constrained by their networks, this is not true for entrants. Indeed, a central task of innovative entrepreneurial firms is the creation or transformation of markets; an activity where establishing and aligning a network of actors that supports a profitable business model is central (Santos and Eisenhardt, 2009). Being relatively unconstrained by pre-existing resources, capabilities and customers, entrants are able to enlist an expanding network of customers, suppliers and partners in a process of re-shaping the environment (Berglund 2007).

With a background in the IT sector, Axis had developed a business model based upon selling via distributors, working with open interfaces and co-creating value with partners. As a partial outsider with a different set of capabilities, the company had more incentives to transform the security industry. While it has taken considerable effort to reeducate the industry and adapt it to digital technology, Axis had more incentives to engage in these activities than incumbent firms who had already fine-tuned their relationships to the analogue technology. Conversely, Axis had little incentives to adapt its business model to the traditional security industry as doing so would have required significant changes on its behalf. The firm therefore instead changed the security industry to suit its business model, i.e. Axis acted entrepreneurially. In doing so, the company built an ecosystem of software developers and system integrators, which in turn provided them with a competitive advantage versus incumbent firms.

Summarizing the above, we argue that the effects of internal capabilities, external resource dependencies, and network embeddedness combine to provide an explanation of entrant success and incumbent failure under conditions of discontinuous technological change which rests on asymmetric incentives to act entrepreneurially. Previous research in relating technological discontinuities to markets have by and large assumed that markets are pre-defined and static (Sandström et al., 2014), with some pointing to the importance of entrepreneurial action (Dew et al., 2008). This article therefore contributes to literature on technological discontinuities and incumbent failure by pointing out that entrant firms might have more incentives to act entrepreneurially, especially when new technologies require altered behaviors and skills among several actors (Ciborra, 1997).

Revisiting contemporary cases of incumbent failure such as Eastman Kodak and Nokia, the notion of entrepreneurial incentives would shed some new light on the decline of these firms. In the early stages, these

firms were entrants who had to change and redefine established markets and customer preferences in order to grow. As their respective markets matured, these firms became less inclined to act entrepreneurially. When Apple entered the cell phone industry with the iPhone in 2007, they had more incentives to transform the market due to their background. Having launched iTunes previously and built the required set of competencies, Apple was more motivated to transform the industry and could thus displace Nokia. Further research into these cases and the role of entrepreneurial incentives is welcomed. More generally, the topic of entrepreneurial action and technological change merits further research, especially since this paper rests upon one exploratory case study.

7. Conclusion

This paper has explored how entrants relate to the surrounding environment when an industry undergoes a technological discontinuity. Our findings from the ongoing shift from analogue CCTV to digital, IP-based video surveillance suggest that entrant firms may displace incumbents since they have more incentives to act entrepreneurially, i.e. to create new markets or transform existing ones.

The studied firm, Axis Communications, had a background in the IT industry and invented the first IP surveillance camera in 1996. Axis has exhibited a very high growth rate over the last decade and became the world's largest provider of surveillance cameras in 2011, toppling incumbents such as Panasonic, Pelco and Bosch. Our findings suggest that Axis has transformed the CCTV industry and in doing so it gained a competitive edge vis-à-vis incumbents.

Based upon this empirical description we add to the literature on entrant-incumbent dynamics and technological discontinuities by arguing that entrant firms may have different incentives to act entrepreneurially. As incumbents posit competencies that are aligned with the previous technology, as well as being embedded in an established actor constellation, they have little incentives to transform the market. This incentive asymmetry is arguably an important explanation of entrant success, especially when a technology requires altered behavior and new actor constellations. Our conclusions are therefore different from the ones advocated by previous research, which broadly speaking has argued that entrants either posit different competencies or incentives to invest in R&D. In contrast to this work, we argue that entrants might have more incentives to transform markets.

As stated previously, it is hard to draw general conclusions from a single case study. We therefore encourage future research to further explore how entrants and incumbents differ in terms of inclination to act as entrepreneurs.

7 References

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