Incumbent firms and Response to Disruptive Innovation through Value Network Management
Lessons from Eastman Kodak’s failure in the digital era

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Abstract

Title: Incumbent firms and Response to Disruptive Innovation through Value Network Management - Lessons from Eastman Kodak’s failure in the digital era

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Background

The question of why incumbent or established firms get into difficulties when they are faced with disruptive innovations has been extensively researched and discussed by many authors. Many explanations given for such failure seem to take “inside-out” approach by focusing on problems of organizational inertia, complacency, lack of insight and incompetence. On the other hand, Christensen’s (1997; 2003) explanation takes an “outside-in” approach by focusing on the role of established firms’ value network, particularly mainstream customers, as a determining factor to what incumbent firms can and cannot do.

Purpose

(i) Examine comprehensively the impacts of the value network on the incumbent firms when they are challenged by the arrival of disruptive innovations; (ii) Developing a model for the incumbent firms to recognize and manage effectively changes occurring in the value network in the face of disruptive innovations; and (iii) Gain a new insight into Kodak’s failure in the reign of digital technology from the value network management perspective.

Definitions

Disruptive Innovation: Disruptive innovations in this study are considered as new products based on new technologies and which provide different attributes or product characteristics than what the company’s mainstream or established customer segments historically value, while at the same time bringing new performance attributes to the market.
**Value Network**: Value network is the context or environment within which a firm identifies and responds to customers’ needs, solves problems, procures input, reacts to competitors and strives for profit.

**Results**

A Value Network Management model is developed for the incumbent firms to recognize and manage effectively changes occurring in the value network caused by the arrival of disruptive innovations. More specifically, the model aims at helping firms to overcome insight and action inertia and to choose the right partners among various new actors entering the value network. This model is iterative in essence and incorporates steps of searching/scanning, value network analysis and partner selection on the basis of appropriate role selection in the value network.

**Key words**: Disruptive Innovation, Value networks, Value network structure, Inertia, Repositioning, Digital revolution.
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# Table of Contents

**Acknowledgements** ........................................................................................................ iii

**CHAPTER 1. INTRODUCTION** .......................................................................................... 1  
1.1. Background .................................................................................................................. 1  
1.2. Problem area ............................................................................................................... 3  
1.3. Research purpose and research questions .................................................................. 4  
1.4. Scope and Limitation ................................................................................................. 5  
1.5. Contributions and Target Group .............................................................................. 6  

**CHAPTER 2. METHODOLOGY** ......................................................................................... 7  
2.1. Research Design ........................................................................................................ 7  
2.2. Research Approach ................................................................................................... 7  
2.3. Research Reasoning .................................................................................................. 8  
2.4. Data collection .......................................................................................................... 9  
2.5. Reliability .................................................................................................................. 10  
2.6. Validity ..................................................................................................................... 11  

**CHAPTER 3. THEORETICAL FRAMEWORK** .................................................................. 13  
3.1. Disruptive technologies and disruptive innovations ............................................... 13  
3.2. Value network .......................................................................................................... 15  
3.2.1. Value network in Christensen’s theory of disruptive innovation ......................... 15  
3.2.2. Value network in other literatures ....................................................................... 17  
3.3. Similar concepts to value network .......................................................................... 18
3.3.1. Business Ecosystem ........................................................................................................18
3.3.2. Industrial Network Approach .......................................................................................19
3.4. Disruptive innovations and changes in the value network ...........................................21
   3.4.1. Changes in the value network structure ..................................................................23
   3.4.2. Changes in incumbent firms’ position within the value network ............................24
3.5. Challenges related to changes in value network ..............................................................25
   3.5.1. Change recognition and Initiation of response to change ......................................26
   3.5.2. Reaction/Response to changes in the value network .............................................29

CHAPTER 4. KODAK CASE STUDY DESCRIPTION ................................................................34

4.1. Kodak from 1880s to late 1970s .......................................................................................34
   4.1.1. Kodak – As a Disruptor of its time .....................................................................34
   4.1.2. Kodak’s Strategy and Business Model .................................................................35
   4.1.3. Invention of “Toaster-sized” Digital Camera in 1975 ...........................................35

4.2. Late 1970s - 1993: Beginning of Competitive Challenges and Kodak’s Re-organization 36

4.3. The digital revolution in the photography industry .........................................................38
   4.3.1. Development of digital camera .............................................................................38
   4.3.2. Development of related products and services .....................................................39

   4.4.1. A hybrid and incremental approach .................................................................40
   4.4.2. Partnership and acquisition ...............................................................................41

4.5. Kodak’s Digital Transformation Strategy in 2004 .......................................................43

CHAPTER 5. ANALYSIS AND DISCUSSION ...........................................................................48

5.1. The digital camera as a disruptive innovation ..............................................................48
5.2. Digital technology and changes in value network ......................................................49
5.2.1. Digital technology and changes in value network structure .............................................. 49
5.2.2. Digital technology and the change of Kodak’s position in the value network ............ 52
5.3. Inertial forces in Kodak at the Emergence of the digital technology .......................... 53
5.3.1. Mindset Barrier in Adopting the Disruptive technology ........................................... 55
5.4. Kodak’s efforts to re-position itself in the digital era ...................................................... 58
5.4.1. Main themes of Kodak’s partnerships and acquisitions ............................................. 58
5.4.2. Kodak’s problems of re-positioning in the digital era ............................................. 62
5.5. Proposed solutions ........................................................................................................ 64
5.5.1. Overcoming insight inertia ......................................................................................... 65
5.5.2. Overcoming Action Inertia and proper re-positioning ............................................. 66

CHAPTER 6. CONCLUSION .............................................................................................................. 70
6.1. Answering the research question ................................................................................. 70
6.2. Suggestion for further research ................................................................................... 72

References .................................................................................................................................. 73
List of Figures

Figure 1. Kodak vs Fuji Annual Market Share ................................................................. 37
Figure 2. Kodak’s Annual total Net Sales ............................................................................ 46
Figure 3. Kodak’s Annual Net Profit/Loss .......................................................................... 46
Figure 4. Kodak’s Stock Price from January 31, 2000 – January 30, 2012 ......................... 47
Figure 5. Value network of film-based photography technology ........................................ 49
Figure 6. Value network of digital photography technology ............................................... 50
Figure 7. Categorization of partnerships and acquisitions during
the period 2004 – now along activities in the value network .......................................... 60
Figure 8. Categorization of partnerships and acquisitions during the period
2004 – now along activities in the value ........................................................................... 61
Figure 9. Value Network Management Model .................................................................... 69
CHAPTER 1. INTRODUCTION

1.1. Background

“To My Friends, My work is done. Why wait?”¹ was a suicidal note left on March 13th, 1932 by 77 years old George Eastman, the man who founded Eastman Kodak. When the company he established more than 130 years ago filed for Chapter 11 bankruptcy protection on January 19th 2012, this news was also deemed by many as an announcement for the sad ending of the company itself while some observers still considered it as its last hope to revitalize itself into a profitable business.

The end of Kodak’s industry dominance and its deteriorating performance as a result of the digital revolution was not just a sudden and catastrophic event. Instead, speculations about Kodak’s struggle in responding to the digital revolution and the discussion of reasons for such struggle started already in mid-2000s. Those diverse opinions reflect a significant attention being paid to a quite popular phenomenon occurring across technology-driven industries, more specifically, the failure of incumbent firms when confronted by disruptive innovations, of which Kodak’s case can be considered as a typical example.

The term disruptive innovation according to Christensen (1997; 2003) is applied to the type of innovations which initially underperform along performance dimensions that the company’s mainstream or established customer segments historically value. Even if such products provide other features that a few fringe customers or new customers value, they do not initially address the needs of the incumbent firms’ best customers and often promise lower profit margin. This results in incumbent firms’ lack of interest in pursuing or commercializing these types of innovation until it is too late to exploit and benefit from it.

Many scholars have discussed why incumbents usually fail to embrace disruptive innovations where the reasons given range from smaller perceived incentives (Hendersen, 1993), lack of

¹George Eastman House, International Museum of Photography and Film shows a copy of the note, as Image No. 49 http://education.eastmanhouse.org/discover/kits/imageNotes.php?id=5
foresight and organizational inertia (Hill & Rhothaermel, 2003) to lack of adequate commitment and underinvestment (Christensen & Bower 1996; Gilbert 2005). Particularly, Chandy and Tellis (2000) have termed these arguments as “The Incumbent’s curse” since such thinking proposes that incumbents are found to be so “enamored with their success or hampered by their bureaucracy” that they eventually fail to introduce the next generation of radically new products (p.2). These explanations take an “inside-out” approach as they focus on locating impediments to adoption of disruptive innovation within the companies themselves.

Based on his definition of disruptive innovation, Christensen on the other hand provides the concept of value network to explain why incumbent firms fail to introduce disruptive innovation. Christensen (1997) defines value network as “the context within which a firm identifies and responds to customers’ needs, solves problems, procures input, reacts to competitors and strives for profit”(p.32). The author explains that the value network and particularly its mainstream customers, which are part of the value network in which the firm is embedded, place insufficient value on the disruptive innovation and hence constrain the pursuit of this technology by the firm. This explanation on the other hand takes an “outside-in” approach as what constrains incumbent firms from introducing or embracing disruptive innovation is the value network which is something that exists outside the firms.

While the theory of disruptive innovation and the concept of value network are very interesting and informative, the explanations and examples given by the author mostly focus on the relationship between the focal firm and its customers. Thus, further research about incumbent firms’ failure by taking a comprehensive perspective in looking at the phenomenon from not only the relationship between the firm and its customers, but also other players in the network like its suppliers and complementors is needed. The authors of this thesis, hence, departing from such a need combined with our strong interest in the recentness of the Kodak’s failure case, has been inspired to conduct this research.

In the next section, the problem area related to the extant literature on the failure of incumbent firms challenged by disruptive innovations in relation to value network will be discussed.
1.2. Problem area

Christensen and his colleagues (Bower & Christensen, 1995; Christensen & Rosenbloom, 1995; Christensen, 1997) provide the concept of value network as a new perspective to look at the popular phenomenon of incumbent firms’ failure in the face of disruptive innovations. They argue that such failure is due to the incumbent firms often being constrained by and trapped in the existing value network built around the existing technology. Consequently, those firms cannot manage to engage themselves in the new value network brought by the disruptive innovations in order to embrace those innovations profitably.

To illustrate the new perspective, those authors used the case of the disk drive industry. However, most attention is given to describing the deep embeddedness of the incumbent firms in the relationship with their existing customers, which constrains them from embracing the disruptive innovation. The search for new customer segment is, thus, implicitly suggested as a way for them to overcome such embeddedness to engage in the disruptive innovation. Meanwhile, the value network, as conceptualized by the authors, also includes other players like suppliers, complementors and competitors. Nevertheless, the relationships of the incumbent firms with those players and their impacts on the incumbent firms’ ability to embrace the disruptive innovation are almost not discussed by Christensen and his colleagues.

Furthermore, regarding the value network as the whole, those authors have only contended that the incumbent firms are constrained by the existing value network, and then suggested to overcome this constraint by forming a separate organizational unit which is responsible for developing and commercializing the products embodying disruptive technologies. However, the solutions which are directly related to how to handle effectively such value network – related constraint are still missing. Therefore, it can be said, to some extent, that Christensen and his colleagues seem to view the incumbent firms as passive actors in their value network, rather than proactive ones who can reconfigure and shape the value network in a beneficial way. However, successful cases of incumbent firms in exploring and exploiting disruptive technologies profitably (e.g., Sandberg, 2002; Birkinshaw et al., 2007) prove that it is possible for incumbent firms to manage effectively the value network to benefit from the disruptive innovations.
Departing from the theoretical gap and the observed phenomenon in reality, the authors of this thesis find it intriguing to do further research about how the incumbent firms can manage the value network to exploit the opportunities springing from disruptive innovations profitably. In more details, it is about how the incumbent firms can recognize changes occurring in the value network in the face of disruptive innovation and then take advantages of those changes to exploit the potential profit of the innovation. In the following section, the purpose of this thesis is described and the research question is formulated.

1.3. Research purpose and research questions

The purpose of this thesis is, first, to examine comprehensively the impacts of the value network – the concept developed in Christensen’s theory of disruptive innovations – on the incumbent firms when they are challenged by the arrival of disruptive innovations. More specifically, this research will utilize the case study of Eastman Kodak to look at how various network players affect (either motivate or demotivate) the incumbent firms to get involved in developing and commercializing products embodying disruptive technologies.

Furthermore, the insight gained from the case study when examining Christensen’s theory of disruptive innovations will be the basis for developing a model for the incumbent firms to recognize and manage effectively changes occurring in the value network in the face of disruptive innovations. This model integrates outside-in approach and inside-out approach to managing the disruptive innovations by taking into consideration factors external and internal respectively to the incumbent firms when proposing how they can deal with those innovations successfully.

In addition, during the process of examining Christensen’s theory of disruptive innovations and developing a model for the incumbent firms to manage the value network in the arrival of those innovations, a new insight into Kodak’s failure in the reign of digital technology will be gained from a new perspective - the value network management perspective.
Regarding these purposes, the research question is formulated as following:

_How can the incumbent firms recognize and manage changes occurring in the value network in the face of disruptive innovations in order to exploit those innovations effectively?_

1.4. **Scope and Limitation**

One of the focuses in this thesis is about how the incumbent firms can manage changes occurring in the value network caused by the arrival of disruptive innovations. Managing those changes, in this thesis, is delimited to mainly discuss about how those firms can choose the right partners to collaborate with among various new actors entering the value network. Meanwhile, what happens next after the selection of appropriate partners (e.g., trust and commitment building, the type of partnerships like equity-based or non-equity, long-term or short-term, etc.) are not in the focus of this research.

This thesis will utilize the case study of a single firm who did fail in the face of the disruptive innovation. Therefore, the generalizability of findings from the case study is limited when the model developed upon these findings is expected to help the incumbent firms in other industrial, high-tech settings to deal successfully with the disruptive innovations. The authors of this research have tried to minimize this limitation by choosing a typical example of the incumbent firms failing to embrace the disruptive innovations and by describing this case study in a very detailed manner.

In addition, the thesis will utilize exclusively secondary data collected from various sources. The absence of primary data collected through interviews or direct observations can cause the problem of incongruence between the real essence of the case study and the findings reached in the end due to the lack of confirmation of the findings with the company which has been researched. This limitation is minimized, in the efforts of this research’s authors, by collecting data from different sources, of which the interviews of people who had worked in the company studied are a part.
1.5. **Contributions and Target Group**

This study has taken departure from Clayton Christensen’s theory of disruptive innovation and its impact on incumbent firms. More specifically, the concept of value network in explaining why incumbent firms fail has been examined and further expanded by incorporating the role of other value network players like complementors and also considered the influence of inertial forces in determining how a firm responds to disruptive innovation. Based on the insight gained from the case study and a synthesis of different theoretical frameworks, a model which helps firms in recognizing and managing changes in the value network in the face of disruptive innovation has been proposed.

Hence, the result of this thesis addresses top level managers who are strategic decision makers within the firm and Business Unit managers in facilitating the adoption of disruptive technologies initiating internally or externally. It will also make additional contributions to the current literature and our own understandings regarding disruptive innovation, value network and the concept of network approach which is becoming an important concept in this era where interconnectedness and interdependencies between firms is ever increasing. This research can also possibly serve as a base for similar future research which can also be applied in a different type of industry setting.
CHAPTER 2. METHODOLOGY

2.1. Research Design

As already mentioned in Chapter 1, this study intended to extend the existing concept of value network in Christensen’s theory of disruptive innovation and to find out how incumbent firms can exploit disruptive innovation by managing the value network. Therefore, we believe that Case study is the appropriate research design to test the further extended theory and to propose a model which helps in answering the research question.

As Bryman and Bell (2007) indicate, Case Study entails a detailed and intensive analysis of a single case which can be a single organization, a single location, a person or a single event. For this study, Eastman Kodak Co. has been chosen as a unit of analysis two important reasons. First is the fact that it is a company with more than 130 years of existence and has been in the forefront of the photographic industry for about a century. Second, the company’s dominance in the industry and its control of the value chain was step by step diminished after the introduction of the Digital Camera which is considered a disruptive innovation. This means that we have considered Kodak to be a typical example of incumbent firms which failed in the face of disruptive innovation. In addition, as the disruptive innovation, more specifically the introduction, commercialization and diffusion of the digital camera is a process not an event that happened at a specific point in time, this study will cover a broader range of historical time line to see the changes in the structure of the value network and position of the firm before and after adopting the disruptive innovation.

2.2. Research Approach

Based on what type of information we have collected to build our case study and on how we analyzed the information (Hussey & Hussey, 1997), our research approach can be termed as Qualitative.
First, the long range data we have gathered regarding Kodak is mostly focused on Kodak’s strategic moves like decisions regarding innovation, diversification, acquisitions and partnership and their implication on the value network in the pre and post digital era. These information are presented in a chronological order and are mostly described in a textual and descriptive detail (Bryman & Bell, 2007) instead of in the form of numbers which later on need to be measured and manipulated to be interpreted. Nevertheless, the collected information also includes numerically expressed quantitative data like the company’s yearly sales or profit figures, or its market share as compared to competitors which are used directly for explanatory purpose.

Second, in analyzing and interpreting the data, we have followed the structure of the theoretical framework and tried to present findings in a detailed descriptive manner supported with visual data displays such as charts to summarize our findings. As Bryman and Bell (2007) pointed out, in qualitative research, the tendency is to interpret people’s behavior in terms of norms, values and culture of the subject being studied. Similarly, while analyzing and interpreting the data, we not only have tried to compare it with what the theory says but also we have tried to subjectively see the meanings of actions taken in the context of the company’s background and culture.

In summary, this study has taken a qualitative approach to collect and analyze data, where the collected data however also includes numerically expressed quantitative data.

2.3. Research Reasoning

Research reasoning, according to Cooper and Schinddler (2008, p.71), involves “finding correct premise, testing the connections between their facts and assumptions, making claims based on adequate evidence”. In a simplified way, research reasoning is understood as how conclusions are reached with respect to raised research questions (Ghauri et al., 1995).

As mentioned in the Research Design section, the starting point of this thesis is to examine Christensen’s theory of disruptive innovation and his concept of value network - a previously developed theory, in the context of a real case study – Eastman Kodak. Therefore, the link between the research and the theory is that the research is, first, executed to test the theory. It
means that deductive reasoning (Bryman & Bell, 2007) is employed as the research reasoning in this thesis.

It is also noteworthy that the gained insight from the comparison between the phenomenon in the case study of Eastman Kodak and the previously developed theory of Christensen will be the base for expanding the current theory. This theory expansion will help to fill in the current gap in existing literature on how firms can recognize and take advantage of changes in value network Therefore, the research in this thesis also plays the role of generating new theory, meaning that the research can be characterized as inductive (Bryman & Bell, 2007).

To summarize, this thesis will utilize both deductive and inductive reasoning to test and develop theory respectively.

2.4. Data collection

The research in this thesis utilizes exclusively secondary data which is defined as those that are collected for the purposes other than those of the study in focus (Ghauri et al., 1995). Sources of collected secondary data are diverse, including:

- Organizational documents (Annual Reports) and Case studies written by other authors (e.g., Gavetti et al., 2005; Grant, 2010).

- Academic articles and books about Kodak and the photography industry in the face of the digital revolution (e.g., Jenkins, 1975; Kadiyali, 1998; Munir & Phillip, 2005; Benner & Tripsas, 2010; etc.). These articles and books were found from LiU library, LiU online database and Google Scholar.

- Interviews with previous employees and CEO of Kodak done by various mass media agencies (e.g., New York Times, BBC, Newsweek, etc.) and Virtual archives from the Internet about the photographic industry and Kodak in the arrival of the digital revolution (websites of Kodak, its partners and other mass media agencies, and specialized websites about the photographic activities).
To ensure the good match between the collected secondary data and the purpose of the research, the authors of this thesis have undergone a time-consuming process of filtering and categorizing relevant data for the case study and the theoretical perspectives in focus. Therefore, collecting secondary data is not actually time-saving as Bryman and Bell (2007) and Ghauri et al. (1995) state.

Despite anticipating such time-consuming process, the secondary data has been chosen because this thesis has been conducted in the context of time limitation, the geographic distance from the location of the studied company and when the company has just filed for the Chapter 11 bankruptcy protection and is struggling to restructure itself. Furthermore, the phenomenon studied in this thesis (the incumbent firms’ failure in the face of disruptive innovations) usually takes place as a prolonged process, not a transient event and the chosen theoretical perspective of value network, by itself, is dynamic and evolving over time. Meanwhile, what Kodak did to respond to the digital revolution occurred through several generations of CEOs, implying that the company personnel, especially managers, have changed significantly over the period examined in this thesis (from 1993 until now).

With such idiosyncrasies of the phenomenon, the company studied and the theoretical perspective chosen, the methods of collecting primary data for a single case study method such as direct observation, interviews seem to be of little efficiency and of difficult implementation. Meanwhile, the deployment of secondary data can help to handle effectively those idiosyncrasies, offering a chance to look through the whole process of the phenomenon.

2.5. Reliability

According to Miller (2008), Reliability in the field of research is broadly described as the dependability, consistency, and/or repeatability of a project's data collection, interpretation, and/or analysis. Similarly, Bryman and Bell (2007) relate the issue of reliability with repeatability and replicability.

As mentioned before, we have chosen qualitative study which emphasizes words and narratives implying the need for the researchers to interpret the data to extract its true inner meaning and
then to convert it to information. Miller (2008) indicates that one of the commonly provided indicators of dependability (reliability) is methodological coherence which is the appropriate and thorough collection, analysis and interpretation of data. As we have indicated in our Data Collection section, although we have exclusively used secondary data, we have tried to cover a vast array of sources which are publicly available, trustworthy in our belief.

On the other hand Zikmund et al. (2009) argue that, in qualitative research, the researcher is deeply involved in the research process and in constructing results hence, this type of research is said to be more subjective and researcher-dependent with a possibility of lacking inter-subjective certifiability, that is, “the ability of different individuals following the same procedures to produce the same results or come to the same conclusion” (p.135). Accordingly, although we have tried to be unbiased in how we collect and interpret the data, we do not expect our results and interpretations to be totally objective and the same if repeated or replicated by other researchers. As Bryman and Bell (2007) assert, in qualitative research, the reliance upon the researcher’s ingenuity and predilection makes it almost impossible to conduct a true replication.

In conclusion, as Golafshani (2008) citing Lincoln and Guba (1985) implies, the steps we have taken to make sure our research’s validity is “sufficient to establish the reliability” indicating that “reliability is a consequence of the validity” (pp.601 - 602).

2.6. Validity

*Internal validity* in the qualitative research, according to Bryman and Bell (2007) citing Lincoln and Guba (1985) and Guba and Lincoln (1984), refers to the research findings’ credibility. A research is credible if it provides feasible and acceptable account of the studied phenomenon among several possible accounts of that phenomenon.

This thesis deploys theoretical triangulation, as suggested by Bryman and Bell (2007) to ensure the credibility of a qualitative research, by looking at the phenomenon in focus from Christensen’s theory of disruptive innovations and the Business Ecosystem construct and the Industrial Network approach. Moreover, the inside-out approach and outside-in approach are combined to explain the Kodak case, thus helping to avoid the problem of “one-sidedness of a
single theory” (Boeije, 2010, p.176). The facts about the case study over a longitudinal period have also been gathered from various sources of secondary data, reflecting both the company’s perspective and outsiders’ perspective. Therefore, the congruence between the theory used and the phenomenon studied (Bryman & Bell, 2007) is ensured.

**External validity**, referring to Bryman and Bell (2007), is the issue of the generalizability of the research findings so that they can be applicable for other contexts in addition to the one studied.

In this thesis, the Kodak case (including both the company’s actions and its industry in the digital age) will be described in great details. Therefore, the Kodak case study has a great potential of being a “thick description” Bryman & Bell (2007, p.413) or in other words, being generalizable in the form of naturalistic generalization (Stake, 1978). Such thick description of the Kodak case, hence, enables informed judgment about the degree to which the findings from the studied case can be applied in other contexts Schofield (1990). Moreover, as mentioned in the Research Design section, the Kodak case is chosen due to its typicality of the incumbent firms failing in the face of disruptive innovations.

With such features, the findings from the research on Kodak case study are expected to be potentially generalizable for the incumbents in industries other than the photography industry, and hence somehow eliminating the criticism of the case study method as lacking generalizability (Bryman & Bell, 2007). However, to make sure the generalizability of findings from this case study, the suggestion to conduct further research to examine these findings in other incumbent firms in other industrial settings will be made in the last chapter of this thesis.
CHAPTER 3. THEORETICAL FRAMEWORK

3.1. Disruptive technologies and disruptive innovations

The term “disruptive technology” was first introduced by Bower and Christensen (1995) and further elaborated by Christensen (1997) when those authors came to explain why many incumbent firms fail in the face of new technologies. According to them, “disruptive technologies introduce a very different package of attributes from the one mainstream customers historically value, and they often perform far worse along one or two dimensions that are particularly important to those customers” (Bower & Christensen, 1995, p.45), but “they have other features that a few fringe (and generally new) customers value” (Christensen, 1997, p.18). Typical characteristics of products based on those technologies are “cheaper, simpler, smaller and frequently, more convenient to use” (p.18) at their emergence. As such, those products often start being valued by customers in the low-end segment of the market. However, the performance of those technologies increases quite quickly over time and eventually can meet or exceed the requirement of mainstream market, thus replacing the technology previously valued by mainstream customers. This pattern of “attack from below”, thus, characterizes disruptive technologies in Christensen’s original term (Utterback & Acee, 2005). In Christensen and Raynor (2003), the term “disruptive innovation” was used to “include not only technologies but also products and business models” (Danneels, 2004, p.19).

Although being considered as offering a new insight into failure of incumbent firms in the face of technological shifts, Christensen’s theory of disruptive innovation has still been criticized as ignoring other kinds of discontinuous innovations which have the same impacts on the mainstream market of firms as disruptive innovations in Christensen’s definition have. For instance, Utterback and Acee (2005) pointed out seven cases of discontinuous innovations which are not as lower-priced, lower-performed in traditionally valued features and higher-performed in ancillary features as Christensen’s disruptive innovations are, but still have disruptive impact on mainstream market of firms. Some of those cases even show attacks from higher-end segment downwards to mainstream market. In a similar vein, Schmidt and Druehl (2008) mentioned high-
end encroachment as innovations starting in high end of old-product market, and then diffusing downwards to mainstream market. These arguments actually provide a different perspective to Christensen’s definition of disruptive innovation. As such, disruptive innovations, in addition to the effect of replacing the products based on existing technologies, also enlarge markets and bring new functionality (Utterback & Acee 2005), and thus “changes the bases of competition by changing the performance metrics along which firms compete” (Danneels, 2004, p.249).

Another concern towards Christensen’s “disruptive innovation” terms is that what is disrupted by disruptive innovations (Danneels, 2004). As it can be seen from Christensen’s original concept, disruptive innovations actually disrupt the mainstream market of products based on established technologies, thus having demand-side disruptive effect. However, Danneels (2004), citing Charitou and Markides (2003), noted another way of considering the disruptive effect of new technologies, as to on organizational capabilities and resources. In other words, such technologies render the established technological capabilities of firms obsolete, hence being viewed as having supply-side disruptive effect. From this perspective, competence-destroying technology (Tushman & Anderson, 1986) can also be seen as disruptive innovations. However, Christensen (1997) argued that established firms can develop the products based on new technologies of all sorts (incremental or radical, components or architecture) as long as those products are demanded by their existing customers, whereas they are demotivated and actually neglect to commercialize even technologically simple innovations that do not figure out their existing customers’ needs and wants. Additionally, the problem of incumbent firms in the face of technological shifts is not lying in their technological capabilities, but their inability to commercialize products based on new technologies in a profitable way (Christensen & Overdorf, 2000; Cooper & Smith, 1992; and Vanhaverbeke & Peeters, 2005). Said differently, common failure pattern of incumbent firms confronted by technological shifts is in the demand-side, rather than supply-side. For that reason, in this study, disruptive technologies/innovations are understood as those having demand-side disruptive effects.

Last but not least, it is important to clarify what types of disruptive innovations are covered in this study. As pointed out in Christensen and Raynor (2003), and elaborated later on by Markides
disruptive innovations include three distinct types, namely disruptive technological, product and business model innovation, which “arise in different ways, have different competitive effects, and requires different responses from incumbent firms” (Markides, 2006, p.19). Despite that, inarguably there is correlation among those types of disruptive innovations. Specifically, disruptive innovations are often built based on disruptive technologies, and usually requires established firms to develop new business model to translate value latent in the technologies into economic value, and then to capture some portion of that value (Chesbrough & Rosenbloom, 2002). Therefore, in this study, “disruptive innovations” are to be viewed as only disruptive technologies which are then employed to produce disruptive product innovations, while business model innovations are not in the research scope but new business model is, rather, the requirement for exploiting those technologies. The term “disruptive innovation” and “disruptive technologies”, thus, are used interchangeably hereinafter in this study.

In short, disruptive innovations (or technologies) in this study are conceptualized as those new products based on new technologies which have demand-side disruptive effects, specifically disrupting the market of products based on existing technology, enlarging the markets of firms and providing new product functionalities, and hence changing the competition basis in the marketplace.

3.2. Value network

3.2.1. Value network in Christensen’s theory of disruptive innovation

Value network is utilized by Christensen and Rosenbloom (1995) and Christensen (1997) as a new approach to explaining incumbent firms’ failure in the face of technological shifts in addition to previously well-discussed explanations. Before the work of Christensen and his colleagues, organizational inertia in structure and processes and the nature of new technologies (competence-enhancing versus competence-destroying, incremental versus radical, or component versus architecture) were considered main reasons for incumbent firms’ failure. Such explanations provide an inside-out approach, which is different from Christensen’s value network - an outside-in approach.
Christensen came up with the concept of value network based on the rationale that “products are systems comprised of components which are related to each other in a designed architecture” (Christensen & Rosenbloom, 1995, p.238). As such a particular product consists of sub-systems (or components), and simultaneously is a component of a higher-level system-of-use. This means that multiple components are needed to manufacture a particular product which in turn needs to be used in combination with other complements in order for it to be utilized by customers to its full potential. Christensen (1997) indicated that those components and complements can be produced within a single firm, but also be easily traded through the market. Therefore, “the nested physical architecture of a product system […] implies the existence of a nested network of producers and markets through which the components at each level are made and sold to integrators at the next higher level in the system” (p.37). This nested commercial network is called value network. It is, here, noteworthy that this value network is the value network of a product (or the technology underlying it) in order for it to be manufactured and then utilized (or consumed) to its full potential. Therefore, whether a firm’s product can be utilized to its full potential depends on the degree to which the firm involves in the technology’s value network.

According to Christensen (1997, p.36), value network is “the context within which a firm identifies and responds to customers’ needs, solves problems, procures input, reacts to competitors and strives for profit”. As such, there are individuals and/or organizations who can supply a firm with components (suppliers) for its particular product, those whose offerings can complement the firm’s product (complementors), competitors and customers in a technology’s value network. Within this value network, a firm sets up its competitive strategy, particularly the market segment to compete, which in turns shapes its perception of the economic value of a new technology (Christensen, 1997), and then its incentive to pursue different opportunities coming from technological innovations (Christensen & Rosenbloom, 1995). Therefore, the value network, more precisely a firm’s position in a value network, determines what a firm can and cannot do. From this perspective, a firm’s position in a value network is very similar to its position in an industrial network which will be further elaborated later on in this study.
One noteworthy point in Christensen’s work of disruptive innovations is that he focused mostly on the disk drive industry as the example and the base to build and develop the concept of disruptive innovation and that of value network. He argues that incumbent firms in the disk drive industry often have no incentive to embrace disruptive innovations which initially do not address the need of their existing customers. Meanwhile, new entrants who bring disruptive innovations to the industry, first, usually locate their innovative products in a market segment other than the mainstream one which is being served by incumbent firms. Through that line of argument, Christensen’s work mostly implies that incumbent firms that want to survive in the face of disruptive innovations need to address a new customer segment as the context in which the economic value of new technology is to be made sense of. However, his work mostly does not mention the need of incumbent firms to address also suppliers and complementors who provide the incumbent firms with components and complements necessary for their innovative products before those products can come to customers. This missing piece in Christensen’s work on value network in relation to disruptive innovation is, therefore, a promising area for this thesis to do research about.

3.2.2. Value network in other literatures

Value network, initially developed by Christensen and his colleagues, is further utilized by scholars whose focus is on business model (e.g., Chesbrough & Rosenbloom, 2002; Chesbrough, 2007). According to those authors, value network is described as the context around a given business, involving not only a focal firm’s suppliers and customers in its value chain “required by the firm to create and distribute the offering” (Chesbrough, 2007, p.13), but also other players that lie outside its value chain. The logic of value chain, as described by Porter (1985), is that value is sequentially added to a product when it passes through all activities in order. Meanwhile, the concept of value network reflects a “value-creating system […] within which different economic actors – suppliers, partners, allies and customers – work together to co-produce value” (Peppard & Rylander, 2006, p.132). Hence, the scope of a value network is larger than that of a value chain in the sense that several value chains can be simultaneously embedded in one value network.
According to those authors, value network is not discussed in isolation, but in relation to value creation and value capture. Value network is, thereby, the context within which value – creating and value – capturing activities of a firm take place (Shafer et al., 2005). The role a firm chooses to play (or its position) within a value network is defined by the degree to which it establishes relationship with various network players, and influences how much value the firm can create and then capture later on. It is worthy to note here that the term “value network” in literature on business models covers not only those with whom the focal firm has been having relationships, but also potential complementors and competitors with whom a focal firm has not had a relationship before, but might have in the future.

Compared with Christensen’s theory of disruptive innovation, it can be said that the concept of “value network” is further clarified in the literature on business model, to the extent that the degree of a firm’s involvement (or its position) in a value network is illustrated through relationships it has established with various players in the value network. Meanwhile, those with whom the firm has not had relationships before are still potentially their partners in the future. All these show that the firm’s position in a value network is dynamic and partly dependent upon its proactive choices.

3.3. Similar concepts to value network

In extant literature, there are some concepts which are, to some extent, similar to the “value network” concept. The discussion about those similar concepts matters because bodies of theories related to those concepts are to be utilized in this study as the background to answer the proposed research questions.

3.3.1. Business Ecosystem

The concept of business ecosystem was first introduced by Moore (1993). The author argued that innovative businesses cannot evolve in a vacuum, rather they need to gather resources of all sorts, rely on various partners, suppliers, customers to create cooperative networks that support the innovative initiatives. Therefore, Moore suggested seeing a firm not only as a part of a single industry, but rather that of a business ecosystem that involves numerous industries. According to
the author, “in a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovation” (p.76).

On the one hand, because a business ecosystem is needed to satisfy customer needs, it is very similar to the concept of value network in Christensen’s term. Value network was conceptualized by Christensen around a system-of-use including the focal innovative product, components necessary to manufacture that product and complementary products/services for that product to be utilized to its full potential by customers. Said differently, the presence of a value network around an innovation helps customers fully utilize that innovation, and hence satisfying their needs. From this angle, business ecosystem and value network are two similar concepts.

On the other hand, a business ecosystem, as defined by Moore (1993), includes companies who cooperate with and compete against each other at the same time. Thus, if taking the perspective of a focal firm, a business ecosystem is comprised of only those with whom the focal firm has cooperative and/or competitive relationships. Meanwhile, there might be others who have no cooperative and/or competitive relationships with the focal firm, but have offerings which assist the focal firm’s customers in fully utilizing its innovative products. Such actors are parts of the value network around the innovating product of the focal firm, but not part of the firm’s business ecosystem. From this angle, the value network and business ecosystem are not identical concepts. Rather, business ecosystem is the network of business relationships built by the focal firm in order to satisfy as much as possible its customers with its innovation, and thus reflecting its effort in engaging in the value network evolving around its innovation.

3.3.2. Industrial Network Approach

In the mid-1970s a major international research venture was started by a group of researchers involved in an International Marketing and Purchasing (IMP) project. The group was focused on the idea that long-term stable relationships rather than short-term purchasing decisions play a major role in industrial markets and called this perspective interaction approach (Easton, 1992). Later on this idea was further developed into the industrial network approach which gives the
relationship a network perspective rather than a dyad or two-party exchange relationship. In this approach, “Network” is a term used to express the interconnectedness of a large number of entities, while the word “industrial” is used to show that the entities are actors involved in economic process of converting resources into finished goods and services as opposed to social, communication, electrical or other types of networks (Easton, 1992).

The important concept within the industrial network approach is that firms operate in the context of interconnected business relationships, which affect the nature and outcome of their actions and serve as potential sources of efficiency and effectiveness (Gadde et al., 2003). Hence, as Håkansson and Ford (2002) argue, *interactions* between firms in the form of sale, purchase, delivery or payment, can only be understood with the reference to the relationship of which it is part and that *relationship* in turn can only be understood with reference to the wider network the firm is part of. This indicates that as “no business is an island” (Håkansson & Snehota, 2006), what a firm can or cannot do is actually not solely determined by their own decision but is rather affected by the network of interactive relations that link the resources and activities of one party with those of another. This argument goes along with what Shafer et al. (2005) have discussed stating that “neither value creation nor value capture occur in a vacuum” but within “a value network, which can include suppliers, partners, distribution channels and coalitions that extend the company’s own resources” (p.202).

In general, the industrial network approach is concerned with understanding the totality of relationships among firms engaged in production, distribution and the use of goods and services in what might best be described as an industrial system. Such relationships according to Easton (1992) comprise four elements: (i) mutual orientation where they cooperate and exploit each other’s complementarity (ii) dependence that each has upon the other (iii) bond of various strengths and (iv) the investment each party has made in the relationship. Hence, both in Industrial Network approach and the value network approach we can see a similarity in the existence of strong interdependence between actors in engaging in an economic process or exchange.
In the following, incumbent firms are to be considered as focal firms in the network, working to innovate disruptive technologies. Therefore, terms such as incumbent firms, innovating firms and focal firms are used interchangeably.

3.4. Disruptive innovations and changes in the value network

As noted above, a firm does not exist in isolation, but in a network of relationships with numerous partners which might influence significantly the firm’s performance. Håkansson and Ford (2002) and Gadde et al. (2003) suggested that a firm seeking to change is dependent upon actions of other partners within the network of which it is a part. Product innovation, regardless of its nature (incremental versus radical, sustaining versus disruptive, component versus architecture), always reflects a change. Moreover, “a given innovation, […] often does not stand alone, rather it depends on accompanying changes in the firm’s environment for its success” (Adner & Kapoor, 2010, p.306). Similarly, Konst-Laakso et al. (2012) claimed that value creation from innovations requires not only a firm’s internal innovation capability, but also its ability to involve other organizations in the implementation of innovations. These arguments, hence, indicate that incumbent firms seeking to bring about a disruptive innovation, needs to gather relevant partners who can support them to carry on successfully that innovation. Whether or not such relevant partners are those who are the incumbent firms’ existing partners has a significant implication for incumbent firms. Therefore, incumbent firms who wish (or are forced) to carry out innovations for their products initially need to look beyond their organizational boundaries to see whether they can continue exploiting relationships with their existing partners or they need to find new ones before they can take actions in order to take advantage of their innovations.

Nevertheless, previous research on innovations has mostly focused to a substantial degree on impacts of new technologies on the innovating firm’s capabilities, structure and processes (e.g., Abernathy & Clark, 1985; Abernathy & Utterback, 1978; Henderson & Clark, 1990; Tushman & Anderson, 1986), leaving possible impacts of those technologies on capabilities of its partners in its network of relationships, the network structure and hence the firm’s position within this network almost neglected. Therefore, looking at how disruptive innovations affect the value
network structure and the incumbent firms’ position in this network can help fill in that neglected part in extant literature.

Christensen and Rosenbloom (1995) and Christensen (1997) conceptualized a technology’s value network in association with a ranking-order (prioritization) of the importance of various performance attributes. According to these authors, for each product based on a technology, there are some performance attributes which are considered more important in a particular value network, but less important in another value network. This idea is illustrated through the example of disk drives in mainframe computer value network and in notebook computer value network. In the former, the most important performance attributes of a disk drive are capacity, speed and reliability. Meanwhile, in the latter, performance attributes such as ruggedness, power consumption and physical size matter most. Based on that idea, it is expected that a disruptive innovation which brings new functionalities other than those historically valued by existing value network require a new value network which is built to give rise to its new and advantageous performance attributes. Nonetheless, Christensen and his colleagues’ work did not go further than suggesting that a disruptive innovation calls for a new value network. They did not clarify what could be the differences between the value network of the existing technology and that of the new one.

Therefore, some concerns might be raised as to (i) whether or not innovating firm’s partners in the value network of existing technology can still play a role in that of disruptive technology; (ii) if yes whether or not their roles in the new value network become more or less important in terms of creating value from the new technology (thus their bargaining power relative to the innovating firm); (iii) whether the firm needs to establish relationships with new partners with whom it has not had before; (iv) the position of incumbent firm (here also being the innovating firm of the disruptive technology) in the new value network compared with that of it in the value network of existing technology. In short, there is a need to examine the possible impacts of disruptive innovations on the value network structure and incumbent firm’s position in the network.
3.4.1. Changes in the value network structure

In their work, Afuah and Bahram (1995, p.52) claimed that “an examination of the effects of an innovation cannot be limited to the impact on the capabilities, competence and assets of the innovating entity”, but needs to expand to see the impact of the innovation on the capabilities of suppliers, customers, complementors. According to them, an innovation, for instance, is incremental to the innovating firm, but might be radical to its customers, and something else to suppliers and complementors. Applying the same rationale to disruptive innovations, it can be said that a disruptive innovation might have competence-destroying or -enhancing effect on incumbent firm’s customers, suppliers and complementors. It is also supposed that even among, say, suppliers the effects of incumbent firm’s disruptive innovation are not identical. The effect can render some suppliers’ competence obsolete, while sustain other suppliers’ competence. The same can happen to complementors and customers.

The impact of disruptive innovations on incumbent firm’s suppliers, complementors and customers has great implications for the structure of its value network. For example, Afuah (2000) posited that if a technological change disables incumbent firms’ current suppliers to make components necessary for its product innovation, it needs to switch to new suppliers. This means that existing suppliers might have to leave and new suppliers will be moving into the value network of the new technology in the face of disruptive innovation. This phenomenon might also supposedly happen to the focal firm’s complementors and customers. Such switching surely results in changes in value network structure. In a similar vein, Madhavan et al. (1998) research on impacts of industry events on industry network found that the emergence of radical technology can urge incumbent firms to build relationships with new partner to gain access to sets of resources which cannot be supplied by the firm’ current partners. Thus, a change in industry network structure often follows a radical technological change.

In addition to changes in value network structure in terms of some suppliers/complementors/customers leave and new ones enter, changes also take place in terms of new competitors. Utterback and Suárez (1993) claimed that the emergence of new technology brings many new entrants into an industry, of which some can still stay in the industry after the
emergence of dominant design and the shakeout phase, whereas some cannot or only choose to focus on niche market.

In summary, it is proposed that disruptive innovation impacts the value network of the existing technology by making competences of actors (suppliers, complementors, customers, competitors) in this value network and their existence as well no longer necessary in the value network of the disruptive technology. In contrast, new actors with competences and assets necessary for disruptive innovation will enter the value network built around it.

3.4.2. Changes in incumbent firms’ position within the value network

The changes in value network structure also imply change in the incumbent firm’s position in the value network. Madhavan et al. (1998) suggested measuring a firm’s position in a network in terms of its centrality degree. The degree of a firm’s centrality in a network reflects how widely it can cover the network by establishing relationships with network partners, thus manifesting the firm’s significance in a network. The authors, citing Galaskiewicz (1979), related the firm’s centrality degree with its power, then its strategic advantage in a network. In more details, the more contacts a firm has with network partners, “the better it is ‘plugged in’ to the key task and influence processes of the industry, and the stronger is it strategic advantage” (p.442). Here, it can be seen that a firm’s position within a value network is defined in terms of the roles the firm chooses to play in the different value chains embedded in the value network.

In the research on impacts of industry events on industry network, Madhavan et al. (1998) proposed three criteria for a structure-loosening industry event which makes “hitherto powerful firms decrease their network power” (p.444). Those criteria are that (i) the event changes radically the basis of competition in the industry, (ii) firms with previously powerful network position are often constrained to automatically benefit from the event, and (iii) the event is often initiated by currently peripheral firms. Checking disruptive innovations against these criteria, it is highly possible that a disruptive innovation is a structure-loosening industry event.

Based on empirical research on steel industry, Madhavan et al. (1998) found that a structure-loosening industry event reduces the previous centrality, making hitherto highly central firms not
in the best position to benefit from the event at least at the emergence of the event. This has implication for incumbent firms in the face of disruptive innovations. Those firms’ position in the industry network is expected to become less powerful compared with their position before. However, it is noteworthy that this reduction in power is not necessarily permanent and whether the firm can recover its position in a new value network is dependent upon how it acts to form relationships with new network partners and manage existing ones as well which are essential for its implementation of the disruptive innovation.

In summary, disruptive innovation is proposed to change the position of an incumbent firm in the new value network in terms of the firm’s centrality degree (or said differently, in terms of the roles it can play in several value chain embedded in the new value network). However, this change is temporary at least at the emergence of the innovation, implying open chance for the firm to enhance its position later on, depending on how it works on building new relationships and managing existing ones.

3.5. Challenges related to changes in value network

As previously mentioned, a change in the value network implies the inclusion and/or exclusion of competitors, suppliers, customers, new products, complementors and other entities along a continuous period of time. At least if not seen from the focal firm’s side, the network structure does not have a given centre allowing one node to have a complete control over others. In addition, the network structure is borderless and most importantly it is dynamic over time (Håkansson & Snehota, 1995; Gadde et al., 2003). Considering the dynamic nature of the value network, the lack of mechanism to predict ex-ante which technology will be disruptive (Daneels, 2004) eventually affecting the network and the fact that disruptive innovation itself is a process, not a cataclysmic event that happens at once (Christensen, 2006), it can be inferred that it would be difficult for incumbent firms to easily recognize the changing dynamics in the network structure. In the next part, the challenges firms face in terms of analyzing their value networks and in taking subsequent actions will be further discussed.
3.5.1. Change recognition and Initiation of response to change

A radical or disruptive as well as incremental or sustainable technological innovation may lead to important changes in the structure of value networks and in the business models of the actors of these value networks (Kijl et al., 2005). Change, according to Abrahamsen (2011) is always transmitted through the network in form of changed activity patterns, resource structures, and actor bonds.

Hence, the first challenge for incumbent firms would be having the proper insight as to what is actually happening within their value network. This problem can be related to and better explained by what Hedberg and Wolff (2003) discussed about “Insight Inertia”. The authors defined Insight inertia as the “inertial forces that cause time lags between important changes in the environment and the organization's discovery and insights about the implications of that change” (p.539). If insight inertia is considered as a problem of awareness about external or even internal changes, it is important to know what factors contribute to this problem in the first place.

An interesting study by Chen and Miller (1994) used expectancy-valence motivational framework to identify factors that trigger retaliation to a competitive attack. Some of their findings indicate that “visibility” of the attacker’s actions and the “centrality” of the attack i.e. the extent to which it threatens their major market determine the tendency to respond. The problem with the “visibility” is similarly acknowledged by Birkinshaw et al. (2007) when they noted that one of the challenges firms face in discontinuous innovations is related with the ambiguity and vagueness of signals about new technology or new market opportunity at the times of their emergence. The authors elaborate that the new innovation does not usually surface in a perfect, ready-to-use format rendering it uncertain, hard to make sense of and typically slow to emerge.

On the other hand, one reason that might contribute to incumbent firms’ inability to recognize and properly evaluate the changes in the network structure could be the subjective interpretation taken at the corporate setting. According to Abrahamsen (2011) subjective interpretation in a network aspect is the actors’ perspective within a network in interpreting the action of other actors and the world around them. As already mentioned by Chen and Miller (1994) in
“centrality”, firms might also interpret the attack or change as an event that is not directed to them, “rendering the disruption to be insignificant and irrelevant to their businesses” (Voelpel et al.; 2005, p.37).

Often times, even if incumbent firms “attend to cues in the environment” (Weick, 1995) and sense the changes in the network structure which potentially could affect them, they interpret past success as readiness for the future and prefer not to respond. This according to Fulton (2005) is caused by an attempt in making sense of a new situation by drawing meaning from it based on previous experience stored in memory. These memory storages, or the organization’s shared mental models are the bases on which “managers conceptualize the business and make critical resource allocation decisions - be it in technologies, product development, distribution, advertisement or in human resource management” (Prahalad & Bettis, 1986, p.490). This is related to Christensen’s argument about the value network, particularly the firm’s existing customers being the reason why incumbent firms fail in the face of disruptive innovations. Christensen observes that inability of some successful firms to allocate sufficient resources to technologies that initially cannot find application in mainstream markets or their important customers, but which later on invades them, leads to their eventual failure. He also stresses that the more attention paid to their existing and best customers’ needs, the less they will recognize that the disruption is detrimental hence restraining them from taking subsequent actions (Christensen & Bower, 1996; Christensen 1997, Christensen 2003). Huff et al. (1992), citing Williamson (1979), mention accumulating good will assets with suppliers, buyers and others as one of the sources contributing to firms’ resistance to strategic renewal. All these lines of argument can be synthesized in Birkinshaw et al. (2007) as “the ties that bind may become the ties that blind”, indicating that forces of inertia extend to the firm’s value network and web of relationships ending up being an obstacle to change (p.68).

As such, McGrath (2010) argues that a challenge often faced by leaders is in getting firm decision makers to recognize and acknowledge the threats signaled by innovative new models in the value network and then to address this concern by mobilizing resources. This again can be related to what Hedberg and Wolff (2003) referred to as Action Inertia – meaning “the forces
that result in additional time lags between managerial insight and the implementation and results of actions taken” (p.539). This means that the action inertia comes after managers have actually observed the internal dynamics or external changes but the decision making and the action taken is too slow or ineffective.

Hence, at the event of disruptive innovation creeping up in the existing value network, the challenge faced by incumbent firms can be related to sensing the change in the network and timely responding to it in order to realize where value can be created and captured. To do such sensing and responding in a timely manner, organizational inertia needs to be overcome. Literature on strategic renewal/change suggested factors or mechanisms that act as counteracting the impact of inertia so that changes can be implemented in response to threats or opportunities emerging from the firm’s external environment. Although mentioned in different terms, for instance “stress” by Huff et al. (1992), “triggers” by Grinyer and McKiernan (1990) or “activation” by Dutton and Duncan (1987), these are either performance gap or stakeholder demands that put pressure on firms to consider overcoming inertia and carrying out some necessary changes. Performance gap refers to realized organizational performance result dropping behind the expected/planned performance, while the latter refers to the analysis of stakeholders including “individual actors, parties and organized groups and institutions that have bearing on the policies and actions of the organization” (Dutton & Duncan, 1987, p.282). However, as mentioned above, disruptive innovations are often initially inferior to the existing technology along the product attributes valued by existing customers of incumbent firms. Therefore, any decline in sales and profitability of the existing products (performance gap) is hardly seen until the disruptive innovations gain momentum and start replacing the existing technology in the mainstream market segment. Moreover, the disruptive innovations are often valued by customers, suppliers and complementors other than those who incumbent firms are currently serving and partnering with. Analysis of stakeholders who are currently related to the focal firms, hence, cannot provide the firms the awareness of threats or opportunities. As such, it can be said that suggested factors/mechanisms in existing literature on strategic renewal/change are of little usefulness for incumbent firms to overcome inertia in the face of disruptive innovations.
3.5.2. Reaction/Response to changes in the value network

If and when incumbent firms recognize the magnitude of the disruptive innovation and consider which decision to make regarding response to the innovation, the next logical step would be to find the most beneficial way to respond to it. Charitou and Markides (2003) conducted a multiyear research and examined 98 established companies to find out what options these firms have, and under which circumstances each option was preferable. These authors identified that established firms responded in five different ways: (i) Focus on and Invest in the traditional business to make it even more attractive; (ii) Ignore the innovation; (iii) Attack back – disrupt the disruption; (iv) Adopt the innovation by playing both games at once; (v) Embrace the innovation completely and scale it up. The authors also noted how firms respond to major disruptions is influenced by two factors: their ability to respond and motivation to respond to it.

Although this study will not look further into what each option means and how the firms reacted, their research shows that unless firms decide to completely ignore the disruptive innovation and the changes it might entail, they have to somehow retaliate and re-identify their position within the network. Christensen (2006) also pointed out that if the objective function of a firm is just to survive, inaction could also be considered as a good course of action, however he also implies that a firm which considers maximizing its shareholder value as its objective will have to adopt and exploit the disruptive innovation.

Hedberg et al. (1976) suggest that reactions of organizations to a changing environment are divided into three heuristic phases. The first one is metaphorically termed as phase of “weathering the storm” to indicate that the changes are considered only as temporary and the challenges are expected to be dealt with through short term improvements expecting the situation would get better or return to normal soon. As Voelpel et al. (2005) point out, as established firms “familiarized themselves over a number of years with such ways of doing business, their first reaction to discontinuous (fast-changing, disruptive) competition is to “work harder”, when what they need to do is to “unlearn” what they know and “work differently” (p.37). In fact, Hedberg et al. (1976) also termed the second phase of action as “unlearning yesterday” which accepts the permanence of change and the organization's members must decide
what permanent actions to take including revolutionary changes in structure, strategy, personnel, and ideology. At this phase, a new environment must be found, and the organization must restyle itself to match this environment, which in essence is related to what was meant by new value network to match the new disruptive technology. The third phase “inventing tomorrow” is about organizations effort to seek out tomorrow's opportunities, perceiving potential new niches, and striving to boldly manipulate its environment.

As we can see the first type of reaction, weathering the storm, treats changes as temporary which are not the type of changes caused by disruptive innovation to value network. Therefore, it is supposed that changes in value network caused by disruptive innovation would require the latter two types of reaction, namely unlearning yesterday and inventing tomorrow. Clearly, those types of reaction involve incumbent firms’ actions to position themselves in the new value network and thus challenges in responding to changes in value network are often associated with the practice of position management.

**Re-identifying a position within the value network**

Thorelli (1986) notes that new entrants face the strategic challenge of positioning themselves within the preexisting network as the existing linkage and relationships of trust and social bonds makes it difficult to enter. In the same manner, established firms face some challenges as they may have to do some repositioning to accommodate the new entrants and also identify their own position within the new value network.

Repositioning is a perpetual process (Thorelli, 1986) which might result in change in the role played by the firm, loss or weakening of power within the network, breaking previous relationships with certain network actors and forming of new relationships. Ford *et al.* (2002) also note that when firms decide to change their positions, they can create a new position by combining existing relationships and developing new and different relations. For example, in order to respond to a disruptive innovation, a firm might try to form strategic alliances or partnerships with other actors already existing in the network or with entirely new ones. On the other hand, the firm may decide to create a new position within the network for instance by
being its own supplier thereby leading to breaking of previous relationship with other suppliers. However, such processes of breaking and making relationships are not just a simple endeavor to take on. As Johansson and Mattson (1985) elaborate it, positions take time and resources to develop and so does establishing, maintaining and developing relationships between firms. Firms invest a lot in marketing activities like advertisement, market research and surveys, product and service customization to build long lasting customer relationship and put themselves in a favorable position among their competitors. Similarly, firms and their suppliers invest a lot of time and money to build supply chains that are agile, adaptable, and aligned with each other’s interest in order to get sustainable competitive advantage (Lee, 2004). Therefore, the management of position, either by defending an existing position or developing that position through forming various relationships should be the focus of strategic action (McLoughlin & Horan, 2000). Putting in the context of disruptive innovations, the practice of position management, including forming new relationships, is deemed even more crucial as incumbent firms need to get new competences essential for realizing the potential brought by the innovation (Birkinshaw et al., 2007).

**Selecting new and right partners**

In spite of the practice of position management unarguably related to both combining the management of existing relationships with the establishment new ones, the main concern associated with position management for incumbent firms in the face of disruptive innovation should be about choosing new partners. Birkinshaw *et al.* (2007, p.69) emphasize the importance of moving beyond “existing, tried-and-tested relationships” if incumbent firms wish to “succeed in capturing value from the emerging opportunities in their industries”. The authors also mention that there are quite many researches whose focus has been on managing the existing network for building innovation system, rather than on creating a new network. With respect to forming new sets of relationships, they stress the need for firms to identify the right partners. This means that establishing relationships with new partners among various new ones is not sufficient to exploit the innovation, but more importantly is to find the right ones. In a similar vein, Dittrich *et al.* (2007, p.1507) contend that “it is not the number of alliances which matters but the nature of
alliance network which is most important”, meaning that with whom the firm partners and the type of partnership it has with them do matter. This line of argumentation stresses the importance of how incumbent firms can choose the right new partners and how they can balance the existing relationships with current partners and newly built partnership with new actors.

Trott (2012) describes partner selection as the first step of forming strategic alliance, which is actually also applicable to all other kinds of collaborative agreement. Gulati (1998), citing Kogut (1988), highlighted three main motivations for firms to establish partnerships: (i) transaction cost, (ii) enhancing competitive position or market power, and (iii) acquiring critical capabilities from counterparts. In the case of incumbent firms challenged by changes in the value network and their position within that network, the two latter seem to be the main motivation, especially at the emergence of the innovation. However, Gulati (1998) indicates that firms entering collaborative agreement face the risk of partners’ moral hazard due to their unpredictable and opportunistic behavior as well. As such, choosing the new and right partners who have capabilities essential for incumbent firms confronted by disruptive innovation to enhancing their position is of significant difficulty, but of definite importance.

Extant literature has been devoted much to specifying criteria for partner selection. Schilling (2008) categorizes those criteria into two dimensions: (i) resource fit which “refers to the degree of which potential partners have resources that can be effectively integrated into a strategy that creates value”; and (ii) strategic fit which “refers to the degree to which partners have compatible objectives and styles” (p. 168). Similarly, Gulati (1998) points out that organizations collaborate with those with whom they share the greatest strategic interdependence. In other words, partners are selected based on if they have the resources or capabilities valuable to, but not owned by the firms. Here the complementarity between resources of the firm and those of its partners (or the resource fit) is emphasized. Meanwhile, Birkinshaw et al. (2007) point out the difference in objectives of the firm and those of prospective partners is one of barriers that hinder the firms to find the relevant partners. It is here implied that objective alignment (or strategic fit) is necessary for two firms to establish collaboration.
Nevertheless, Dodourova (2003) stresses that technological change in an industry often questions the appropriateness of the resources which are being employed by the firm and the competitive strategy which are being pursued by the firm. This means that the firm may have to re-evaluate their resources and strategy in the context of changed industry conditions. Therefore, using the current state of the firm’s resources and strategy as the basis to assess the fit of prospective partners’ resources and strategies might be misleading. In a similar vein, Koka and Prescott (2008) indicate that, a new industry environment caused by the emergence of new technology might call for a new set of criteria for choosing partners and managing alliances. As such, the true challenges for incumbent firms in relation to position management are about re-evaluating, and if needed re-identifying and modifying, its resources and strategies which, in turn, become the basis for new partner selection.
CHAPTER 4. KODAK CASE STUDY DESCRIPTION

This case description will illustrate how an iconic photographic company which for decades held a near monopoly in the photographic industry was swamped by others firms and finally slid into bankruptcy. After the company’s market was disrupted by the digital technology, it struggled to survive through various turnaround and cost-cutting strategies. However, the company incurred loss for six consecutive years and run out of cash forcing it to put to market a large number of its patents to gain money. Its number of employees which had reached 120,400 in 1989 (Eastman Kodak Co., 1993) became as low as 17,100 in 2011 (Eastman Kodak Co., 2011). Unfortunately, Kodak’s debt of $6.8 billion was too high to be solved through the transformation strategies it pursued and eventually it filed for bankruptcy protection on January 19th 2012.

4.1. Kodak from 1880s to late 1970s

Eastman Kodak is a company with an interesting story to tell, a history which starts more than 130 years ago, all thanks to the young American amateur photographer from Rochester, New York named George Eastman. By 1879 Eastman patented in England an emulsion-coating machine for mass producing large dry plates (Gray, 1987), and in 1880 he began commercial production of dry plates in a rented loft of a building in Rochester, N.Y. On the very first day of the following year, Eastman and Henry A. Strong formed a partnership known as the Eastman Dry Plate Company. In 1892, the company name itself became Eastman Kodak Company of New York. Since then, Eastman is said to have played a key entrepreneurial role in fostering and exploiting the mass amateur market both in the United States and abroad (Jenkins, 1987).

4.1.1. Kodak – As a Disruptor of its time

In the 1880s Eastman has successfully developed the roll film as a flexible and rollable system as a substitute to the previously used glass plate which was instead heavy and breakable. However, it was not accepted by professional as well as amateur photographers because of the complication in processing such film and due to its low quality of negatives produced. Thus, Eastman reconceptualized and combined in a new way to use his assets and capabilities. The
idea was “If a camera could be produced that was both simple to operate and relatively inexpensive, the novice photographer could take his own pictures and let the Eastman Service department do all the complicated developing and printing for him” (Jenkins, 1975, p.112).

Consequently, the first fully portable KODAK camera was placed on the market in the year 1888, with the slogan, "You press the button - we do the rest." Following that, “Brownie” – a camera that Eastman introduced in 1900 for just $1 and that uses a film priced 15 cents a roll was what made the hobby of photography simple enough and within the financial reach to the masses. Hence, Eastman Kodak is said to have become a disruptor of Photography by transforming it “from a complex, alchemy like activity to a popular social practice that became part of everyday life for billions of people around the world” (Munir & Phillips, 2005, p.1672).

4.1.2. Kodak’s Strategy and Business Model

Since the very beginning, Kodak’s guiding principles established by Eastman were mass production at low cost, international distribution, extensive advertising and customer focus. According to Jenkins (1987), Eastman achieved a good balance between quality and cost by focusing his financial and human resources on an international mass market and large-scale production. Accordingly, Kodak’s business model was selling low margin cameras and profit from mass production of consumable products such as film and photographic paper, hence using the razor-blade strategy. In addition, as Kodak’s motto “You press the button we do the rest” indicates, “snapshots may be taken by Kodak camera, on Kodak film, developed by Kodak’s color print and processing Laboratories and printed on Kodak Photographic Paper” (Kadiyali, 1998, p.91) indicating its power in cameras, film and processing.

4.1.3. Invention of “Toaster-sized” Digital Camera in 1975

Most find it ironic that it was Steven J. Sasson, an Electrical Engineer working at Kodak itself who invented the digital camera in 1975\(^2\) which started the digital revolution of the photographic

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\(^2\) On December 25, 1978, Kodak is assigned Patent No. 4,131,919 for its Digital Camera with Mr. Steven J. Sasson and Gareth A. Lloyd registered as the inventors. [http://www.patft.uspto.gov](http://www.patft.uspto.gov)
industry and which is said to be one of the reasons to overthrow this giant company from its throne. The prototype that Sasson developed was the size of a toaster and captured black-and-white images at a resolution of 0.01 megapixels. As a permanent form of storage it used Digital cassette which took 23 seconds to record to the cassette which is made to hold 30 images.

In an interview given to The New York Times, Sasson described the management’s reaction to his new invention as follows:

“My prototype was big as a toaster, but the technical people loved it, ....but it was filmless photography, so management’s reaction was, ‘that’s cute — but don’t tell anyone about it’ ” (Deutsch, 2008)

As David A. Gloker, who also developed a coating process at Kodak notes, this kind of reaction from the management can be attributed to the fear of introducing technologies that would disrupt the film business. He also remarked that “there were excellent scientists and engineers at the bench level and through several layers of management who generated some of the world’s leading innovations. Kodak was never short on innovation... but there was a disconnect between the research labs and upper management”. (Knowledge@Wharton, 2012)

4.2. Late 1970s - 1993: Beginning of Competitive Challenges and Kodak’s Reorganization

Towards the end of the 1970s, Kodak started facing a series of strong challenges as competition from the Japanese camera industry like Sony and Fuji Photo Film Company started to confront it. According to Kadiyali (1998), Fuji started selling film in the USA in 1964 but decided to aggressively push into the US market after the photographic market in Japan reached maturity level in 1978. Grant (2010) also noted that Fuji’s combination of cost leadership, high quality and market aggressiveness forced Kodak to retaliate through price cuts and bigger advertising budgets. Still, data on market share during the 1970s and 80s show declining figures for Kodak while Fuji’s continuously increased. (See Fig.1)
Annual Film Market Shares

<table>
<thead>
<tr>
<th>Year</th>
<th>Kodak</th>
<th>Fuji</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>80.00</td>
<td>N.A</td>
</tr>
<tr>
<td>1978</td>
<td>79.92</td>
<td>3.65</td>
</tr>
<tr>
<td>1979</td>
<td>79.92</td>
<td>4.12</td>
</tr>
<tr>
<td>1980</td>
<td>79.57</td>
<td>5.60</td>
</tr>
<tr>
<td>1981</td>
<td>77.95</td>
<td>5.75</td>
</tr>
<tr>
<td>1982</td>
<td>74.42</td>
<td>6.27</td>
</tr>
<tr>
<td>1983</td>
<td>69.25</td>
<td>8.38</td>
</tr>
<tr>
<td>1984</td>
<td>66.17</td>
<td>9.87</td>
</tr>
<tr>
<td>1985</td>
<td>63.96</td>
<td>11.48</td>
</tr>
<tr>
<td>1986</td>
<td>62.33</td>
<td>13.80</td>
</tr>
<tr>
<td>1987</td>
<td>63.57</td>
<td>16.36</td>
</tr>
<tr>
<td>1988</td>
<td>66.46</td>
<td>17.21</td>
</tr>
<tr>
<td>1989</td>
<td>65.14</td>
<td>17.33</td>
</tr>
<tr>
<td>1990</td>
<td>62.93</td>
<td>17.37</td>
</tr>
</tbody>
</table>

Figure 1. Kodak vs Fuji Annual Market Share
Source: Kadiyali (1998)

To respond to these challenges, Kodak under leadership of Colby Chandler and Kay Whitmore was forced to undertake major restructuring and series of diversification initiatives which unfortunately were followed by thousands of layoffs as well (Grant, 2010). The recognition that Kodak could not stick much longer to its camera and film business resulted in a series of diversification initiatives between 1983 and 1993, the two main ones being investments in digital imaging and data storage products and life sciences. This involved quite a number of acquisitions and joint ventures in addition to further investment to introduce new products for scanning, electronic image capturing etc. In addition, 1990, Kodak announced its Photo CD system which allowed digitized photographic images to be stored on a compact disk which later could be viewed and manipulated on personal computers (PC). These moves show the expansion of the photography and imaging value network which included new competitors but also the need for new partners and cooperation. As Colby Chandler himself acknowledges in an article he wrote about the reorganization,

"Historically, Kodak's practice has been to "do everything itself" in bringing new products to market. Part of the emerging strategy is to access new technology through cooperative arrangements with other major companies". (Chandler, 1986, p.8)
4.3. The digital revolution in the photography industry

By the end of 2003, the sales of digital cameras started exceeding that of film-based cameras (Benner & Tripsas, 2010) and De Castella (2012) mentions that currently approximately 2.5 billion people in the world possess digital camera. However, it is not until in the beginning of the 21st century that the digital age of the photography industry started taking place. Instead, the seed of the digital revolution in photography industry must be traced back to the decade 1970s. This development of the digital photography ultimately reflects what Christensen (2006, p.50) says, disruptive innovation itself is “a process, not a cataclysmic event”.

4.3.1. Development of digital camera

The world’s first digital camera was invented in 1975, however, this 8-pound camera recording 0.01 megapixel black and white photo was just a prototype in the labs and has never been launched in the market. The first commercial filmless camera was Sony Mavica (Magnetic Video Camera) launched in the market in 1981, but was not an authentically digital camera in today’s sense, because images were stored on a floppy disk instead of film (Marple, 2008). In 1986, Kodak invented the world’s first megapixel electronic image sensor with 1.4 million pixels, allowing producing a 5x7 inch digital photo-quality print. This invention was then considered the base for development of new products for scanning and electronic image capture (Grant, 2010). The first complete consumer digital camera was marketed in 1991. However, the digital camera was only made available to wide range of consumers in 1994. During the 1990s, many incremental innovations in digital cameras were made and since 1997, it became hard to keep track of every innovation related to this product.

The development of the digital cameras brings many new players entering the photographic market from the consumer electrics field and the computing field, in addition to those transforming from the film-based era (Benner & Tripsas, 2010). Such development also has the impact of replacing analog cameras. By the end of 2008, analog cameras accounted for only 0.7% of worldwide sales volume of photographic products (including single-use, digital and analog cameras) (Datamonitor, 2009). Since mid-2000s, several camera and film manufacturers
claimed to stop making analog camera and film in order to focus their efforts in digital camera business (BBC 2006, BBC 2008, Musgrove 2006).

4.3.2. Development of related products and services

Reviewing the digital revolution in the photography industry cannot, by any means, ignore the development of other related products and services which gives rise to the development of the digital camera so that it could gain the current degree of sophistication and popularity.

The improvement of the removable memory card during recent 20 years played a significant role in supporting the development of the digital camera in terms of the increasing high resolution. Therefore, the activity of taking pictures has become very easy at almost no extra cost for any additional snapshot.

The popularity of the digital camera has been also supported by the development of complement products and services which enable people to enjoy photographic activities much more independently from the retailers than they used to do in the film-based era. First to mention is the arrival of the software for editing digital images in 1990 which now has become widely available, ranging from basic to professional programs (Consumerresearch, 2010). Moreover, the introduction and improvement in the quality of inkjet and laser printers done by printer manufacturers make high-quality prints of digital images on standard office paper possible. Therefore, the home printing of digital images on coated paper is enabled much easier and the need of printing photos on photographic paper in drugstores becomes trivial for most photographers. Finally, it is important to mention the emergence and development of online photo sharing websites since 1999 (Kissmetrics, n.d.) where people can share their digital images to others without costly sending the printed photo. Now sharing pictures on-lines has become the norm.


Kodak started explicitly involving in the digital technology since 1993 with the recruitment of George Fisher as the Chief Executive Officer (CEO) and the Chairman. He claimed to bring Kodak into focus with regard to Kodak’s traditional imaging business after a period of too many
diversification initiatives led by his predecessors Colby Chandler and Kay Whitmore. Kodak’s digital imaging strategy under Fisher’s reign was maintained until 2003 (Grant, 2010).

4.4.1. A hybrid and incremental approach

In the context of the 1990s when digital technology in the photography industry was still in its emergence and development, Kodak chose an incremental and hybrid approach to the digital technology in order to transform the company gradually from its traditional film-based business to the new digital age. By the end of 2002, the sales of analog cameras and film still accounted for 64% of global photographic products by value (Datamonitor, 2003). It might be, hence, understandable why Kodak decided to pursue an incremental and hybrid (evolutionary), rather than revolutionary, approach.

This approach was focused on taking advantage of both the film-based technology’s high quality images (high resolution) and the digital technology’s image manipulation and transmission potential. Kodak introduced technologies that allowed their customers to digitize conventional printed pictures before those pictures can be edited and transmitted on-line. These include: (i) Kodak’s Picture Maker - a self-service kiosk for customers located in retail stores, (ii) Kodak I.Lab system – the infrastructure for photofinishers to digitize every film negative and eliminate common problems in consumer photos in order to offer consumer better quality printed photos; and (iii) Kodak’s Advanced Photo System (APS) which allows both chemical film images and electronic data to be stored on a single film. In addition to the objective of combing the strengths of both technologies, this approach was chosen in order continue exploiting the company’s wide network of retailers which was around 30,000 outlets by the end of 2002 and increased to around 55,000 worldwide in the beginning of 2004 (Grant, 2010).

During this period, Kodak also made various purely digital investments, including the digital cameras for consumer segment in the market, and other products/services related to digital imaging. The company marketed products for image storage such as Photo CD system and Picture CD system allowing storing digitized images on a compact disk, which can be viewed on the screen by a Photo CD player or by using PC with compatible software. Kodak also invested in printing-related products, including inkjet printers for consumer market segment, printer docks...
that allow consumers to print images directly from the digital camera (Eastman Kodak, a, n.d.) and a new photographic paper technology which emphasizes durability, sharpness, whiteness, brightness of print photos (Eastman Kodak, b, n.d.). Meanwhile, in activities of image downloading, organizing and editing, Kodak provided customers with the camera dock that allows transferring images from Kodak camera to a PC by just one touch of a button and the software to manipulate digital images. Besides, the company also positioned itself as a provider of online digital imaging service with Kodak’s Picture Network, Kodak’s You’ve Got Picture in order for customers to view, share, and order reprints pictures via the Internet. This service was further reinforces by Kodak’s acquisition of Ofoto, an online photo-sharing site, in 2001 (Grant, 2010).

Overall, the main theme of Kodak’s hybrid and incremental approach to digital technology is about providing customers simplicity in taking and doing anything else with pictures.

4.4.2. Partnership and acquisition

During the transition period, Kodak’s acquisition and partnerships strongly demonstrated its evolutionary approach to digital technology. Below, some partnerships and acquisitions related to digital and film-based imaging businesses are listed.

**Partnerships**

In 1991, Kodak with Canon, Nikon, Minolta, Fuji formed a Research and development joint venture to develop Advanced Photo System (Eastman Kodak, c, n.d.) which included a 24mm film that can store both chemical film images and data that can be downloaded electronically and a hybrid camera between film-based and digital systems. This system was then marketed by Kodak under the brand name Advantix in 1996.

In 1995, Kodak partnered with Microsoft, Hewlett-Packard, Live Picture to jointly develop FlashPix file format that allows the use of digital color image easier. This file format enables people to edit and transmit photos more quickly (Grant, 2010).

In 1998, Kodak partnered with AOL to launch You’ve Got Picture – an online service for uploading, sharing digital images and ordering prints. According to The New York Times
(1998), in the same year, a 3-year cross-licensing agreement with Intel Corp was made to update Kodak’s photofinishing labs with Intel equipment. As a result, the first tangible product out of the partnership was a Picture CD (a compact disk for pictures) which included digitized images from print photos and software for enhancing, cropping and e-mailing those images (Deutch, 1998).

In 1999, Kodak and Lexmark partnered to produce and introduce Kodak Personal Picture Maker for home printing of digital images. In 2000, a 3-year Phogenix joint venture with Hewlett-Packard was formed to develop digital inkjet photofinishing mini-labs for use at retail (HP, 2003).

In 2001, Kodak cooperated with Maytag Corporation to use the partner’s vending machines and the Internet to expand the number of locations where consumers could buy film and single-use cameras. In the same year, a cross-licensing agreement with Olympus to share digital camera technology and offer consumers better ways of storing and printing digital images (The New York Times, 2001) and a cross-licensing agreement with Sanyo to share digital camera technology were formed (Tomkins, 2001).

**Acquisitions**

In 1994, Kodak acquired Qualex, Inc., a provider of photo-finishing services, to develop online photofinishing service. In 1998, Kodak acquired Picture Vision, Inc., a provider of PhotoNet online digital and imaging services and retail solutions, to develop online services for uploading, sharing digital images and order prints. In 2001, the acquisition of Ofoto, an online photo-sharing service, was made to develop online services for uploading, sharing digital images and order prints.

In 2003, Lucky Film Co., Ltd, the China’s biggest photographic film manufacturer was acquired with the aim of continuing to exploit film-based photography business in emerging market (Lucas & Goh, 2009). In the same year, two other acquisitions were done, namely the acquisition of Laser-Pacific Media Corp – the provider of post-production services for filmmakers – to strengthen film-based photography business and the acquisition of Applied Science Fiction – the
provider of Digital PIC rapid film processing technology which helps convert image stored in film into digital format and fastening process of printing photo from film (The Big Picture, 2003).

4.5. **Kodak’s Digital Transformation Strategy in 2004**

Once Kodak realized that the world of photography is changing to digital and after seeing that its consumer film business was disappearing each year by 25% (Henry, 2005), the company decided to lay out a complete digital transformation strategy to take place between the year 2004 and 2007.

In its Annual Report of 2004, Kodak announced that in the first full year of its digital transformation strategy, it came out of the gate at a full gallop and that the new strategy was right on track (Eastman Kodak Co., 2004). In the same report, Kodak indicated that the strategy has required them to make a number of portfolio and operational changes including further acquisitions and integration with other companies and technologies and at the same time to exit some major existing businesses. Perhaps the important one in photography is said to be in January 2004, when the company announced that it would stop making traditional film cameras (APS) for the American and European market.

> “the move marks a milestone in the history of Kodak, which brought photography to the masses through a cheap, easy-to-use film cameras. It reflects a recent surge in demand for filmless digital cameras, which now outsell traditional models”. BBC (2004)

Since Kodak foresaw the end of its film profits, it tried to leverage its imaging and chemical technology by diversifying into other businesses such as medical diagnostics, copiers, and computer hardware. In addition to diversification, new relationships in the form of alliances and partnerships were found to be of paramount importance. As Grant (2010) pointed out, the traditional Kodak business which was based on vertical integration and self-sufficiency where it developed its own technology, produced its own products and supplied them through its own global network no longer work in the digital era. Hamm and Symonds (2006) of Business Week reported that, for 120 years Kodak had done everything for itself where at one time, it even
raised its own cattle and used the bones for making photographic gelatin. However, Kodak could no longer do everything alone as the rate of technological change was too rapid and also it lacked much of the expertise needed to build the digital imaging business.

One example of such partnership indicated in the 2005 Annual report is the collaborating on the next generation of mobile capture devices through a 10-year global product, cross-licensing and marketing alliance with Motorola (Eastman Kodak Co., 2005). This agreement was said to provide Kodak with an opportunity to sell image sensors to Motorola, and to link Motorola phone users with the Kodak Gallery and other Kodak services for storing and printing pictures. Kodak’s CEO Antonio Perez in an interview he gave to Newsweek acknowledged that

“They [camera phones] are the greatest opportunity we have today. We just initiated a 10-year relationship with Motorola to put our CMOS sensors into Motorola camera phones”. Brad (2006)

In addition, the acquisitions and some partnerships that Kodak undertook for the digitally oriented growth strategy seemed to mostly focus on strengthening its commercial printing and graphic communication business. In the following, some of the major acquisitions and partnerships related to consumer digital imaging during this transformation will be presented.

**Partnership**

In 2004, Kodak teamed up with IBM through a multi-year arrangement with the aim of development and manufacture of image sensors (CMOS) to power mass-market consumer products, such as digital still cameras and camera phones.

In the same year, Kodak and Lexar Media, Inc made a multi-year agreement in which Lexar Media would manufacture and distribute a full range of KODAK branded removable digital memory cards and Kodak contributes with its brand power and global distribution network. This then was extended by a five-year agreement signed in 2007.

In 2005, Kodak made a 10-year global product, cross-licensing and marketing alliance with Motorola to sell image sensors to Motorola, and to link Motorola phone users with the Kodak Gallery and other Kodak services for storing and printing.
In 2006, Kodak extended its partnership with Leica Camera AG to provide image sensors for Leica’s newest digital camera model LEICA M8. In the same year, Kodak entered a partnership with Martha Stewart Living Omnimedia, Inc., who works on designing unique lifestyle products like greeting cards, calendars, stickers, etc., in order to enable customers to upload their photo and then create personalized, high-quality greeting cards and photo gifts.

In 2007, Kodak and Sony signed a technology cross-license agreement that allowed each to access the other’s patent portfolio. A similar technology cross-license agreement was also made between Kodak and Sony Ericsson Mobile Communication AB.

**Acquisition**

In 2004, Kodak announced the acquisition of Chinon Industries, Inc (Japan), a digital camera manufacturer, with the aim of increasing its worldwide design and manufacturing capability for consumer digital cameras and accessories and enhancing its position in the Japanese as well as worldwide market.

In spite of all these efforts, in the year 2006, the digital camera, just like the PC, mobile phones, pocket calculators and DVD players was subject to intense competition as there were low entry barriers, falling prices and commoditization. Furthermore, as more and more people started to rely on their mobile phones for taking digital images, the market for digital cameras was speculated to decline even more. In fact, it was also in the year 2006 that Kodak announced that it would stop making digital cameras altogether and shift the manufacturing, including assembly, production and testing to Flextronics International. (The New York Times, 2006)

Although, during the year 2003-2007 Kodak was expected to undergo the digital transformation period and come out of it successfully, the year 2007 ended up being the last time that the company ever made profit (See Fig.3). During the same year Kodak attacked the high-cost of inkjet printing, introducing the revolutionary KODAK EASYSHARE All-In-One Printers by selling the ink at a price that Kodak says will allow consumers to cut the cost of printing supplies up to 50 percent, without compromising on quality or speed Holcomb (2007). For this new product and its different versions, Kodak applied a new concept than what is common in the
business, i.e. providing the printer at a relatively higher price than competitors but cutting the cost of inkjet cartridges as low as by half, which in essence is a reversal of the razor-blade business model.

However, Kodak was faced with high competition from veterans like HP and Canon, and at the same time suffering from the growing trend of people viewing photographic and other images by electronic display rather than printed form. Indeed, Mattioli et al. (2011) reported that by the year 2010 the company held only 3% of the all-in-one inkjet printer market world-wide showing a meager increase from the 1% market share in 2008. Furthermore, what the company originally forecasted about consumer printers reaching breakeven in 2010 was never reached and was later on pushed to 2011.

Perhaps, what marked end of Kodak’s film era was the decision in 2009 to discontinue the production of KODACHROME Color Film concluding its near 75-year run as a photography icon due to declining customer demand in the digital age. However, as Fig.2 shows, not only the traditional business but the total sales and profit of the company similarly continued to decline forcing the company to run out of cash. As a result, the company turned into raising money through licensing its accumulated portfolio of digital and other patents. Between 2008 and 2010 alone, Kodak has made $1.9 billion through cross-licensing agreements with leading technology companies including Nokia, Motorola, Sony, and Panasonic.

![Figure 2. Kodak’s Annual total Net Sales](source_image)
![Figure 3. Kodak’s Annual Net Profit/Loss](source_image)

Source: Consolidated from Annual Report 2004 - 2011
In August 2011, the company’s stock market reached as low as $1.77 and in order to raise even more money, the company started selling its vast portfolio of patents and non-core assets. Unfortunately, Kodak’s highly anticipated inkjet printing business and the digital camera business nor the income from sale of patents could not save it from failing miserably.


On January 19, 2012, Eastman Kodak Co, the photography icon filed for bankruptcy and according to a statement put in the company website, the reason the company filed for Chapter 11 is stated as:

“…to complete the company's transformation and emerge as a more competitive, sustainable enterprise, Kodak’s Board of Directors concluded that a court-supervised plan of reorganization would best protect the long-term business interests of the Company” Eastman Kodak (2012)
CHAPTER 5. ANALYSIS AND DISCUSSION

5.1. The digital camera as a disruptive innovation

The digital camera is considered as a good example of products embodied with disruptive technology though it does not fit perfectly Christensen’s (1997) conceptualized characteristics of a disruptive innovation, namely initially simpler, cheaper and inferior quality.

Since consumer digital cameras started appearing in the market in the early 1990s, they brought about different attributes that conventional camera which roll film did not have. In addition to the replacement of film with sensors and memory card, most compact digital cameras were more convenient and easier to use and smaller in size. However, as compared to the conventional film, digital cameras had initially a very low resolution and quality, consumed battery more quickly since they have to power the LCD and had slower shutter speed. Meanwhile, not all digital cameras were initially cheap. Nevertheless, as the competition grew and the technology advanced rapidly, these digital cameras became more and more refined with additional features at the same time the cost of cameras declined rapidly. Such significant improvement in quality and reduction in price made the digital camera widely accepted by both the most conscious professional photographers and hobbyists who initially have ignored early digital cameras. This wide acceptance, in turn, harmed severely the film-based business of conventional photographic companies.

To summarize, the digital camera technology has the effect of disrupting the market of film-based camera and roll film as a high end - encroachment (Schmidt & Druehl, 2008) and finally displacing that of products embodying film-based technology. Therefore, the digital camera is a perfect example of the disruptive innovation in this thesis’s theoretical sense as mentioned in Chapter 3.
5.2. **Digital technology and changes in value network**

Value network is simply viewed as the network of suppliers, complementors, competitors, other partners and customers. To its correct theoretical sense, it is conceptualized based on the rationale that a particular product is made of several components and then used in combination with other complements in order for end customers to get the full potential from that product. Therefore, a value network can be seen as comprised of different roles/functions which can be played by one single firm or different firms. This view is mentioned in Peppard and Rylander (2006, p.134) that the network should be seen as to “contain roles or functions as nodes not specific organization names”. This view has important implication that fully integrated (vertically and horizontally) firm still has its value network for its focal product even though it is in charge of producing all components and complements, and thus having no suppliers or complementors.

5.2.1. **Digital technology and changes in value network structure**

Departing from above mentioned view, in this analysis part, value network is seen as consisting of various activities that contribute to adding value (either sequentially or in parallel) to the innovating product. The obsolescence of any activity inherent in film-based photography technology and the emergence of new activities in the context of digital technology imply the changes in the focal firm’s partners (suppliers, complemetors and others).

![Figure 5. Value network of film-based photography technology](image)

*Source: Authors’ own elaboration*
Fig. 5 describes briefly the value network of film-based photography technology (silver-halide technology). This network of film-based camera embodies sequential activities of which the successive one is essential for the preceding one in order for photo-shooters to get the photo. Firstly, an image is captured by using a film-based camera (analog camera) filling with a roll of film. This film, then, is brought to photo-finishing labs at retailer outlets to be developed before the photo is printed. With this film-based technology, taking photo inevitably asks for the use of film and printing is the only way for photos taken to be viewed. Hence, consumables as film, photographic paper, ink are repeatedly consumed (not like one-time bought camera), being the main source of revenue and profit of this kind of photography technology.

*Figure 6. Value network of digital photography technology*

Source: Authors’ own elaboration
In Fig.6, the value network of digital photography technology is outlined. This network embodies many new activities which are not part of the film-based value network. In this network, more than one value chains are embedded, enabling value to be added into the preceding activity either sequentially or in parallel. With the digital technology, once the image is captured and/or digitized, several choices are available for photo-shooters: (i) to print; (ii) to download onto and then store in PC; (iii) to edit by using photo editing software and share/transmit via photo sharing websites. Now the printing is just one among several options for people to see the images captured. Even with this option, the digital technology is supported by the introduction and improvement of inkjet and laser printers to enable people to print their digital images at home on either photographic or plain paper with good image quality, thus to be independent from the retailers’ printing service.

These options reflect what Afuah and Bahram (1995) contend that the effect of an innovation is not limited to capabilities of only the innovating firm, but might be expanded to those of its existing suppliers, complementors and customers. In the digital era, the skills and assets of those manufacturing film and those providing the services of film developing and printing photo from film (retailers) were rendered either obsolete or almost unnecessary in the usage of the digital camera. Therefore, the digital technology has competence-destroying impact on those actors. Meanwhile, the technology is competence-enhancing to end customers because it causes no change in the way images are captured, while enabling customers to do more by their own with images captured at little cost.

The digital value network incorporates new players whose offerings support end users of digital camera to exploit new benefits brought by the digital technology, namely taking as many images as possible with almost no extra cost, manipulating and sharing/transmitting images much more easily. For instance, the value network of the digital camera consists of firms who provide removable memory cards used in the digital camera, those providing photo editing software, those offering virtual space on the Internet for storing, sharing and sending digital images and professional printer makers who provide home printers that can be used for printing digital images with good quality. This appearance of new actors in the value network reflects Madhavan
et al.’ (1998) research findings that the radical technology urges incumbent firms to form relationships with new partners to gain access to new set of resources. In other words, this observed phenomenon supports Christensen and Rosenbloom’s (1995) and Christensen’s (1997) indication of disruptive innovations requiring new value network.

In addition to new players entering the new value network by supplying new components or complements, the emergence of the digital technology in the photography industry also observes the entry of various firms producing the focal innovating product – the digital camera – from other industries (computer industry and consumer electronic industry). This supports what Utterback and Suarez’s (1993) claim that new technology brings with it many new entrants, either being start-ups or diversified firms.

In summary, the emergence of digital technology in photography industry has changed the structure of the value network by: (i) eliminating some players (those producing film) or rendering some players’ assets/capabilities obsolete or unnecessary (those providing photo-finishing services); (ii) involving new players (those providing new components, new complementary services/products and new competitors).

5.2.2. Digital technology and the change of Kodak’s position in the value network

According to Madhavan et al. (1998), a firm’s position in a network can be measured through its significance in the network (centrality) in terms of the role(s) it plays in the different value chains embedded in the value network.

In the film-based value network, Kodak positioned itself in each and every activity. Kodak was the manufacturer of analog cameras and roll film and had well-established relationships with a wide network of retailers distributing Kodak’s products (camera, film) and providing service of film development (using Kodak’s photo-finishing process and photographic paper). In the reign of silver-halide technology in the photographic industry, Kodak managed to gain dominance in all value chain activities. Therefore, referring to Madhavan et al. (1998), Kodak is said to have very strong position in this value network.
Madhavan et al. (1998) indicate that hitherto highly central firms in an industry are often not in the best position to benefit from the advent of industry event like disruptive innovations, thus becoming less powerful (at least at the emergence of the event) compared to their position before the occurrence of the event. The Kodak case at the emergence of the digital technology reflects those authors’ indication. As analyzed above, the significance of Kodak in the photography industry laid in the traditional value chain of image capturing – film development – photo printing. However, in the digital age, new value chains are incorporated into the value network, for instance: (1) image capturing – downloading onto and storing in PC – editing – printing; (ii) image capturing – downloading onto and storing in PC – editing – sharing/transmitting online – printing. In these new value chains, roll films are no longer needed, leading to the complete elimination of the film development activity, whereas the printing becomes optional (not necessary like before) and can be done by the users themselves (instead of depending on retailers). Moreover, the digital technology praises the benefit of photo manipulation and easy online sharing, making new value chains more favored by end users than the traditional value chain. It can be seen that Kodak, at the emergence of digital technology, did not have a foothold in new activities added to the value network of digital technology, while its strengths in silver-halide technology become much less important and less relevant (and hence so does Kodak’s position) in the new value network.

5.3. Inertial forces in Kodak at the Emergence of the digital technology

As mentioned in the Theoretical Framework section, Hedberg and Wolff (2003) discussed Organizational Inertia in terms of Insight and Action Inertia. The former is concerned with inertial forces that cause time lags in realizing changes happening in the environment and the implication of those changes while the latter is about the additional time lag between managerial insight and the implementation and results of actions taken. When we look at Kodak’s case, contrary to what many believe and claim, Kodak was not actually ignorant of the disruptive changes that digital technology was bringing to the photographic industry. This is reflected in the company’s pioneering move in providing the prototype of the first digital camera as well as many other digital technology related innovations.
Kodak was actually aware of the move towards the digital era and was also one of the first movers in putting to market such innovative products. One surprising fact is that Kodak had actually waited for about 20 years to commercialize its digital camera invention for the consumer market with the introduction of DC-40 and costing almost USD 1000. As the inventor Steven Sasson himself indicated, outside of the patent which was issued in 1978, Kodak made no public disclosure of his and the colleagues work until the year 2001. The question why Kodak shelved away this invention which later on ends up being a product to displace the film business does not seem to have an easy answer. In fact, in retrospect Kodak’s decision to focus on the film business rather than the newly emergent technology seems to a certain extent to be a rational decision. On the one hand, Kodak’s film market share by the year 1976 was a staggering 90% and controlled 85% of the camera sales in the United States and by 1981 its sales had reached USD 10 Billion from USD 1 Billion in 1962 (Gavetti et al., 2005). On the other hand, during that same period of time, Sasson’s invention was basically demonstrated to senior managers and other internal audiences as a “Film-less” photography which means there will be no need for film, film development and printing services at the normal retailer shops. This clearly indicates that it threatens to cannibalize the company’s highly lucrative film business and was a disruption to the successful razor-blade business model used by.

Hence, even though the new innovation did not come from an outside competitor, as discussed by Chen and Miller (1994) the “centrality” of the attack i.e. the extent to which the disruptive innovation threatens the firm’s major market, was considered so high that Kodak’s executives whose power was “centered on Kodak park’s massive film-making plant” (Gavetti et al., 2005, p.2) did not give a favorable reply to it. In addition, it is important to note that personal computers, various manipulating software and high broadband internet service which are now complements and an integral part of the digital imaging value network were not in the picture at that time making the potential of this product blurry.

In short, it can be argued that Kodak thanks to its innovative technical people was not a company which exhibited insight inertia in foreseeing the inevitable move towards digital technology, as the technology itself was also breeding and growing in its own research and development labs.
As mentioned in Chapter 3 however, such disruptive innovations rarely surface in a perfect and ready-to-use format which reflects what happened with Kodak’s first digital camera since what users can do with electronically taken pictures if they do not print it was not entirely clear yet. At that time, all the camera could do was show the electronically taken picture on a TV screen, which makes it hard to accept a filmless camera which provides TV screen as an output at a cost of the existing and much rewarding photo paper business. We can also assume that the technical people’s estimation of 20 years that would take the invention to reach customers may have furthermore pushed the senior management to be reluctant in aggressively pursuing with this innovation until the early and mid-1990s. Such time lags which are seen between the invention of a new technology with a new market opportunity and the company’s delay in that product’s commercialization reflects the existence of action inertia as discussed in Hedberg and Wolff (2003).

5.3.1. Mindset Barrier in Adopting the Disruptive Technology

One problem we can infer from Kodak’s slow moves was the assumption that the film business would continue to be profitable and people will always need it. The fact that they have controlled the entire value chain of the film and camera business for decades with no major threat from competitors and their ever-growing market share must have made them think of the new digital technology as something their technical people can keep on experimenting and put in the reserve for as long as they can. Contrary to Kodak’s belief, we can see that the problem surfaced as early as 1981 when Sony Corporation announced it would launch Mavica, a filmless electronic camera. Indeed, we can consider that it was a wakeup call for Kodak to actually accept the fact that the longevity of the photographic industry might be in danger.

Let us now see Kodak’s subsequent moves in adopting the digital technology. Similar to Charitou and Markides’s (2003) research mentioned in Chapter 3, Kodak’s decision at the beginning was to adopt the innovation by playing both games at once. When Kodak released the Photo CD system mentioned previously, Kodak was still thinking in terms of film as a product that still needs to exist and the digital technology was seen as something that acts as incremental innovation or facilitator to the existing film-based business. The photo CD was a blank CD
where users after taking a photo with film would still need to take it to a photo finisher and then instead of just printing the images as done before, they digitize and store it in this CD. This process still requires the use of film and the service of photofinisher service where Kodak plays the major role. Also, in 1994 the Picture Maker Kiosk was launched with the aim of editing and printing digital or digitized versions of conventional film photos which still focuses on the use of film and printing. Although Kodak could not be expected to completely give up its traditional silver-halide technology at that time, we can say that the hybrid strategy has made it to move to the digital half-heartedly and slowly with a deeply rooted belief that it would be “very hard to find anything (with profit margins) like color photography that is legal” (Gavetti et al., 2005).

Even going much ahead in the years, we can also consider the Kodak Easy Share Gallery system which was launched by the year 2001. This system comprised of Easyshare Digital cameras, softwares for manipulating the pictures, camera docks and special purpose printers and the online digital imaging service or website called the Kodak Gallery. This system reflects Kodak’s strong belief in the need and the capacity to control the entire value network of the digital photograph technology just like in the silver halide technology. However, as discussed in Chapter 3, companies now exist in a business ecosystem where customers’ need and initiatives in innovation are satisfied through a combination of industry players, emphasizing the growing networked approach for value creation and capture.

Another example of Kodak’s interpretation of adopting the digital technology is can be seen in how it wanted to impose its strong resource and capability in the traditional film era into the new value network. One of Kodak’s strong assets has been its wide and global network of retailers for its photo processing finishing (developing and printing) service as well as its film cameras. These retailers were of course an indispensable part of the traditional film business value network where customers necessarily need them. As indicated in section 5.1.1 of the analysis however, the digital value network now incorporates many new activities which didn’t exist before and some of them could equally replace the services provided by the retailers in photo finishing service. Yet in the digital era, Kodak wanted customers to stay attached to its wide network of retailers with services like the Picture Maker, which is a self-service kiosk for
customers to edit and print scanned photos of traditional films as well as digital images. In fact, the previous CEO, George Fisher once pointed out that even in the digital era, “the wide spread photo retailing infrastructure will continue to be the principal avenue by which people obtain their pictures” (Grant, 2010, p.2).

We must acknowledge that the photo kiosks are still one way of obtaining the output, but were they and did they continue to be the “principal” avenue? Not really. The digital camera itself has become an electronic commodity that we can buy it even from supermarkets while the photofinishing process can also be easily done by customers themselves at home. This indicates that while Kodak was embracing the new digital technology, it was also still engraved with the assumption that its strong capability and control in terms of distribution and retailer network will still continue to be a valuable competitive advantage. However, in this context the new disruptive innovation has created a new value network where technology-empowered customers have become the company’s own competitors.

From the above discussions we can draw the following conclusions. Kodak is a company which since its foundation has continually built layers of routines, organizational culture and mental models which are shared by many of its employees. Schein (2004) argues that culture is created by shared experience, but it is the founders as leaders who initiate this process by imposing their beliefs, values, and assumptions at the outset. George Eastman’s strong desire and dedication was to make photography “as easy as a pencil” and hence accessible to all through his early inventions. His slogan “You press the button, we do the rest” implied making picture taking easier and convenient without letting users worry about the rest of the process. His customer-oriented problem solving processes were indeed required and indispensable at that time requiring customers to leave “the rest” to Kodak. However, even in the digital era, we can see that these views were still engrained in Kodak’s culture and reflected in its strategy as discussed above. On the contrary, in the new value network, Kodak does not necessarily have to play every role as customers themselves or other players can do “the rest”.

In addition, it is true that the company still has some customers who are film enthusiasts and hobbyists using film but most consumers now do not use it since they have the option of taking
unlimited number of pictures digitally almost at zero cost. The high-margin and lucrative film and photo printing paper business which has made Kodak almost a monopolist in the industry has also made it fixated in being product and consumable-oriented company. However, when core assumptions (like what customers need) built throughout many years and strengthened by previous success formulas are not revised and scrutinized during a changing environment, they inhibit “correct interpretation and unlearning” which are key barriers to disruptive innovation. (Assinik, 2006, p.222)

5.4. **Kodak’s efforts to re-position itself in the digital era**

Facing the disruption caused by the digital technology, Kodak tried to re-position itself in the new era through forming new partnerships and making new acquisitions. With these initiatives, the company expected to recover the dominant position what it used to occupy in the film-based era. However, the way Kodak re-configured its network of business relationships reveals its deep embeddedness in the film-based value network which is believed to be the manifestation of the above analyzed mindset barrier in adopting the digital technology of Kodak.

In this part, on the one hand, Kodak’s partnerships and acquisitions in each period will be categorized on the basis of their relevance to activities in the value network. On the other hand, the value network will be simply decomposed into two main parts: one which includes activities entailing the use of film and service of photo-finishing at retailer outlets (hereinafter called conventional value chain); and one which includes activities entailing no use of film (hereinafter called digital value chain). By doing so, we can see the degree of Kodak’s involvement in the digital technology over time and the role(s) (or activities) the company chose to play in the new value network.

**5.4.1. Main themes of Kodak’s partnerships and acquisitions**

During the transition period (1993 – 2003), Kodak made collaborations and acquisitions that support activities in both the conventional and digital value chains (see Fig.7). In the conventional value chain, the position of Kodak in each and every activity was further strengthened through the collaboration with and the acquisition of firms whose capabilities and
resources supplement those which Kodak already strongly developed in the reign of film-based technology. These newly formed partnerships and acquisitions aimed to either (i) facilitate the film production and distribution or (ii) improve the attractiveness of using film by shortening photo-finishing process and enabling the digitization ability of roll film.

Besides, several partnerships and acquisitions were also made related to activities in the digital value chain, showing Kodak’s efforts to engage itself in the digital technology. Although it seems Kodak positioned itself in each and every activity in this newly emerged value chain, its efforts was actually mostly focused on what Kodak used to be familiar with. Specifically, in the context of the digital technology where the printing is only optional (not necessary) for customers to see their photos, most of collaborations and acquisitions made by Kodak pertaining to the digital value chain aimed to persuade people to continue printing. New partners were selected on the basis of making either home printing or the printing service provided by retailers easier and more convenient for customers.
During the period since 2004, Kodak claimed it would implement the fully digital strategy. This was in part reflected in the fact that the company no longer made any partnerships and acquisitions related to the conventional value chain (see Fig.8). Instead, the company concentrated significantly on the partnerships and acquisitions which reinforce its roles as a
provider of components used to produce digital camera and a manufacturer of digital camera. The company also made another collaborative agreement of which the objective is to make the printing a tempting option for customers.

![Image capture flowchart](image.png)

**Figure 8.** Categorization of partnerships and acquisitions during the period 2004 – now along activities in the value network

*Source:* Authors’ own elaboration

To summarize, during the transition period, Kodak’s type of response to the emergence of the digital technology is to “adopt the innovation by playing both games at once” (Charitou & Markides, 2003, p.60). On the one hand, the company tried to make the traditional film-based business more attractive by investing more in it and utilizing the digital technology to add more value into it. On the other hand, the new technology was also invested in, but mostly in what the company used to be familiar with in the film-based era. This pattern of investment remained even in the next period starting 2004. Thus, Kodak has hardly been said to ever embrace the new technology completely in the sense that the company has invested in it with a new mindset different from the one the company had in the context of the film-based technology.
5.4.2. Kodak’s problems of re-positioning in the digital era

The imprint of the film-based value network in Kodak’s new network of partnerships

The way Kodak formed partnerships and made acquisition shows its mindset is stuck tightly to the value network in which the company managed to get a dominant position – the film-based value network. While the essence of the digital technology is the filmless need, Kodak actually made much of its investment in the film-related business. During the transition period (1993 – 2003), many of Kodak’s partnerships and acquisitions were made to incorporate strengths of the digital technology into the roll film with objective of making the roll film more attractive to customers. This imprint of film-based value network is also seen in Kodak’s efforts to form collaborations and make acquisitions regarding activities in the digital value chain. Comparing the film-based and the digital value networks, to some extent, the only possible similarity found is the activities of image capturing and photo printing (though the printing is only optional in the digital value network). And the partnerships and acquisitions Kodak made to embrace fully the digital technology were mainly focused on strengthening Kodak’s roles as the player doing these activities.

The imprint of the film-based value network in Kodak’s new network of partners proves the indication of a firm being constrained by its position in the existing value network to embrace the disruptive innovation mentioned in Christensen’s theory of disruptive innovation or in the Industrial Network approach. This constrain only allowed Kodak to look for new partners within the boundary of its existing, well-developed competences of which mostly are those already built in the film-based reign. Meanwhile, Dittrich et al. (2007) contend that looking for new partners in areas outside of the focal firm’s existing competences is important to bring out successful strategic change regarding a new innovation. Therefore, the evident imprint of the film-based value network in Kodak’s new network of partners in the digital era is believed to be one of the company’s problems in embracing the new technology.

Inappropriate criteria for selecting new partnerships and acquisitions

It can be evidently stated that most of the partnerships and acquisitions made by Kodak in the digital era were done on the basis of the criteria as resources fit and strategic fit (Schilling,
The resource base used to determine the degree of resource fit between Kodak’s resources and those of the prospective partners is Kodak’s well-developed capabilities and assets related to the film-based technology. Meanwhile, the strategy pursued by Kodak starting the year 1993, reflected through the type of firms Kodak collaborated with and acquired, was the one of making profit from consumables like film and printing service. However, the digital technology eliminates the need for roll film and makes the printing trivial. In such a context, Kodak’s competences regarding film-based technology becomes much less relevant and its strategy of making profit from consumables become much less appropriate to exploit effectively the new technology. Therefore, the current state of Kodak’s well-developed resources and tried-and-tested strategy in the film-based era became misleading basis for the company on which it selected new partners to explore and exploit the digital technology. Clearly, what Kodak did is exactly contrary to the right course of action in the context of changed industry condition caused by the disruptive innovations implied by Dodourova (2003) and Koka and Prescott (2008), that is, re-evaluating the appropriateness of existing resources and strategy to establish a new and suitable set of criteria for partner selection. It was, hence, problematic for Kodak to embrace successfully the digital technology.

**Unchanged role in the value network from the film-based to the digital era**

The imprint of film-based value network in Kodak’s new network of partners and its criteria for partner selections are ultimately the reflection of the unchanged role chosen to play by the company in both the film-based and the digital value networks. In the reign of the film-based technology, profit mainly came from the consumables (not from the analog camera). Therefore, Kodak acted as a system integrator by positioning itself in all activities in the value network, which helps simplify the process of taking photo. This simplification aimed at persuading people to keep taking and printing photos, and hence ensured Kodak’s main profit base from the consumables like roll film, photographic paper and ink.

In the digital era, Kodak had not changed its role as a system integrator by spreading its investment in everything (from the digital camera, to photo editing software, online service for sharing images and printing business). The rationale for Kodak to do so is that the company still
kept in mind that the simplification would encourage people to continue taking and printing their photo. Therefore, the investments in digital camera (and its main components) manufacture, software and online service were made as the facilitator of the printing business which were still expected by Kodak to be the main source of its profit. However, the digital technology makes the printing trivial for end users, thus those investments made to be the facilitator of the printing business could not be explored and exploited effectively by Kodak to their fullest potential. To some extent, it can be said that Kodak somehow tried to go further than what it used to be familiar with, but did not go far enough.

To conclude, Kodak’s root problem in re-positioning itself in the digital era through forming new partnerships and making new acquisitions lies in the unchanged role played by the company over time despite the change in the industrial competitive environment. Therefore, we believe that successful position in the new value network caused by the disruptive innovation needs to be done on the basis of the appropriate role selection.

5.5. Proposed solutions

As mentioned in the Chapter 3, challenges related to the changes in the value network caused by the disruptive innovation include the change recognition (insight inertia), the initiation of response to change (action inertia) and the firm’s re-positioning in the new value network through selecting new and the right partners. In Chapter 3, the existing literature directly aiming at counteracting organizational inertia and selecting partners is also criticized as showing some drawbacks when being applied to the context of incumbent firms facing disruptive innovation. Therefore, in this part, solutions are proposed for the incumbent firms to recognize and manage changes occurring in the value network in the face of disruptive innovation to exploit those innovations effectively.

These solutions are proposed based on the drawn insight from the root causes of Kodak’s problems in the digital era, combined with further development from the synthesis of theoretical framework of dynamic capabilities (Teece, 2007) and network value analysis (NVA) approach (Peppard & Rylander, 2006).
5.5.1. Overcoming insight inertia

Teece’s (2007) sensing capabilities entail how firms can recognize opportunities and threats from the changing environment, and thus are believed to be useful for the incumbent firms to recognize changes occurring in the value network in the face of disruptive innovations. In order to sense the changes, firms must constantly scan, search, learn and interpret across technologies and markets, both “local” and “distant”. These activities are interrelated in the sense that scanning and searching the external and internal environment constitutes the primary mode of organizational learning, while what is learnt or discovered must then be interpreted and given a meaning to serve as a ground for subsequent action.

Scanning and searching activities can be problem or opportunity driven, and need to be embedded as part of the organizational process and done on a constant basis in order to facilitate timely recognition of changes in the network. Moreover, these activities, in addition to being carried out in the external environment, need to be done even within the firm boundary because the event resulting in the changes in the value network might initially surface from within the organization itself as in the Kodak case.

Once such event is glimpsed it should be scrutinized and interpreted in terms of what it entails to the organization itself, and to others within the value network. This interpretation then has an implication on how the company will react and take subsequent actions. For example, at the emergence of the digital technology, Kodak interpretation of this discovery was as a “threat” which should be avoided as it could damage the profitability of the existing business and once the introduction of the technology became inevitable, Kodak’s interpretation of the new technology was as a “facilitator” that could be incorporated into the existing business of providing customers with film and film print.

In order to get the precise interpretation of the event as opportunity or threat, sensing should actually foster probing of what customers really want and even what their latent demand is instead of pushing products to them. Teece (2007) points out the importance of customers in perceiving the potential for application of new technology for unmet demand and further notes
the importance of broad external search and subsequent integration involving, other players in the value network. For this, we can mention how the Danish Toy manufacturer, LEGO uses insights from customers as an extension of its R&D to come up with new and innovative designs ideas. The company uses its online communities (Lego Club) to work with and get them involved in developing their product offerings and at the same time understand their needs more closely.

To summarize, sensing and scanning the environment should overcome narrow search horizon and being prisoners of the deeply ingrained assumptions and information filters (Teece, 2007) and hence should also understand latent as well as changing customer demand. If Kodak was not using its old and obsolete logic fixated on films and prints (consumables), it would have realized that in the digital world, what people wanted pictures for, where they want to view them, and how they want to view them has actually changed.

5.5.2. Overcoming Action Inertia and proper re-positioning

As previously discussed, Action inertia is said to exist when managerial response to environmental changes and decision making is too slow. This means that the next step after the opportunity or threat already sensed from the internal or external environment is to translate it into concrete and proper actions. Teece’s (2007) concept of seizing capabilities helps in such action initiation, usually in the form of the investment in and commercialization of new product, service or process.

Teece (2007) notes that how firms make decision on the investment in developing new product/service/process depends on the firm’s identity itself. Therefore, determining the firm’s appropriate identity in the new context caused by disruptive innovation is crucial before investment-related decision can be made. This argument sounds convincing when looking at the root cause of Kodak’s problem in re-positioning itself in the digital era, that is Kodak’s unchanged role (or identity) despite the significant changes in the industry condition.

The NVA approach, proposed by Peppard and Rylander (2006), though not pointing out concretely how a firm can choose its proper role in the value network, assists the incumbent
firms in getting a thorough understanding of the value network which, in turn, becomes the basis for their selection of appropriate roles. The approach provides a comprehensive overview of the value network in terms of where value lies in a network and how value is created through a five-step analysis. Those steps are: (i) Defining the network from the perspective of the network focal (say, the incumbent firm’s viewpoint); (ii) Identifying and defining network participants in terms of the role they play in the network; (iii) Defining each network member’s value perception; (iv) Identifying the value linkages among various participants; and (v) Analyzing scenarios in terms of effects on the network of discrete events. The first four steps can be done with the support from the scanning and searching activities. Meanwhile, the last step reflects the dynamic nature of the value network. By carrying out those steps, the incumbent firm can get insight in: (i) what roles (or what actors playing those roles) benefit most in the new value network; (ii) what role the incumbent firm can play best with respect to its current resources and capabilities.

The analysis of the whole value network becomes the ground on which the incumbent firm makes decision on what role(s) to play. Two indicators, proposed by the authors of this thesis based on the Kodak’s case, are: (i) the relevance of the firm’s current resources/capabilities in the context of the disruptive innovation (in other words, in the new value network); and (ii) the potential of a particular role in creating and capturing value from the innovation. If the firm’s current resources/capabilities can be still utilized in the new value network, then the firm can choose to continue the role it already played in the context of the previous technology. However, if the existing role cannot help the firm in a good position that is highly potential to create and capture value from the disruptive innovation, then a new role with higher potential of creating and capturing value should be chosen instead of the existing one. Looking at the Kodak case, it can be seen that the company decided to continue the role it already played well in the film-based era on the ground of its strengths in its existing competences and assets. However, what Kodak missed is the examination of the potential of its existing role in creating and capturing value in the digital value network. Therefore, instead of choosing a new role with higher benefit, sticking to the existing role caused Kodak’s serious problem in embracing effective the digital camera.
When a new role is chosen by the incumbent firm, the next step is to determine what are needed for playing the role and how the role is played. The former means the resources and competences needed for the firm to play the role it selected. Because new role means new resources and competences, the firm needs to make decision towards building and developing these internally or getting them from outside through collaborating with new partners and acquiring firms. The building and development of new resources and competences often takes time, whereas surviving disruptive innovations asks for quick response to changes occurring in the value network. Therefore, the option of finding new partners through collaboration and acquisition often makes more sense in short-term and in near future. However, when the firm decides to play a new role, that role needs to be considered as part of its long-term identity, meaning that the firm needs to really possess resources and capabilities itself. Therefore, in a long-term basis, those resources and capabilities which the firm gets access from its partners need to be integrated and internalized into its own stock of capabilities.

This notion is, to some extent, shared by Padula (2008) who states that collaborating with new partners in the area outside of the firm’s existing competences brings the potential of new knowledge generation and needs to be supported by a cohesive of well-connected partners around newly accessed competences in order to make such potential realized (or in other words, the firm’s own knowledge). Therefore, absorptive capabilities are required for the incumbent firm to internalize externally accessed competences to play its role effectively in long run. Again, here the Kodak case is utilized to examine this suggestion. Kodak’s problem in benefiting from its partnerships and acquisitions, according to FujiFilm’s President and CEO - Shigetaka Komori, is that the company ignored the development of in-house expertise necessary “to vet acquisition candidates well, to integrate the company it had purchased and to negotiate profitable partnerships” (The Economist, 2012). Thus, if Kodak had absorptive capabilities, it would not go to the bankruptcy situation as it does recently.

Finally, we would emphasize that all the process of recognizing changes and repositioning in the value network is not a one-time process, but instead a continuously implemented one due to the dynamic nature of the value network and the inherent characteristic of disruptive innovation as a
process, not a cataclysmic event. This emphasis is also supported by Hedberg et al’ (1976) argument that for organizations to function smoothly in a changing environment, they must cherish impermanence. And it is actually in line with Teece’s (2007) concept of reconfiguring/transforming capabilities related to enhancing, combining, and reshaping resource base in order to sustain profitability and firm’s position within the value network.

To conclude, the process needed for the incumbent firms to recognize and manage changes occurring in the value network in the face of disruptive innovation to exploit those innovations effectively proposed in this section will be combined into the following model.

Figure 9. Value Network Management Model
Source: Authors’ own work
CHAPTER 6. CONCLUSION

This research started with pointing out the popular phenomenon of the incumbent firms failing in the face of disruptive innovations and the problem of existing literature in helping them effectively handle those innovations from the value network perspective. Departing from this, a research question has been raised as following:

*How can the incumbent firms recognize and manage changes occurring in the value network in the face of disruptive innovations in order to exploit those innovations effectively?*

By looking through and then drawing insight from the case study of Eastman Kodak in the digital era, the findings about the root causes of the incumbent firms’ failure in the face of disruptive innovations from the value network perspective are figured out before the answer for the research question has been obtained.

6.1. **Answering the research question**

Looking from the value network perspective and deriving from the Kodak case study, it might be stated that the incumbent firms often fail to embrace effectively the disruptive innovations, first, due to their un-scrutinized and un-revised core assumptions about what customers really want and what customers can do in the arrival of those innovations. Besides, the unchanged role chosen to play by the incumbent firms over time in the value network also contributes to their failure by preventing the selection of new and right partners in order to re-position themselves effectively in the changed value network. Such non-changes in the core assumptions and the firms’ role, thus, inhibit the incumbent firms from recognizing timely and managing effectively changes occurring in the value network necessary for embracing successfully the disruptive innovations.

When the root causes of the incumbent firms’ failure in the face of disruptive innovations have been diagnosed, a Value Network Management model has been developed to help those firms
recognize and manage effectively changes in the value network in the arrival of those innovations. The model starts with suggesting the incumbent firms to constantly search and scan across technologies and markets (both in external environment and within the organizational boundary) to recognize and interpret precisely the arrival of a particular innovation as either an opportunity or a threat to the firms on the basis of understanding the customers’ latent demand. These activities of searching and scanning not only help overcome insight inertia, but also become the base upon which an analysis of the whole value network (called Network Value Analysis) is done to get an overview of where value lies and how value is created in the value network.

The outcome of this Network Value Analysis, subsequently, acts as the input for the next step of appropriate role selection which is carried out on the basis of two indicators: (i) the relevance of the firms’ current resources/capabilities in the context of the disruptive innovation (in other words, in the new value network) and (ii) the potential of a particular role in creating and capturing value from the innovation. When a particular role is chosen to ensure the firms to be in a good position to create and capture value from the focal innovation, new and right partners can be then selected after the determination of the resources and competences needed for playing the role. The model also emphasizes the importance of developing absorptive capabilities in order for the incumbent firms to internalize externally accessed competences, which is essential for them to play the chosen role effectively in long-run.

The process of scanning/searching, analyzing, role and partner selecting is described in the model as iterative, reflecting the inherently dynamic nature of the value network and the process-like (not event-like) feature of disruptive innovations. This iterative process means that the activities of scanning/searching and analyzing the network which will become the base for re-evaluating the current roles and existing partners need to be done in a continuous, instead of one-time, manner.
6.2.  **Suggestion for further research**

Departing from the initially acknowledged limitations of this research and throughout the process of conducting it, the authors of this thesis suggest some potential areas for further research as following:

- The model in this thesis has been proposed based on the findings drawn from a single case of an incumbent firm who failed when being confronted by the disruptive innovation. And as mentioned in Chapter 2, the problem regarding the generalizability of these findings is acknowledged by the authors of this thesis. Therefore, to validate the proposed Value Network Management model, we suggest conducting further research with the aim of testing the model in a larger sample of incumbent firms in different industrial, high-tech settings, including those who, indeed, have embraced successfully the disruptive innovations.

- The findings of this research can be the background for further research about how the incumbent firms can design a business model appropriate for commercializing disruptive innovations profitably as the value network is the context within which a business model for creating and capturing value is built (Shafer et al., 2005). Existing literature mentions implementing, adjusting and honing the business model to be crucial for superior long-term business performance of firms facing fast changing environment (e.g., Katkalo et al., 2002; Teece, 2007), and hence for that of the incumbent firms challenged by disruptive innovations. Nevertheless, the question of how the business model needs to be designed to fit the disruptive innovation has been still left unanswered. Therefore, we believe this kind of further research is worth conducting.
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